PROCEEDINGS

OF THE

GENERAL MEETINGS FOR SCIENTIFIC BUSINESS

OF THE

ZOOLOGICAL SOCIETY

OF LONDON

FOR THE YEAR

(1897.)

ZSL
BOOK NO.
020

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

LONDON:
MESSRS. LONGMANS, GREEN, AND CO.,
PATERNOSTER ROW.

D. Accno. 1747
dt. 16/05/02

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PROCEEDINGS

OF THE

GENERAL MEETINGS FOR SCIENTIFIC BUSINESS

OF THE

ZOOLOGICAL SOCIETY OF LONDON.

January 19, 1897.

Sir W. H. Flower, K.C.B., LL.D., F.R.S., President, in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of December 1896:—

The registered additions to the Society's Menagerie during the month of December 1896 were 177 in number. Of these 43 were acquired by presentation, 2 by purchase, 3 were born in the Gardens, 81 were received by exchange, and 48 on deposit. The total number of departures during the same period, by death and removals, was 109.

The Secretary exhibited a set of seven slightly enlarged photographs illustrating the mode in which the Rough-keeled Snake (*Dasypeltis scabra*) swallows an egg. These had been taken from a living specimen in the Society's Gardens (which had been received April 21st, 1894, and died October 4th, 1896), by Mr. R. F. Nesbit, by whom they had been presented to the Society. The specimen from which the photographs had been taken, measuring about 28 inches in length, was also exhibited.

The Secretary also placed upon the table a specimen of the

Cerastes Viper (*Cerastes cornutus*), which had lately died in the Menagerie, having been received in exchange from the Zoological Gardens, Gizeh, Egypt, on December 14th, 1896, and having died January 11th, 1897. This was the specimen which had been frequently alluded to in the daily journals as having been tampered with, by having had two spines, probably taken from a Hedgehog or some other spiny mammal, inserted on the top of the head behind the eyes. After death it was ascertained that one of these spines had been driven through the head into the mouth and had, no doubt, caused the death of the animal, from which the poison-fangs had been removed.



Myrmecophaga jubata, two days old.

Mr. Sclater exhibited a photograph of a young Ant-eater, born in the Zoological Garden of Herr Adolf Nill, at Stuttgardt (*cf.* P. Z. S. 1893, p. 613), when two days old. So far as he knew, this was the first instance of this animal having bred in captivity. The parents had been in Herr Nill's garden more than three years.

The following papers were read:—

1. On the Synonymy of the Butterflies of the Genus *Teracolus*. By Guy A. K. Marshall, F.Z.S., of Salisbury, Mashonaland.

[Received July 2, 1896.]

In view of the rapidly increasing recognition of the fact that many families of Butterflies exhibit very strongly-marked differences in their wet- and dry-season broods, it seems advisable that some attempt should be made to revise the nomenclature of these insects in the light of our wider knowledge. The phenomena of seasonal dimorphism are so varied and so inconstant that it is practically impossible at present to lay down any general rules for the determination of seasonal forms in Rhopalocera without making them so general as to be almost useless. Indeed, so susceptible are these insects to the influence of their environment, that some of the more widely ranging species exhibit different seasonal modifications in different localities.

This great complexity renders it extremely difficult for purely museum workers to accurately determine which characters are really specific and which are seasonal. For not only is it necessary to know the locality from which a given specimen may have come, but also some knowledge of the altitude and general conditions of the neighbourhood is requisite, and the climate is of even greater importance. The date of capture is again a detail of the highest significance when accompanied by a knowledge of the environment in which a species lives, but without this it is almost useless as a basis for argument, and is only apt to create confusion: moreover, an unusually wet or dry season may retard or accelerate the appearance of the various seasonal forms, so that without knowing the exact meteorological conditions of any given year the date of capture cannot be absolutely relied on, apart from the fact that the forms in many cases have a tendency to overlap. In this latter case the condition of the specimen when it is captured is often significant.

It will be therefore seen that the determination of species in genera which are known to be dimorphic must be based to some extent on the notes and observations of field-lepidopterists; and it is only for this reason that I have ventured to attempt a short revision of the nomenclature in so complicated a genus as *Teracolus*. I had at first intended dealing only with the African species occurring south of the Zambesi, almost all of which I have been able to observe in their natural haunts, but owing to the wide range of many of these Butterflies, and the close relationship and even actual identity of some of the African and Indian species, I have found it advisable to deal with the whole genus.

Apart from my field-observations during five years' residence in South Africa, I have had opportunities of investigating a very large

number of specimens of *Teracoli*, which I trust will minimise any probability of error in the conclusions at which I have arrived. Among the collections which I have seen I may mention those of Messrs. J. M. Hutchinson and C. N. Barker in Natal, that of the South-African Museum in Capetown, and those of Mr. Trimen and Miss E. M. Sharpe in London. To the latter lady I am further indebted for having kindly permitted me to examine several collections from Central East Africa which are in her charge, and notably the fine series of *Teracoli* collected by Mr. F. J. Jackson, which are of more than ordinary interest owing to the careful way in which the locality and date of nearly all the specimens are recorded, details which are painfully lacking in most collections. But this paper is chiefly based on the magnificent series of this genus contained in the British Museum, which possesses a very large number of type specimens, and I have to thank Mr. Butler for his courtesy in affording me every facility and assistance in his power.

With regard to the Asiatic species I have only seen those in the British Museum, which seem to thoroughly bear out the conclusions arrived at by Capt. E. Y. Watson in his most interesting paper on the Indian *Pierina* (Journ. Bomb. Soc. 1894), and these conclusions I have entirely adopted, as they are in complete accord with my experience in South Africa.

I have followed Mr. Butler and Mr. Trimen in including *Idmais* and *Callosune* in the genus *Teracolus*, for the species contained in the three genera are so closely connected as to render it impossible to draw any hard-and-fast line between them; and a multiplication of ill-defined genera appears to me to be in every way undesirable. As regards the arrangement of the species, the affinities of so large and varied a genus cannot be properly shown in linear form; and although the order which I have adopted may be open to objections, it gives a fair idea of the relationship of the species.

The genus *Teracolus* reaches its fullest development along the Eastern side of Africa, where all the largest and handsomest species are found; it ranges thence eastward through Arabia into N. India, in both of which areas it is fairly well represented, but becomes much scarcer in Central and South India, Ceylon being its southern limit. In Africa it ranges across the Continent to the West Coast in the South-Tropical and Extra-Tropical belts, and has been recorded along that side as far north as Senegal.

In this paper I provisionally recognize 72 species of *Teracolus*, of which 61 are Ethiopian and 19 Oriental, eight species being common to the two regions. Of these latter one species also occurs in the Palæarctic region, viz. *T. evagore*, Klug (= *nouna*, Luc.), which has been recorded from Algeria; and one of the Oriental species also occurs in the Northern region, viz. *T. faustus*, Ol., which ranges into Asia Minor. Of the African species, 55 occur on the mainland, one is peculiar to the island of Socotra (*T. niveus*, Butl.), and five to Madagascar, viz. *T. zoë*, Grand., *T. mananhari*, Ward, *T. guenei*, Mab., *T. siga*, Mab., and *T. evanthe*, Boisd. Of the 55 Continental species,

21 occur in the South-African subregion (the northern boundaries of which are the Zambesi R. and Cunene R. on the East and West Coast respectively) and 5 of them are restricted to it. In the Oriental region as many as 8 out of the 19 species are not found further east than Arabia.

In any attempt to differentiate the species of *Teracolus*, or indeed of any other genus of Butterflies, two important facts must always be kept in view: firstly, the strong tendency of these insects to develop more or less marked local variations consequent upon the different conditions of their environment in different localities; and secondly, the phenomenon of seasonal dimorphism, owing to which the same species may present a strikingly different appearance at different times of the year, more especially in those countries whose climate is marked by well-defined wet and dry seasons. In dealing with local variation the general rule that I have laid down for myself is, that when two local forms exhibit a gradual mergence into one another so that intergrades occur which might be attributed to either of them, then those two forms constitute a single species. As an example I may refer to *T. evagore*, Klug. This is a North-African form which is represented in the West and South by the very different looking *T. phlegetonia*, Boisd. But throughout Central Africa we get the admittedly variable form *T. minans*, Butl., which shows beautifully the gradual change from *T. phlegetonia* to *T. evagore*, and I have therefore grouped them together, regarding the latter as a dwarfed and under-coloured climatic variety of the former, to which it is closely linked by a number of other so-called species. On the other hand, in the island of Socotra there is *T. niveus*, Butl., which is in every way far more like *T. evagore* than is *T. phlegetonia*; but the slight characters which distinguish it are quite constant (it being confined to the island), and therefore I regard it as a distinct species.

With regard to seasonal dimorphism, without a certain amount of field experience it is usually difficult to decide what may be the dry-season form of any given wet-season specimen and *vice versâ*; but the following general rules may give some idea of the seasonal modifications in *Teracolus*.

The dry-season form usually differs from that of the wet-season in the following respects: (*a*) its smaller size; there are, however, several species, such as *T. faustus*, *calais*, and *protractus*, in which the dry form is not reduced; (*b*) when there is any difference in the shape of the fore wing, that of the dry form is always more acute; (*c*) the reduction or complete absence of many of the black markings: in groups like *T. achine* and *T. evagore* this is very noticeable, but apparently it does not hold good in *T. calais*, *protractus*, or *chrysonome* and their allies, for in them the upperside markings do not vary; (*d*) the colouring of the underside of hind wings, which is perhaps the most reliable character of all: the white or green undersides of the wet-season forms assume a yellowish, sandy, or pinkish tinge and become more or less irrorated with fuscous atoms; the colouring, however, is often very variable in the same species and is

probably largely influenced by the surroundings, such as soil, leaves, &c., in which the insect habitually rests.

In addition to these there are instances in which a species may show seasonal modifications peculiar to itself. For example, in *T. pleione*, Klug, the area of the discal yellow is reduced in the dry season, which, however, does not occur in its near allies. Again, *T. hetaera*, Gerst., exhibits a marked reduction of the crimson apical patch; whereas in the dry-season form of *T. regina*, Trim., the purple patch is, if anything, rather larger and brighter, owing to the reduction of its black borders.

With regard to the nomenclature adopted in this paper, my object has only been to give a more or less clear definition of the species which constitute the genus *Teracolus*, and I have not attempted in any way to apply a system of nomenclature to the variations, whether local or otherwise, to which these species may give rise. Besides, at the present time the classification of such variations is in a somewhat chaotic state, at least so far as exotic Lepidoptera are concerned, and the same form may be referred to by various authors either as a true species, subspecies, local race, climatic variation, variety, or seasonal form. This is, no doubt, due to the lack of any standard definition, so that each man is a law unto himself in the matter. However, there is no doubt that it will be necessary to apply names to a few of the more marked local forms, which I regard as incipient species; and in such cases the trinomial system of nomenclature seems to me to be the clearest and most satisfactory, as we thus keep in view the gradual evolution of the parent species. But at the same time I cannot inveigh too strongly against the idea that every slight deviation from the typical colouring of a species must be encumbered with a Latin name, which appears to me to be thoroughly pernicious, and stultifies the very object of nomenclature, which is to elucidate and not to confuse. This variety-mongering has reached such a pitch in Europe that even artificial varieties are adorned with "scientific" names, which has certainly not been done in the interests of science, but is due partly to a misguided ambition on the part of the gentlemen who coin the names, and partly to trade motives. With regard to the naming of seasonal forms, I can see no more necessity for it than for the naming of sexual forms; and a simple solution of the difficulty would be the adoption of three standard signs or letters, to signify wet, dry, and intermediate forms respectively, in the same way that signs are used to distinguish the sexes.

1. TERACOLUS SUBFASCIATUS.

Teracolus subfasciatus, Swainson, Zool. Ill., Ins. ii. pl. 115 (1823).

Ptychopteryx bohemani, Wallengren, K. Sv. Vet.-Akad. Handl.; Lep. Rhop. Caf. p. 18 (1857).

On the eastern side of South Africa this swift-flying *Teracolus*

seems restricted to the northern half of the Transvaal[1]; but on the west it has a more extensive range, occurring from the Orange River to Ovampoland. In the summer form the underside of hind wings is pure yellowish, but in the dry-season form it is thickly speckled with sandy hatching.

2. TERACOLUS ERIS.

Pontia eris, Klug, Symb. Phys., Ins. pl. vi. figs. 15 & 16 (1829).
Idmais fatma, Felder, Reis. Novara, Lep. p. 189, pl. xxv. fig. 3 (1865).
Teracolus abyssinicus, Butler, Ann. Mag. N. H. (4) xviii. p. 486 (1876).
Idmais maimuna, Kirby, Pr. Roy. Dubl. Soc. p. 46 (1880).
Teracolus johnstoni, Butler, Ent. Mo. Mag. xxiii. p. 29 (1886).
Teracolus opalinus, Butler, Ent. Mo. Mag. xxiii. p. 30 (1886).
Teracolus agoye ♀?, Butler, Proc. Zool. Soc. p. 572 (1894).

This wide-ranging and variable species has received many names, none of which seem worthy of specific distinction. *Idmais fatma*, Feld., is founded on a very lightly marked dry-season female from Kordofan; and a still lighter specimen was tentatively attributed to female *T. agoye*, Wallgr., by Butler. There are three specimens of *T. abyssinicus*, Butler, in the British Museum; they are clearly yellow females of *T. eris*, the type being rather more heavily marked than usual. *Idmais maimuna*, Kirby, is quite indistinguishable from *T. eris*; and *T. johnstoni*, Butl., is only the ordinary South-African dry-season form of the species. The type of *T. opalinus*, Butl., is an unusually large female from Delagoa Bay, in which the upper white spots in apical black patch are almost obsolete, but it is certainly nothing but *T. eris*. This species ranges practically throughout Africa, with the exception of the extreme S.W. and N.W., and even extends into Arabia.

3. TERACOLUS COLIAGENES.

Euchloë coliagenes, Butler, Ann. Mag. N. H. (3) xx. p. 216 (1867).

The single type in the British Museum is a yellow female from the White Nile, which seems to link *T. eris* to the *T. fausta* group.

4. TERACOLUS AGOYE.

Anthopsyche agoye, Wallengren, K. Sv. Vet.-Akad. Handl.; Lep. Rhop. Caf. p. 15 (1857).
Anthocharis cosphorus, Trimen, Trans. Ent. Soc. (3) i. p. 523 (1863).

This species seems to occur only in the strip of country lying between 20° and 26° S. lat., from Damaraland to the Eastern Transvaal. In the latter country I found it fairly plentiful within a limited area along the Olifants River in May 1893.

[1] Since writing this I have seen a male taken by Mr. R. Crawshay in Nyasaland, and a female taken by Dr. Ansorge in Uganda.

5. TERACOLUS BOWKERI.

Teracolus bowkeri, Trimen, Trans. Ent. Soc. p. 358 (1883).

The South-western representative of *T. agoye*, to which it is very nearly allied, but all the distinctions dwelt on by Mr. Trimen appear to be constant. According to him it does not occur north of 26° S. lat., being only recorded from Namaqualand, Griqualand West, and Basutoland.

6. TERACOLUS ZEPHYRUS, sp. nov.

Size and shape of *T. agoye*, Wallgr.

♂. *Upperside.—Fore wing* white, with a mere trace of black speckling at base, and a fine black line along costa as far as apical patch; the latter is of the same size and tint as in *T. agoye*, but the black border along its inner edge is much narrower and more clearly defined; along the inner side of this border is an ill-defined suffusion of sulphur-yellow. The patch is bordered outwardly by a narrow fuscous edging, which radiates slightly on nervules. *Hind wing* white, the only marking being a few black scales at base. *Underside* pure white throughout, without markings of any kind.

This interesting species is in some respects intermediate between *T. agoye* and *T. bowkeri*, but Mr. Trimen, to whom I have shown the type, agrees with me that it is quite distinct from either. It may at once be distinguished from *T. agoye* by the complete absence of black neuration or discal black clouding in fore wing, and by the presence of the black line along costa and the yellow on disc. The two latter points also distinguish it from *T. bowkeri*, from which it further differs in the colour of the apical patch and its inner black edging.

Founded on a single male collected by Dr. Donaldson Smith at "Selou," in Somaliland; this specimen is in Miss E. M. Sharpe's collection, who has attributed it to *T. agoye* in a paper now in the press (Proc. Zool. Soc. 1896, p. 535). Miss Sharpe tells me that Dr. Smith took three other specimens, which I have not seen.

7. TERACOLUS FAUSTUS.

Papilio fausta, Olivier, Voy. Emp. Othom., Atl. pl. 33. fig. 4 (1801).

Idmais faustina, Felder, Reise Novara, Lep. p. 190 (1865).

Teracolus solaris, Butler, Proc. Zool. Soc. p. 135 (1876).

Teracolus rosaceus, Butler, loc. cit. p. 134, pl. vii. fig. 6 (1876).

Teracolus oriens, Butler, loc. cit. p. 134, pl. vii. fig. 7 (1876).

Teracolus vi, Swinhoe, Proc. Zool. Soc. p. 437, pl. xxx. figs. 6 & 7 (1884).

This species varies somewhat in the development of the black markings, and has consequently been much split up, but a careful examination of the fine series in the British Museum has convinced me that the differences are worthless as specific characters. It inhabits N.W. India, from Disa to the foot of the Himalayas,

and further west it has been recorded from Afghanistan, Asia Minor, and the Sinai Peninsula.

8. TERACOLUS FULVIUS.

Idmais fulvia, Wallace, Trans. Ent. Soc. p. 392, pl. ix. fig. 5 (1867).

Teracolus tripuncta, Butler, Proc. Zool. Soc. p. 149, pl. xv. fig. 4 (1880).

Teracolus surya, Moore, Journ. As. Soc. Beng. lii. p. 45 (1885).

Teracolus palliseri, Butler, Ann. Mag. N. H. (6) i. p. 418 (1888).

This is the Southern representative of *T. faustus*, being recorded from Khandesh and Ganjam, on the west and east coast of India, and occurs from there southward to Ceylon.

9. TERACOLUS CALAIS.

Papilio calais, Cramer, Pap. Exot. iv. pl. 53. C & D (1782).

Pontia dynamene, Klug, Symb. Phys., Ins. pl. vi. figs 17 & 18 (1829).

Teracolus carnifer, Butl. Proc. Zool. Soc. p. 138, pl. vii. figs 8 & 9 (1876).

This is a wide-ranging but comparatively stable species. The only locality in Extra-Tropical South Africa from which it has been recorded is Delagoa Bay. From there it ranges north along the Eastern littoral (including Madagascar), but does not appear to become plentiful till near the Equator, whence it continues through Somaliland, Abyssinia, and Arabia, into North-western India; on the west side of Africa, it has been recorded from the Congo. It appears to me impossible to separate *T. dynamene*, Klug, from *T. calais*. The lighter-coloured typical form seems to predominate in Africa and *T. dynamene* in India, but the latter is also common in Equatorial East Africa. In Arabia both forms occur, and there is in the British Museum a female *T. calais* from Aden which is noted as having been taken *in copulâ* with a male *T. dynamene*. *T. carnifer*, Butler, from Karachi (November), is clearly a dry-season form of this species, the bright green of the underside being modified into a sandy pinkish. In January 1896 I took a white female of this species at Beira.

10. TERACOLUS AMATUS.

Papilio amata, Fabricius, Syst. Ent. p. 476 (1775).

Papilio cyprœa, Fabricius, Mant. Ins. ii. p. 22 (1787).

Teracolus modestus, Butler, Proc. Zool. Soc. p. 137 (1876).

Teracolus kennedii, Swinhoe, Proc. Zool. Soc. p. 440 (1884).

This species is nothing more than a local race of the preceding, but as the distinctions appear fairly constant and the two forms do not merge too much into one another, I prefer to keep them apart. *T. amatus* therefore represents *T. calais* in Central and Southern India and Ceylon. *T. kennedii* is identical with *T. amatus*; and I cannot accord specific rank to *T. modestus*, which is only a rather

more heavily marked variety of the same species, their identity being well shown in the British Museum series, which represents a gradual and unbroken gradation from one to the other. There are three specimens in the British Museum labelled *T. cypræa*; two of them are, in my opinion, *T. calais* and the third a white female of *T. amata*. Capt. Watson, following Mr. Butler's identification of the insect, considers *T. cypræa* to be a synonym of *T. calais*. Fabricius's descriptions are delightfully vague, but I prefer to follow Boisduval in believing that in *T. cypræa* he was describing the female of his *T. amata*.

11. Teracolus protractus.

Teracolus protractus, Butler, Proc. Zool. Soc. p. 137 (1876).

This handsome species is purely Asiatic, being recorded from Kutch, Punjab, and Baluchistan. As Capt. Watson has pointed out, the seasonal forms are well marked on the underside, but, curiously enough, they have never been separated like so many others.

12. Teracolus ocellatus.

Teracolus ocellatus, Butler, Proc. Zool. Soc. p. 767 (1885).

This species is of interest owing to the exactly intermediate position it occupies between *T. protractus* and *T. phisadia*. I have seen only two specimens—one is in Miss E. M. Sharpe's collection, and the type in the British Museum; they are both from Somaliland.

13. Teracolus phisadia.

Pieris phisadia, Godart, Ency. Méth. ix. p. 132 (1819).
Pontia arne, Klug, Symb. Phys., Ins. pl. viii. figs. 1–4 (1829).
Idmais philumene, Mabille, Compt. rend. Soc. Belg. p. 106 (1880).

In this species the male is quite stable, as is the case throughout this group, but the female is very variable, presenting four gradations: (1) like the male; (2) yellow, with base of primaries suffused with pink; (3) pure yellow; (4) white. The latter might easily be mistaken for the Indian *T. puellaris*, Butler, but may be distinguished by the curved macular discal stripe on underside of secondaries. This is the Western representative of *T. protractus*, occurring in Arabia, through Abyssinia to Senegal, but apparently not south of 10° N. lat. M. Mabille records it from Madagascar and India also; but this must be received with caution, for his idea of the species seems to be a little vague, as he refers to it as "a pretty species intermediate between *T. calais* and *T. dynamene*"!

14. Teracolus puellaris.

Teracolus puellaris, Butler, Proc. Zool. Soc. p. 136 (1876).
Teracolus ochreipennis, Butler, Proc. Zool. Soc. p. 136 (1876).
Teracolus rorus, Swinhoe, Proc. Zool. Soc. p. 438, pl. xxxix. fig. 8 (1884).

Occurs in N.W. India from Kutch to Punjab and does not seem

to come further west than Baluchistan. *T. puellaris*, with a green underside, is the wet-season form, and *T. ochreipennis* and *T. rorus*, with sandy-coloured undersides, represent the dry-season form.

15. TERACOLUS VESTALIS.

Teracolus vestalis, Butler, Proc. Zool. Soc. p. 135, pl. vii. fig. 10 (1876).

Teracolus intermissus, Butler, Proc. Zool. Soc. p. 152, pl. xxiv. fig. 4 (1883).

Teracolus dubius, Swinhoe, Proc. Zool. Soc. p. 439 (1884).

Teracolus peelus, Swinhoe, Proc. Zool. Soc. p. 439, pl. xxxix. fig. 9 (1884).

This species is very nearly allied to the last, and is perhaps doubtfully distinct. However, a few small distinctions appear to be constant: thus, *T. vestalis* is larger, with the black border on upperside of secondaries proportionately narrower; on the underside of primaries the lowest of the three black spots near posterior angle is small and well-defined, but in *T. puellaris* it is large and suffused along inner margin; lastly, the females of *T. vestalis* have a macular discal ray on the underside of secondaries, which appears to be absent in *T. puellaris*. With regard to the synonymy, *T. vestalis* and *dubius* are the same; *T. intermissus* is the dry-season form, and *T. peelus* is merely the yellow female of it. This species has much the same range as *T. puellaris*, but has been recorded a little further west, namely from Fao in the Persian Gulf.

16. TERACOLUS CASTALIS.

Idmais castalis, Staudinger, Exot. Schmett. p. 43, pl. xxiii. (1885).

The East-African representative of *T. vestalis*, Butl. It occurs in the country lying between Victoria Nyanza and the coast, and as far north as Somaliland.

17. TERACOLUS PRÆCLARUS.

Teracolus præclarus, Butler, Proc. Zool. Soc. p. 769, pl. xlvii. fig. 7 (1885).

A very distinct and handsome species, of which I have seen only the male and female types in the British Museum from Somaliland.

18. TERACOLUS CELIMENE.

Anthocharis celimene, Lucas, Rev. Zool. p. 426 (1852).

Anthopsyche pholoë, Wallengren, Wien. ent. Monatsch. iv. p. 35 (1860).

Anthocharis phœnon, Trimen, Trans. Ent. Soc. (3) i. p. 522 (1863).

Anthocharis amina, Hewitson, Exot. Butt. iii. *Anth.* pl. i. figs. 1–3 (1866).

From the descriptions given by Wallengren and Trimen, I have but little doubt that this must be the dry-season form of *T. celimene*, all the distinctions dwelt on by Trimen being quite in

accord with ordinary seasonal variation[1]. Its range is similar to that of several of the *Teracoli*; its stronghold is on the eastern side of Africa, where it occurs from Abyssinia as far south as the North-west Transvaal, but in the Southern Tropic it continues westward to Damaraland. It does not seem to be anywhere very plentiful.

19. Teracolus protomedia.

Pontia protomedia, Klug, Symb. Phys., Ins. pl. viii. figs. 13 & 14 (1829).

This handsome and distinct species seems to be wonderfully stable in its colouring. It ranges from Arabia, through Somaliland, Nubia, Dongola, and Equatorial East Africa to Madagascar.

20. Teracolus vesta.

Idmais vesta, Reiche, Fér. & Gal. Voy. Abys. pl. xxxi. figs. 7 & 8 (1849).

Teracolus amelia, Lucas, Rev. Zool. p. 437 (1852).

Teracolus velleda, Lucas, Rev. Zool. p. 428 (1852).

Teracolus mutans, Butler, Ann. Mag. N. H. (4) xix. p. 459 (1877).

Teracolus argillaceus, Butler, Ann. Mag. N. H. (4) xix. p. 459 (1877).

Teracolus haningtonii, Butler, Ann. Mag. N. H. (5) xii. p. 104 (1883).

Teracolus catachrysops, Butler, Ann. Mag. N. H. (6) ii. p. 178 (1888).

Teracolus rhodesinus, Butler, Proc. Zool. Soc. p. 663 (1893).

Teracolus bipartitus, Rothschild, Nov. Zool. p. 537 (1894).

Although this species is fairly stable in South Africa, it exhibits many variations in the Central North Tropical areas, but a careful examination of them shows that they merge so gradually into one another as to make it impossible to accord specific rank to any of them. *T. mutans* from Lake Nyasa and Njemps seems to me quite inseparable from *T. vesta*; and at the same time it varies so much in the direction of *T. catachrysops* (Central East Africa), that the female type of that form might equally well stand as *T. mutans*. Again, theseries in Mr. Jackson's collection from East Africa shows the impossibility of separating *T. haningtonii* from *T. catachrysops*; and the more extreme specimens of this latter form merge right into *T. amelia*, Luc., from Abyssinia and Senegal. *T. rhodesinus*, Butl., founded on a single male from Lake Mweru, combines the characters of *T. haningtonii* and *mutans*, and is probably an intermediate seasonal form. Judging from the description of *T. bipartitus*, Roths., I cannot distinguish it from a female of *T. haningtonii*, Butl., although the author associates it so closely with *T. celimene*, Luc. *T. argillaceus*, Butl., is the usual South-African dry-season form of the species.

Owing, therefore, to the intricate interrelation of all the above

[1] I have since seen the types of Mr. Trimen's *Anthocharis phœnon* (= *pholoë*, Wallgr.), and I am satisfied that they are dry specimens of *T. celimene*, with which opinion Mr. Trimen himself coincides.

forms, and to the fact that typical specimens occur throughout the eastern side of Africa, I think it advisable to regard them as merely synonyms of one variable species. *T. vesta* ranges practically through the whole of Tropical Africa, but south of the Tropics it does not occur westward of the Transvaal and Natal.

21. TERACOLUS ANSORGEI, sp. nov.

♂. *Upperside* bright ochreous with black markings. *Fore wing*: Pattern and colouring similar to that of *T. aurigineus*, Butl., except in the following points: (*a*) there is no trace of the whitish-grey patch at base, it being replaced by slight blackish clouding; (*b*) the discal zigzag black band is narrower and ends abruptly on inner nervure, instead of being continued to, and suffused along, inner margin. Neuration more finely black throughout. *Hind wing*: Ground-colour as in fore wing, base with very slight fuscous clouding, and a curved dentate band across disc of same colour as basal clouding, much lighter than same feature in *T. aurigineus*, and continuous, not macular; a broad black hind-marginal band, containing inter-nervular dots of ground-colour. Neuration black beyond middle only.

Underside. Pattern exactly like that of *T. vesta*, Reiche. *Fore wing*: Ground-colour somewhat lighter than above; discocellular spot distinct, smaller than above; zigzag discal band of upperside reproduced, but macular, being divided by nervules which are dark pink in colour, near costa the band assumes a brownish tinge; beyond this a row of yellow spots, large below first median nervule and of same colour as base, but above it they are smaller and of a pale yellow tint; beyond this a narrow curved brownish line, which is succeeded by a hind-marginal row of subquadrate pale yellow spots, which diminish towards posterior angle. *Hind wing*: Pale yellow, with basal half of costa and a ray along inner nervure ochreous yellow. A longitudinal ray from base in cell and a shorter one above it deep pink; an irregular transverse band of the same colour passing through the extremity of discoidal cell, then a band of ground-colour and a discal angulated brownish-pink band about middle of wing; then another broader band of yellow, divided into spots by the intersecting pink nervules; beyond this a narrow curved line of brownish pink, and finally a hind-marginal row of subquadrate spots of ground-colour. A thin black line runs along extreme hind margin of both wings, which is present in *T. vesta* but absent in *T. aurigineus*.

Female same as the male, but the colouring duller on both surfaces.

This is a most interesting species, combining as it does the upperside colouring of *T. aurigineus* with the underside colouring of *T. vesta*, being at the same time quite distinct from either species. From the former it may be at once distinguished by the complete absence, in the male, of the basal white patch in fore wing, and the great reduction of the black discal band in the hind wing, but the underside is hardly distinguishable from some specimens of the variable *T. vesta* (more particularly of the *T. mutans* form).

Founded on three males and one female (wet-season specimens) caught on January 5, 1894, at Parumbira in German East Africa, by Dr. Ansorge, to whom I have dedicated the species.

22. TERACOLUS AURIGINEUS.

Teracolus aurigineus, Butler, Ann. Mag. N. H. (5) xii. p. 103 (1883).

Teracolus venustus, Butler, Proc. Zool. Soc. p. 94 (1888).

This species occurs in Equatorial East Africa, being recorded from Wadelai southward to Lake Nyasa, appearing to be common wherever it occurs. *T. venustus*, Butl., from Kilimanjaro, is the dry-season form, being smaller and having the underside of a more pinkish tinge, but the colouring above is unchanged.

23. TERACOLUS DOUBLEDAYI.

Idmais doubledayi, Hoppfer, Peters, Reise Mossamb. p. 362 (1862).

Idmais chrysonome, Doubleday (*nec* Klug), Gen. D. Lep. pl. vii. fig. 5 (1847).

Idmais vesta, Trimen (*nec* Reiche), Rhop. Afr. Aust. p. 62 (1862).

Idmais hewitsoni, Kirby, Syn. Cat. Lep. p. 498 (1871).

This is the West-African representative of *T. vesta*, Reiche. The specimens in the British Museum are from Angola and the Congo.

24. TERACOLUS CHRYSONOME.

Pontia chrysonome, Klug, Symb. Phys., Ins. pl. vii. figs. 9–11 (1829).

Teracolus helvolus, Butler, Proc. Zool. Soc. p. 94 (1888).

T. chrysonome has not been recorded south of Kilimanjaro, occurring northward as far as Dongola and Somaliland. The smaller *T. helvolus* with its pinkish underside colouring represents the dry-season brood.

25. TERACOLUS GAUDENS.

Teracolus gaudens, Butler, Ann. Mag. N. H. (4) xviii. p. 486 (1876).

Teracolus arenicolens, Butler, Ent. Mo. Mag. p. 81 (1884).

Founded on a single male from Abyssinia. It differs from *T. chrysonome* in the reduction of the black discal ray in fore wing and its larger basal grey patch. A long series, however, would probably show them to be inseparable. *T. arenicolens*, founded on a single specimen from Arabia, is clearly the dry-season form.

26. TERACOLUS PLEIONE.

Pontia pleione, Klug, Symb. Phys., Ins. pl. viii. figs. 7 & 8 (1829).

Idmais miriam, Felder, Reise Nov., Lep. p. 190, pl. xxvii. figs. 3 & 4 (1865).

Teracolus chrysomela, Butler, Cist. Ent. p. 244 (1874).

Idmais eucheria, Mabille, Bull. Soc. Ent. Fr. p. 174 (1879); Grand. Hist. Madag. pl. 41. fig. 5 (1887).

There seems to be little doubt that *Idmais miriam*, Feld., is only the dry-season form of *T. pleione* (Kl.), having the black borders and discal yellow markings rather more reduced. *Idmais eucheria*, Mab., is unquestionably referable to this species. *T. pleione* is essentially an Arabian species, but there is one specimen in the British Museum from the White Nile. M. Mabille records it from Madagascar, whence he also records two other Arabian species, viz. *phisadia*, God., and *halimede*, Klug. If this be correct, it is a fact of the highest importance in geographical distribution, but the carelessness which is unfortunately so evident in much of M. Mabille's work prevents my accepting these records without further evidence.

27. TERACOLUS HELIOCAUSTUS.

Teracolus heliocaustus, Butl. Proc. Zool. Soc. p. 768, pl. xlvii. figs. 8 & 9 (1885).

This species is the Somali representative of the Arabian *T. pleione* and *T. halimede*. It resembles the latter in the distribution of yellow in both wings, but is nearer *T. pleione* in its size and in the absence of the grey at base of fore wings.

28. TERACOLUS VENOSUS.

Idmais venosa, Staudinger, Exot. Schm. p. 43, pl. xxiii. (1885).

This is a very distinct little species, being pure white above, with the ends of nervules and a narrow border black in primaries, and comes closest to the *T. halimede* group. As yet it has only been found on the east coast of Africa, close to the Equator.

29. TERACOLUS LEO.

Anthocharis leo, Butler, Ann. Mag. N. H. (3) xvi. p. 397 (1865).
Teracolus halimede, Butler (part.), Proc. Zool. Soc. p. 133 (1876).

This is the Central-African representative of the Arabian *T. halimede* (Kl.), from which it differs constantly in the restriction of the yellow patch in fore wing below 3rd median nervule. It appears to be fairly common in the country lying between Victoria Nyanza and the coast, and Butler's type specimen is from the White Nile[1]. The seasonal forms are well marked, the black borders being almost obsolete in the dry season and the underside of hind wings covered with grey freckling.

30. TERACOLUS HALIMEDE.

Pontia halimede, Klug, Symb. Phys., Ins. pl. vii. figs. 12–15 (1829).
Pontia acaste, Klug, ibid. pl. vii. figs. 16, 17 (1829).
Pieris polycaste, Boisduval, Sp. Gén. Lép. i. p. 525 (1836).

[1] Mrs. Lort Phillips captured a single male in Somaliland (*teste* E. M. Sharpe).

Teracolus cœlestis, Swinhoe, Proc. Zool. Soc. p. 435, pl. xxxix. figs. 1, 2 (1884).

Klug in describing his *Pontia acaste* says that it might prove to be only a white female of his *P. halimede*, and his conjecture is no doubt correct. I can also find no character which would entitle *T. cœlestis*, Swinh., to specific rank. This is a purely Arabian species. Butler records it from the White Nile (P. Z. S. 1876, p. 133), but the locality only applies to *T. leo*, Butl., which at that time he considered to be identical with *T. halimede*. I have already referred to the fact that M. Mabille records it from Madagascar.

31. Teracolus zoe.

Anthocharis zoë, Grandidier, Rev. Zool. p. 272 (1867), and Grand. Hist. Madag. pl. 40. figs. 3–5.

This handsome and curious species is peculiar to Madagascar, but presents affinities to several very distinct groups. The general character of the upperside markings brings it very close to *T. halimede*, but in its large purple apical patch it approaches *T. celimene*, Luc., and its rather distinctive underside markings closely resemble those of *T. mananhari*, Ward.

32. Teracolus mananhari.

Pieris mananhari, Ward, Ent. Mo. Mag. p. 224 (1870).
Anthocharis flavida, Mabille, Bull. Soc. Ent. Fr. p. 37 (1877).
Teracolus nothus, Mabille, Grand. Hist. Madag. p. 290, pl. xxxvi. *a*. figs. 2, 2 *a* (1886).

A very curious and somewhat isolated species peculiar to Madagascar. *Anthocharis flavida* is founded on smaller specimens in which the underside of secondaries is clouded with sandy or pinkish hatching, with a darker angulated ray on disc, and evidently represents the dry-season form. *T. nothus* is an intermediate seasonal form.

33. Teracolus elgonensis.

Teracolus elgonensis, E. M. Sharpe, Proc. Zool. Soc. p. 191, pl. xvi. fig. 6 (1891).

A most interesting and distinct little species, allied to *T. eunoma*, Hoppf., but readily distinguished by its much smaller size, its greenish-white ground-colour, and by the very different position of the three small crimson spots near apex. I have seen the unique type, a male, which is in the collection of Mr. F. J. Jackson, who captured it on Mt. Elgon, to the north of Victoria Nyanza.

34. Teracolus eunoma.

Pieris eunoma, Hoppfer, Bericht Ak. Berl. p. 640 (1855); and Reise Mossamb. pl. xxiii. figs. 1, 2 (1862).
Teracolus chromiferus, Rothschild, Nov. Zool. p. 538 (1894).

In spite of the larger size of *T. chromiferus* and its larger apical patch, which consists of four spots instead of two, I think Hewitson

was right in referring his specimen to *T. eunoma*, as the apical patch of the former is very variable, and two of the spots show a tendency to become obsolete; also the discal row of spots on underside of hind wing, which is absent in typical *T. eunoma*, is partially obsolete in two specimens of the *T. chromiferus* form that I have seen. Beyond the Hewitson male and that described by Mr. Rothschild I only know of four others, which were caught by myself at Beira, East Africa, in January 1896. One of these males was taken *in copulâ*, and the following is the description of the female:—

Upperside.—Yellowish white, with black spots and markings, without any coloured apical patch. *Fore wing*: Costa narrowly edged with fuscous. Terminal discocellular spot very large. Beyond middle a curved row of six large black spots, that on costa being larger than the rest. Black hind-marginal border fairly broad at apex, narrowing towards interior angle, radiating very broadly on nervules so as to give it a strongly dentate appearance; the radiations on third subcostal and upper radial nervules extended so as to just touch first and second spots of discal row. Base of wing very broadly clouded with fuscous, almost as in *T. annæ*, Wallgr. *Hind wing*: Basal fuscous suffusion much fainter and more restricted than in fore wing. Hind-marginal nervular spots very large and diffuse, produced somewhat on nervules inwardly.

Underside.—Fore wing: Apical patch pale yellowish. Discal row of spots as on upperside, but first spot divided into two discocellular spots as above; an ill-defined patch of fuscous clouding in the middle of the discoidal cell. *Hind wing*: As in male, but the ground-colour of a deeper, richer yellow, and the black spots of angulated discal row all strongly marked.

In Miss Sharpe's collection I found another female which is clearly attributable to this species, but differs from the foregoing specimen in having the hind-marginal border suffused so as to enclose the four upper black spots of discal row, leaving three small white spots in the black apical patch. I have also seen three similar females collected by Dr. Ansorge in East Africa. I have not yet seen a dry-season specimen of this species.

35. TERACOLUS HETÆRA.

Callosune hetæra, Gerstäcker, Arch. f. Nat. xxxvii. p. 357 (1871).
Teracolus puniceus, Butler, Proc. Zool. Soc. p. 72 (1888).
Teracolus foliaceus, Butler, ibid. p. 573, pl. xxxvi. fig. 7 (1894).

This species in its summer garb is distinguished from *T. eunoma* by its much larger crimson-lake apical patch, and the distinct fine black neuration on the upperside of both wings, the hind wings in *T. eunoma* having none at all. Moreover the underside of hind wing is only faintly tinged with yellowish, and bears a discal ray from costa similar to that in *T. jalone*, Butl.; whereas the same part in *T. eunoma* is always of a bright yellow colour, and presents an angulated discal row of spots exactly like that in the wet-season

form of *T. regina*, Trim. I have no doubt whatever that *T. puniceus*, Butl., is merely the dry-season form of this species, the size of the apical patch and the upperside black markings being somewhat reduced, and the underside of secondaries having a pinkish tinge with faint grey hatching and a distinct discal ray from costa. I cannot distinguish the single female on which Mr. Butler founded his *T. foliaceus* from the female of *T. hetæra*, of which I have seen a long series. As usual, the colouring of the female is highly variable, ranging from dull white, through opalescent or yellowish white to bright yellow; the black borders are very heavy and radiate somewhat on nervules in hind wings; there is no black bar on inner margin of fore wings, but strong basal grey clouding; the spots in apical black are small, white or yellowish in colour, and usually more or less suffused with crimson scales. At present *T. hetæra* has been recorded from the Sabaki R. and Victoria Nyanza on the south, northward to Wadelai and Somaliland.

36. Teracolus lorti.

Teracolus lorti, E. M. Sharpe, Proc. Zool. Soc. 1896, p. 527.

I have not been able to examine the types of this species, but judging from Miss Sharpe's description it is very nearly allied to the foregoing species, and is perhaps doubtfully distinct; but owing to the unusually large size of the apical patch and its combination with an essentially dry-season underside colouring, I feel constrained to keep it separate. The species was founded on a male and two females, captured in March 1895 by Mrs. Lort Phillips in the Goolis Mts., Somaliland, and it is worth noting that specimens of *T. hetæra* were caught at the same time.

37. Teracolus ione.

Pieris ione, Godart (*nec* Trim.), Enc. Méth. ix. p. 140 (1819).
Anthocharis ione, Boisduval, App. Voy. Deleg. Afr. Aust. p. 587 (1847).
Anthocharis erone, Angas, Kaf. Illust. pl. xxx. fig. 3 (1849).
Anthopsyche speciosa, Wallengren, K. Sv. Vet.-Akad. Handl.; Lep. Rhop. Caf. p. 16 (1857).
Euchloë jobina, Butler, Cist. Ent. i. p. 14 (1869).

As there appears to be some difference of opinion as to what is the true *Pieris ione* of Godart, I have taken some trouble to satisfy myself on the matter. Mr. Trimen considers that Godart was describing the form named *T. jalone* by Dr. Butler, whereas the latter gentleman places *T. speciosa*, Wallgr., as *T. ione*, which seems to be the more generally accepted view. A careful consideration of the original description and a good series of both species leads me to believe that the latter decision is nearer the truth. Godart's description does not exactly suit any specimen that I have seen, but if we are to be satisfied with the nearest we can get to it, *Anthopsyche speciosa*, Wallgr., has certainly the first claim. The most important point seems to be the underside colouring, which he

describes thus :—"below all four wings are white, with black marginal spots and the costa of hind wings orange at base." Mr. Trimen contends that as *T. speciosa* has the hind wings yellow below, it cannot be this species; but I have seen not a few specimens in which the yellow is reduced to but the faintest tinge, and which would thus very well suit the description; moreover the hind-marginal spots are a normal feature in *T. speciosa*, but whenever they occur in *T. jalone*, which is very seldom, they are always accompanied by strong black neuration and a distinct blackish discal ray from costa, to which striking features no reference is made by Godart. But Mr. Trimen's chief contention is that at the time when Godart described his insect there were no Europeans in Natal, which is the only locality where *T. speciosa* has been found at the present day. Godart gives no locality for his specimen; but this argument does not seem sufficiently cogent to induce me to apply his name to a species which clearly does not agree with his description, when we know of another species which suits it reasonably well [1].

T. ione, as here restricted, is a very local insect, being only known at present from the coast-belt of Natal, and is replaced a short distance inland by the wide-ranging and variable *T. phlegyas*, Butl. (=*jalone*, Butl.). *T. jobina*, Butl., is the dry-season form of *T. ione*,

[1] [The point here discussed cannot now be settled; only probabilities can be weighed, in conjunction with the comparison of an incomplete description with the known varieties of the two nearly related forms in question. Perhaps I may here quote what I published in 1889 (S. Afr. Butt. iii. p. 103):—"It is not practicable to determine with certainty the exact form of male upon which Godart (*loc. cit.*) founded his *Pieris ione*, his description being too brief and no locality being given; but as he describes the underside as white, and as it is improbable that he should have had before him in the year 1818 any of the more locally restricted Southern forms, I consider it judicious to regard as the typical *T. ione* the form [*ione* of Reiche and of Hopffer, *jalone* of Butler, &c.] I have above described, which has a very wide Tropical African range, extending northward to the White Nile on the east and to Senegal on the west." As regards Godart's description of the underside of the hind [illegible] it should be observed that his words are "avec *des points margina*[illegible]*res*," which means that those markings are very small and blackish [illegible] they are "black spots" as translated by Mr. Marshall. This is clear from Godart's describing, just before, the corresponding larger markings on the upperside of the hind wings as "une suite de *taches noires*." It would thus appear that in Godart's insect the underside marginal marks were mere blackish dots, and it is reasonable to suppose that the other blackish features—the discal ray and the neuration—were correspondingly reduced. I may note that in the Mozambique male figured by Hopffer (Peters' Reise Mossamb. t. xxi. figs. 1 & 2), although the discal ray is reduced to some very faint brownish traces and the black neuration is extremely fine, there are yet three diffuse blackish spots on the nervules along the upper half of the hind margin. As a fact, all the markings in question are highly variable; and it is not more remarkable that Godart should have omitted to mention the discal ray and neuration if he had a faintly-marked example before him, than it is—supposing, on the other hand, that his type was the Natalian form *T. speciosus*—that he fails to note the costal commencement of the discal ray, which in that form is always well-marked and the most conspicuous marking on the underside.

Godart gives no locality for his *Pieris ione*; but Boisduval—who states (Spéc. Gén., Pref. p. ix, 1836) that he had been able to verify a number of Godart's

38. TERACOLUS PHLEGYAS.

Anthocharis phlegyas, Butler, Proc. Zool. Soc. p. 431, pl. xxv. fig. 3 (1865).
Euchloë jalone, Butler, Cist. Ent. i. p. 14 (1869).
Teracolus burtoni, Butler, Proc. Zool. Soc. p. 130 (1876).
Teracolus imperator, Butler, Proc. Zool. Soc. p. 132 (1876).
Teracolus bacchus, Butler, Proc. Zool. Soc. p. 73 (1888).
Teracolus ione, Reiche, Fér. & Gal. Voy. Abyss. (1849); Felder, Reise Nov. (1865); Trimen, S. Afr. Butt. iii. p. 101 (1889).
Callosune mrogoroana, Vuillot, Bull. Soc. Ent. Fr. p. ci (1891).
Callosune jalone, var. *natalensis*, Staudinger, Exot. Schmet. p. 44 (1885).

The male type of this highly variable species is a dwarfed specimen from the White Nile, and its most distinctive character is that the underside of the hind wings is white with all the neuration finely blackened throughout. From Wadelai and Njemps I have seen very similarly marked specimens, which are, however, of much larger size, being quite equal to the *T. imperator* form. The only important difference between these examples and *T. bacchus*, Butl., which is recorded from Wadelai, Kandera, and the Sabaki Valley, is that the latter has the underside neuration very heavily blackened, which certainly gives it a very distinct appearance; but the development of the black on neuration is such an eminently unreliable character in this genus that I cannot consider it a good species. *T. mrogoroana* from Zanguebar is identical with *bacchus*, the differences referred to by M. Vuillot appearing to me to be absolutely trivial. *T. phlegyas* also varies in the opposite direction, namely in the gradual loss of the black neuration below until the underside of the hind wing becomes pure white without any markings whatever. Such specimens, however, seem to be rare, as there is nearly always some trace of the oblique dusky discal ray from costa, which is so characteristic of the group. It was on a dry-season specimen of this variety that Mr. Butler founded his *T. jalone*, which has the underside of secondaries of a pinkish tinge with a faint discal ray. This again merges gradually into *T. imperator* (Central East Africa) both in the development of the discal ray and in the tendency to assume a 6th spot in the purple

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descriptions by examination of the actual specimens from which they were made in the Paris Museum—gives Senegal only. As late as 1847 (App. Voy. Deleg. p. 587)—referring to the discovery of *T. ione* in Natal—Boisduval writes: "Avant ce voyage, cette espèce était fort rare dans les collections. Les quelques individus que l'on connaissait avaient été recueillis en Abyssinie ou au Sénégal." *T. speciosus* is by far the most strictly local of the known forms of purple-tipped *Teracoli*, and even in England does not seem to have been received before 1840; and it was not until 1857 that Wallengren described it as distinct from the recognized *T. ione*. On the whole I must still regard it as far more probable that in 1818 Godart had before him one of the widely-ranging tropical forms, and most likely a Senegal specimen, than that he should have been in possession of a form peculiar to the Natal coast, where even the pioneer European elephant-hunters and traders did not go till 1825.—R. TRIMEN.]

apical patch, which is generally present in that species, but is very variable in size and sometimes absent. *T. ione*, Trim. (part), and *T. jalone* var. *natalensis*, Staud., represent the Natal form of the species, which differs from *T. imperator* in its smaller size, the absence of the 6th spot in apical patch, and the rather stronger development of the inner black edging of the purple; but specimens from Mashunaland and the Transvaal show every intergrade between the two forms. In the quasi-tropical coast-belt of Natal another variation occurs, in which the purple patch is slightly reduced owing to the broadening of the inner black edging, and the ends of nervules on the underside of hind wings are strongly blackened, often terminating in spots on the hind margin. *T. buxtoni* is the normal dry-season form of the species in South Africa, the Central-African specimens being noticeably larger. Although the males of this species are so variable, the females are even worse and the variations are not so localized. Not only does the ground-colour vary from white to bright yellow, but even the discal black markings are apt to be very much reduced, and the apical patch may be either red or black; in the latter case it contains a row of small spots, which may be either white, yellow, or red. The tints of the underside also vary much, and there seems to be a sporadic tendency to blackening of nervules.

T. phlegyas ranges thoughout East Africa from Natal to Abyssinia, and in the Southern Tropic it extends westwards to Damaraland and Ovampoland.

39. TERACOLUS REGINA.

Anthocharis regina, Trimen, Trans. Ent. Soc. p. 520 (1863).

Callosune anax, H. G. Smith, Ann. Mag. N. H. (6) iii. p. 125 (1889).

Teracolus eliza, Sharpe, Ann. Mag. N. H. (6) v. p. 441 (1890).

This handsome species, which is wonderfully constant, has not quite such a wide range as *T. phlegyas*. On the eastern side its southern limit seems to be about 28° S. lat., and it has not been recorded north of Victoria Nyanza; from the Transvaal it ranges west through Bechuanaland to Damaraland. The species was founded on dry-season specimens; *T. anax*, with which *T. eliza* is identical, being the wet-season form.

40. TERACOLUS DUCISSA.

Ptychopteryx? ducissa, Dognin, Le Natural. p. 132 (1891).

Founded on a single specimen from Zanguebar, apparently the only one recorded. Judging by the description, this must be a very distinct species:—"Breadth 55 mm. Upperside white; apical third of fore wings orange-red, bordered exteriorly with brick-brown, the latter colour extending to inner angle. Underside of hind wings yellowish with reddish striolæ and traversed on disc by a straight, well-defined, reddish-yellow ray." The extension of the hind-marginal border in fore wing is noticeable. The

description comes nearer the dry-season females of *T. phlegyas* (=*buxtoni*), Butl., than anything else, but the complete absence of any black markings along the inner edge of apical patch would at once distinguish it.

41. TERACOLUS ANNÆ.

Thestias annæ, Wallengren, K. Sv. Vet.-Akad. Handl.; Lep. Rhop. Caf. p. 66 (1857).
Anthocharis danaë, Hewitson (*nec* Fabr.), Gen. Diurn. Lep. pl. vii. fig. 3 (1847); Trimen, Rhop. Afr. Austr. i. p. 44 (1862).
Teracolus cinerescens, Butler, Cist. Ent. i. p. 172 (1873).
Teracolus wallengrenii, Butler, Proc. Zool. Soc. p. 157 (1876).
Callosune confusa, Westwood, Oates' Matabeleland, p. 348 (1889).

This is the Southern representative of *T. eupompe* (Klug), inhabiting the eastern side of South Africa from Natal to Zambesi[1]. *T. cinerescens*, Butl., is quite inseparable from *T. annæ*; and there is nothing to distinguish *T. confusa* (Westw.) from *T. wallengrenii*, Butl., which is the dry-season form of the species.

42. TERACOLUS WALKERI.

Teracolus walkeri, Butler, Ann. Mag. N. H. (5) xiv. p. 403 (1884).

The West-African representative of *T. eupompe*, founded on a male and female from Elephant Bay, West Africa. Although from their underside colouring they are clearly dry-season specimens, the inner black edging of apical patch in the male and the basal black clouding in the female are proportionately heavier than in even the wet-season form of *T. annæ* (Wallgr.).

43. TERACOLUS DANAË.

Papilio danaë, Fabricius, Syst. Ent. p. 476 (1775).
Papilio eborea ♀, Cramer, Pap. Exot. iv. pl. 352. figs. E & F (*nec* C & D) (1782).
Teracolus sanguinalis, Butler, Proc. Zool. Soc. p. 158 (1876).
Teracolus taplini, Swinhoe, Proc. Zool. Soc. p. 444, pl. xl. figs. 8 & 9 (1884).

This is the representative of *T. eupompe* (Klug) in Central and Southern India and Ceylon, corresponding with *T. annæ* (Wallgr.) in S. Africa, to which it has a great resemblance. *T. sanguinalis* and *taplini* represent the dry-season form.

44. TERACOLUS EUPOMPE.

Pontia eupompe, Klug, Symb. Phys., Ins. pl. vi. figs. 11–14 (1829).
Anthopsyche theopompe, Felder, Reis. Nov., Lep. p. 183 (1865).
Anthopsyche anteupompe, Felder, Reis. Nov., Lep. p. 184 (1865).
Anthopsyche dedecora, Felder, ibid. p. 184 (1865).

[1] I have since seen a very large dry-season male, captured by Mr. Crawshay near L. Nyasa.

Teracolus pseudacaste, Butler, Proc. Zool. Soc. p. 156, pl. vi. fig. 11 (1876).

Teracolus dirus, Butler, ibid. p. 157, pl. vii. fig. 11 (1876).

Teracolus dulcis, Butler, ibid. p. 157, pl. vii. fig. 13 (1876).

Teracolus eborcoides, Butler, ibid. p. 158, pl. vii. fig. 12 (1876).

Teracolus phœnius, Butler, Ann. Mag. N. H. (4) xviii. p. 488 (1876).

Teracolus miles, Butler, ibid. (5) xii. p. 105 (1883).

Teracolus immaculatus, Swinhoe, Proc. Zool. Soc. p. 443 (1884).

Teracolus subroseus, Swinhoe, ibid. p. 443, pl. xl. figs. 6 & 7 (1884).

Callosune alberta, Swinhoe, Ann. Mag. N. H. (6) v. p. 356 (1890).

Teracolus hildebrandti ♀, Butler (*nec* Staud.), Proc. Zool. Soc. p. 735 (1895).

After a very careful examination of the fine series of this group in the British Museum, which contains practically all Butler's and Swinhoe's types, I find it impossible to regard any of the above mentioned forms as specifically distinct from *T. eupompe* (Klug). Capt. E. Y. Watson has shown that the Indian forms are inseparable, and he even sinks them all as synonymous with *T. danaë* (Fab.). He may be right in this latter course, but I hardly feel justified in following him at present; and I prefer to regard *T. eupompe* as a distinct, though highly variable species, which ranges from Central Africa through Arabia into N.W. India. The numerous species created by Felder, Swinhoe, and Butler are chiefly based on the relative development of all the black markings and the colour of the underside of secondaries; but as these are highly variable seasonal characters, it is clear that they are useless for differentiating species.

In *Anthopsyche anteupompe*, Feld., from Abyssinia, the White Nile, and Senegal, the black markings above are well developed, but the discal spots on underside of hind wings are obsolete; *T. immaculatus*, Swinh., from Fao and Karachi, is inseparable from this form. The underside spots show a gradually stronger development through typical *T. eupompe* (Klug) (=*dulcis*, Butl., from Karachi) and *T. pseudacaste*, Butl., from the White Nile, Wadelai, and Kilimanjaro (=*dirus*, Butl., and *eborcoides*, Butl., from Karachi), culminating in *T. phœnius*, Butl., and *T. miles*, Butl., which are recorded from Abyssinia southward to Kilimanjaro. Towards the arid deserts of Somaliland this species becomes dwarfed and under-coloured, and there we get the *Anthopsyche theopompe* and *dedecora* of Felder. *T. alberta* and *subroseus* are dry-season forms with pinkish undersides—the former being based on large fully developed examples, and the latter on more or less dwarfed specimens. The well-marked summer specimens show a tendency to the blackening of the nervules on the underside of hind wings: this is carried to a greater extent than usual in a black-and-white female in the British Museum, from Uganda, which has been erroneously attributed to *T. hildebrandti*, Staud., by Mr. Butler.

45. TERACOLUS HILDEBRANDTI.

Callosune hildebrandti, Staudinger, Exot. Schm. p. 44, pl. xxiii. (1886).

This striking species is very nearly allied to the southern *T. annæ* (Wallgr.), and had I seen only a single specimen I should have regarded it as a sport of that species. But, thanks to Miss E. M. Sharpe, I have been able to examine a fair series of both sexes, and I think there is little doubt that it is entitled to specific rank. In the male the only differences from *T. annæ* are (*a*) its distinctly larger size, (*b*) the curious ochreous-yellow colouring of the apical patch, and (*c*) the inner black edging of apical patch, which is narrow on costa and broadens to hind margin, whereas in *T. annæ* it is practically the same width throughout. The only constant distinction that I can find in the female is the complete absence of any grey clouding along inner margin of fore wings. At present *T. hildebrandti* has only been received from the basin of the Sabaki River, in East Africa, between 2° and 4° S. lat. At Hartley Hills, W. Mashunaland, I caught what at the time I took to be a sport of the dry-season form of *T. annæ* (=*wallengrenii*, Butl.), in which the apical patch was golden yellow; I am unable to refer to the specimen at present, but it may prove to be *hildebrandti*.

46. TERACOLUS GUENEI.

Anthocharis guenei, Mabille, Bull. Soc. Ent. Fr. p. 38 (1877), and Grand. Hist. Madag., Lép. i. p. 298, pl. xl. figs. 7–9 (1887).

The small size of the apical patch and its strong sinuation on the inner edge give this species almost the appearance of a dwarfed specimen of *T. theogone*, Boisd., on the upperside, but the discal spots below show its relationship to the *T. eupompe* group. The small variety mentioned by M. Mabille is clearly the dry-season form. It is peculiar to Madagascar.

47. TERACOLUS SIGA.

Anthocharis siga, Mabille, Le Naturaliste, p. 100 (1882), and Grand. Hist. Madag., Lép. i. pl. xli. fig. 4 (1887).

This species was founded by M. Mabille on a single male from Madagascar. From the figure it looks suspiciously like a dwarfed specimen of *T. guenei*, in which the underside markings have failed as happens in *T. eupompe*; but until further examples are forthcoming it is perhaps advisable to keep it separate.

48. TERACOLUS EULIMENE.

Pontia eulimene, Klug, Symb. Phys., Ins. pl. vii. figs. 5–8 (1829).

A most distinct species with no very near allies. Mr. Butler refers it to the genus *Ixias*, but it seems preferable to retain it as a *Teracolus*. Recorded from Dongola and the White Nile.

49. Teracolus ephyia.

Pontia ephyia, Klug, Symb. Phys., Ins. pl. vi. figs. 9 & 10 (1829).
Anthopsyche demagore, Felder, Reis. Nov., Lep. ii. p. 186 (1865).

The females associated with *T. ephyia* in the British Museum appear to me to be wrongly placed, as they are inseparable from those of the very different *T. microcale*, Butl. *T. demagore*, with its reduced black markings above and pinkish underside, I take to be the dry-season form of this species. Recorded from Dongola and Upper Egypt.

50. Teracolus liagore.

Pontia liagore, Klug, Symb. Phys., Ins. pl. vi. figs. 5–8 (1829).

This distinct little species, which belongs to the *T. evarne* group, seems to be decidedly scarce. Klug records a single male from Dongola, there is a male from Upper Egypt in the British Museum, and I have seen one other from Suakin.

51. Teracolus auxo.

Anthocaris auxo, Lucas, Rev. Zool. p. 422 (1852).
Anthocaris evarne, Boisduval (*nec* Klug), App. Voy. Deleg. p. 587 (1847).
Anthopsyche evarne, Wallengren, K. Sv. Vet.-Akad. Handl.; Lep. Rhop. Caf. p. 14 (1857).
Anthopsyche eucharis, ? var., Wallengren, ibid.; ibid. p. 15 (1857).
Anthopsyche topha, Wallengren, Wien. ent. Monats. p. 34 (1860).
Anthopsyche keiskamma, Trimen, Rhop. Afr. Aust. p. 56, pl. ii. figs. 2 & 3 (1866).
Teracolus syrtinus, Butler, Proc. Zool. Soc. p. 163 (1876).

T. auxo represents the wet-season form, and *T. topha* (=*keiskamma*) the dry. As Mr. Trimen has pointed out, the two types of *T. syrtinus*, Butl., from Lake Nyasa and Senegal, are inseparable from *T. auxo*; but the remaining specimens associated with them in the British Museum appear to me to be referable to the nearly allied *T. evarne* (Klug). The above specimens of *P. syrtinus* are the only examples of true *T. auxo* that I have seen from localities north of the Zambesi. To the south of that river it is plentiful in suitable spots throughout the eastern side of the continent.

52. Teracolus incretus.

Teracolus incretus, Butler, Ent. Mo. Mag. xviii. p. 146 (1881).
Callosune vulnerata, Staudinger, Exot. Schm. pl. xxiii. (1884).

This handsome species is the Central-African representative of *auxo*, and inhabits a broad belt of country lying between Mombasa and Victoria Nyanza. It has the bright yellow colouring of the Southern species, as opposed to the whiter tints of *T. evarne* (Klug); but differs in its much larger size and in the black markings on primaries, there being no sign of black on the inner edge of apical patch, and the hind marginal border being narrow, not extended to posterior angle nor dilated as in *T. auxo*. In the latter characters

it approaches nearer *T. evarne*. *T. vulnerata*, Staud., is clearly the dry-season form of the same species.

53. TERACOLUS EVARNE.

Pontia evarne, Klug, Symb. Phys., Ins. pl. vi. figs. 1–4 (1829).
Teracolus citreus, Butler, Proc. Zool. Soc. p. 162 (1876).
Teracolus xanthevarne, Butler, Proc. Zool. Soc. p. 163 (1876).
Teracolus philipsii, Butler, Proc. Zool. Soc. p. 772, pl. xlvii. fig. 11 (1885).

This is the northernmost African species in this group, being recorded from Upper Egypt, Abyssinia, and Somaliland, southward to Kilimanjaro. *T. xanthevarne* represents the fullest development of the wet-season form, and approaches *T. incretus*; typical *T. evarne* is a little less strongly marked; the specimens placed with *T. syrtinus* in the British Museum constitute an exactly intermediate seasonal form; and *T. citreus* is the full dry-season form. *T. philipsii* is founded on dwarfed specimens from the Somali deserts, and, as is always the case in such instances, it shows an unbroken gradation into the typical form.

Apart from other characters, *T. evarne* seems to differ constantly from *T. auxo* and *incretus* in the more rounded shape of the fore wings at all seasons of the year.

54. TERACOLUS EUCHARIS.

Papilio eucharis, Fabricius, Syst. Ent. p. 472 (1775).
Papilio aurora, Cramer, Pap. Exot. iv. pl. 299. figs. A & D (1782).
Papilio cæneos, Hübner, Verz. b. Schmett. p. 94 (1816).
Pieris titea, Godart, Enc. Méth. ix. p. 124 (1819).
Teracolus pseudevanthe, Butler, Proc. Zool. Soc. p. 164, pl. vii. fig. 16 (1876).
Teracolus pallens, Moore, Ann. Mag. N. H. (4) xx. p. 49 (1877).

T. pseudevanthe exhibits the strongly marked wet-season coloration; *T. aurora* and *titea* are intermediates; and *T. eucharis* and *pallens* are the dry-season form, the latter showing a very close relationship to *T. evarne* (Klug). This species frequents Central and Southern India and Ceylon.

55. TERACOLUS EVANTHE.

Anthocaris evanthe, Boisduval, Spec. Gén. Lép. i. p. 567 (1836).
Anthocaris ena, Mabille, Bull. Soc. Philom. p. 134 (1879), and Grand. Hist. Madag. pl. xl. fig. 6 (1887).

A curious species, linking the *T. evarne* and *evippe* groups; peculiar to Madagascar. *T. ena* does not seem to present any characters entitling it to specific rank.

56. TERACOLUS ETRIDA.

Anthocaris etrida, Boisduval, Sp. Gén. Lép. i. p. 576 (1836).
Teracolus limbatus, Butler, Proc. Zool. Soc. p. 161 (1867).
Teracolus farsinus, Butler, ibid. p. 159, pl. vii. fig. 1 (1876).

Teracolus pernotatus, Butler, ibid. p. 159, pl. vii. fig. 2 (1876).
Teracolus purus, Butler, ibid. p. 160, pl. vii. figs. 14 & 15 (1876).
Teracolus bimbura, Butler, ibid. p. 161, pl. vii. figs. 3 & 4 (1876).
Teracolus casimirus, Butler, ibid. p. 161 (1876).

Dr. Butler has here, as elsewhere, founded his many species on characters which are subject to seasonal variation, and they therefore merge imperceptibly into one another. The most heavily-marked form is *T. limbatus*, from Ceylon and Southern India, but the slightly broader border in secondaries is, in my opinion, much too unstable to be regarded as a specific distinction. *T. bimbura* represents the normal dry-season colouring. *T. etrida* is the Asiatic representative of *T. evippe*, and appears to range practically throughout India and Ceylon, and there is one specimen in the British Museum from Fao.

57. TERACOLUS EVIPPE.

Papilio evippe, Linnæus, Mus. Lud. Ulr. p. 239 (1764).
Papilio arethusa, Drury, Ill. Exot. Ent. ii. pl. 19. figs. 5 & 6 (1773).
Papilio eborea, Cramer, Pap. Exot. iv. pl. 352. figs. C & D [*nec* E & F] (1782).
Papilio hanna, Herbst, Naturs. Schmett. v. p. 177, pl. 107. figs. 5 & 6 (1792).
Pieris omphale, Godart, Enc. Méth. ix. p. 122 (1819).
Pieris amytis, Godart, ibid. p. 123 (1819).
Anthocharis achine, Boisduval (*nec* Cram.), Spec. Gén. Lép. i. p. 574 (1836).
Anthocharis theogone, Boisduval, ibid. p. 575 (1836).
Anthocharis cebrene, Boisduval, ibid. p. 583 (1836).
Anthocharis ocale, Boisduval, ibid. p. 584 (1836).
Anthocharis exole, Reiche, Fér. & Gal. Voy. Abyss. pl. xxxi. fig. 4 [*nec* 5 & 6] (1849).
Anthocharis eurygone, Lucas, Rev. Zool. p. 341 (1852).
Anthopsyche procne, Wallengren, K. Sv. Vet.-Akad. Handl.; Lep. Rhop. Caf. p. 323 (1857).
Anthopsyche epigone, Felder, Reise Nov., Lep. p. 186 (1865).
Anthopsyche acte, Felder, ibid. p. 187 (1865).
Teracolus loandicus, Butler, Proc. Zool. Soc. p. 724 (1871).
Teracolus omphaloides, Butler, ibid. p. 151 (1876).
Teracolus hybridus, Butler, ibid. p. 152 (1876).
Teracolus delphine, Butler (*nec* Boisd.), ibid. p. 152 (1876).
Teracolus angolensis, Butler, ibid. p. 154 (1876).
Teracolus pseudocale, Butler, ibid. p. 154, pl. vi. fig. 9 (1876).
Teracolus corda, Möschler, Verh. zool.-bot. Ver. Wien, xxxiii. p. 223 (1883).
Teracolus complexivus, Butler, Proc. Zool. Soc. p. 770 (1885).
Teracolus pyrrhopterus, Butler, ibid. p. 575, pl. xxxvi. figs. 8 & 9 (1894).

The inclusion of the East-African *T. omphale*, with its many variations, as a synonym of the West African *T. evippe* will

doubtless seem to many at first sight to be unwarranted, but after a careful study of a large number of insects, including many type-specimens, I can arrive at no other conclusion. Speaking roughly, the position is as follows:—On the eastern side of the Continent we have *T. omphale*, with its heavy black bars in both wings, during the wet season, which is replaced during the winter by its dry-season form *T. theogone*, in which the black bars disappear more or less completely; the black borders are much reduced, and the underside of secondaries becomes speckled with grey hatching, with a darker transverse bar on disc. But, as so often happens in such cases of seasonal dimorphism, at the change of seasons specimens are met with uniting the characteristics of both wet- and dry-season forms. Some such examples were caught by the late Mr. E. C. Buxton in Natal and Swaziland, which resemble *T. theogone* in their shape and in the absence of the black bars, but have the border of the apical patch as in *T. omphale*, and the underside is white, without trace of grey hatching. These were referred, and I think justifiably, to *T. evippe* by Mr. Trimen (=*pseudocale*, Butl.), who at that time regarded *T. omphale* and *theogone* as distinct species. In Eastern Africa, therefore, we have *T. evippe* as an intermediate seasonal form of *T. theogone-omphale*, and this is probably also the case in Angola, on the West Coast; but when we reach Guinea and Sierra Leone *T. evippe* is the predominating form, and the extremes are apparently very scarce, or even absent, this being perhaps due to a greater uniformity of general conditions, which might tend to produce a mean or intermediate form. The question then arises whether *T. evippe* is specifically distinct from *T. omphale*. Personally I think not, but I regard it as a local development or variation of that species, which still exhibits a series of gradations linking it to the parent form. Then by the law of priority *evippe* must stand as the name of the species, and *T. omphale* be ranked as a local variety.

T. omphale, as defined by Trimen (S. Afr. But.), ranges practically throughout Africa, south of the Equator; to the north of this it is only recorded from Senegambia (Hope Coll., Oxford) and Abyssinia, and appears to be very scarce all along the West Coast.

T. hybridus is another example of intermediate seasonal coloration, resembling the summer *T. omphale* above and the winter *T. theogone* below; the type is from Plettenberg Bay, Cape Colony.

T. complexivus (Delagoa Bay and Somaliland), *omphaloides* (Natal, Zululand, Swaziland, Transvaal, and Kilimanjaro), and *corda* (Swaziland) are also intermediate, but nearer the dry-season form than *T. hybridus*, as they have the upperside black markings more reduced, the black bar in hind wings being usually obsolescent and often absent. In the latter case they constitute the *Anthocharis theogone* var. B of Boisduval.

T. epigone, from Zomba, the White Nile, and Arabia, is inseparable from *T. theogone*. The single female in the British Museum from Arabia is of interest, having lost all the discal black markings (probably as a result of the arid climate), and thus represents an extreme example of local dry-season coloration.

T. pyrrhopterus, from British East Africa, cannot be separated from *T. omphale-theogone*, for the curiously dark pink of the underside of secondaries cannot be regarded as a specific character, as the tints of that part are highly variable in the dry season, and are probably more or less influenced by the colouring of the soil.

T. loandicus, from Angola, and *procne*, from Swaziland and Orange River, are quite alike, and represent the small, lightly-marked variety of *T. theogone*, which prevails in dry localities and in the higher plateaux of the interior.

T. delphine, Butl. (*nec* Boisd.), is represented in the British Museum by six examples—two males and one female from S. Africa, and three males from the Niger. The males are interesting, as they exhibit the gradual gradation of colouring from *T. theogone* to typical *T. evippe* on the upperside, and although they are white beneath they show more or less faintly the dusky discal bar in hind wings so characteristic of *T. theogone*.

T. angolensis, from Angola and the Congo, is similar to the preceding, but has quite lost the dusky bar beneath, and closely resembles typical *T. evippe*, though the apical patch is more like that of *T. theogone*.

T. pseudocale is recorded from Swaziland, and, as I have stated above, I can only regard it as an intermediate seasonal form of the variety *T. omphale*, though at the same time it is quite similar to *T. angolensis*.

The female is somewhat like a dwarfed *T. theogone*, but shows an approach to *T. evippe* in its reduced discal black markings.

T. ocale is only a larger form of *T. pseudocale*, and although the single female in the British Museum generally resembles that of *T. evippe*, yet it has the distinct red apical band of the var. *omphale*.

T. arethusa, *eborea*, *hanna*, *amytis*, and *cebrene* are all referable to typical *T. evippe* (Linn.).

58. Teracolus suffusus.

Teracolus suffusus, Butler, Proc. Zool. Soc. p. 152, pl. vi. fig. 10 (1876).

This little species is founded on a single female from Angola, which looks not unlike a dwarf specimen of *T. evippe-omphale*, but the basal black in fore wing extends from inner margin to costa, and continues outwardly almost to the extremity of the discoidal cell. I cannot attribute it to any described male.

59. Teracolus microcale.

Teracolus microcale, Butler, Ann. Mag. N. H. (4) xviii. p. 487 (1876).

This species is only recorded from Abyssinia in the north-east, and the Orange River in the south-west. It looks very much as if it were only a dwarfed and under-coloured local variation of *T. evippe*, and the localities in which it occurs lend some colour to this view. However, in view of the paucity of specimens it seems

advisable to keep it separate for the present. Two females in the British Museum attributed to *Pontia ephyia*, Klug, seem to me to belong to this species.

60. TERACOLUS INFUMATUS.

Teracolus infumatus, Butler, Proc. Zool. Soc. p. 128 (1896).

This is a very distinct little species, of which there are two males and two females in the British Museum, from Lake Tanganyika and Lake Nyasa. The general pattern of the black markings in the male is not unlike that of a very heavily-marked *T. achine* (Cram.), but the apical patch is distinctly of the *T. evippe* type. The female is very like that of the latter insect, but exhibits some of the characters of *T. achine*[1].

61. TERACOLUS HALYATTES.

Teracolus halyattes, Butler, Proc. Zool. Soc. p. 145, pl. vi. fig. 7 (1876).

This little species is at present known only from N.E. Natal and the Transvaal, but it seems to be very scarce, and only dry-season specimens have been captured. It combines several characters of the dry forms of *T. achine* (Cram.) and *T. evippe-omphale*, but is nearer the former. The females in the British Museum, which appear to have been selected by guesswork, are quite similar to those of *T. achine* (dry).

62. TERACOLUS ACHINE.

Papilio achine, Cramer, Pap. Exot. iv. pl. 338. figs. E, F (1782).
Anthocharis antevippe, Boisduval, Sp. Gén. Lép. i. p. 572 (1836).
Anthocharis nr. achine, Angas, Kaf. Ill. pl. xxx. figs. 4, 5 (1849).
Anthocharis exole, ♀ (nec ♂), Reiche, Férr. & Gal. Voy. Abyss. pl. xxxi. figs. 5, 6 (1849).
Anthocharis zera, Lucas, Rev. Zool. p. 423 (1852).
Anthocharis isaura, Lucas, ibid. p. 424 (1852).
Anthopsyche omphale, ♀, Wallengren, K. Sv. Vet.-Akad. Handl.; Lep. Rhop. Caf. p. 11 (1857).
Anthopsyche gavisa, Wallengren, ibid. p. 13 (1857).
Anthopsyche roxane, Felder, Reise Nov., Lep. p. 187 (1865).
Teracolus harmonides, Butler, Proc. Zool. Soc. p. 146 (1876).
Teracolus ithonus, Butler, ibid. pl. vi. fig. 7 (1876).
Teracolus hippocrene, Butler, ibid. p. 147 (1876).
Teracolus ignifer, Butler, ibid. p. 147 (1876).
Teracolus simplex, Butler, ibid. p. 148 (1876).
Teracolus helle, Butler, ibid. p. 149 (1876).
Teracolus hyperides, Butler, ibid. p. 149 (1876).
Teracolus trimeni, Butler, ibid. p. 150 (1876).

[1] I have since seen a male in Miss Sharpe's collection which has the inner marginal black bar and the border of hind wing a good deal reduced, thus approaching very near *T. evippe*, with which it may prove identical.

Teracolus hero, Butler, p. 150, pl. vi. fig. 12 (1876).

Callosune damarensis, Aurivillius, K. Sv. Vet.-Akad. Förhandl. p. 46 (1879).

Teracolus carteri, Butler, Ent. Mo. Mag. xviii. p. 227 (1882).

Teracolus subvenosus, Butler, Ann. Mag. N. H. (5) xii. p. 105 (1883).

Callosune haevernicki, Staudinger, Exot. Schm. pl. xxiii. fig. 19 (1884).

Teracolus fumidus, Swinhoe, Proc. Zool. Soc. p. 442, pl. xl. figs. 4, 5 (1884).

Teracolus sipylus, ♀ (nec ♂), Swinhoe, ibid. p. 445, pl. xl. fig. 12 (1884).

Teracolus laura, E. M. Sharpe, Ann. Mag. N. H. (6) v. p. 441 (1890).

This species occurs practically throughout South and Central Africa as far north as Senegal on the west, and Abyssinia on the east side. It exhibits very strong seasonal dimorphism and slight local variation, and has consequently been much split up.

In South Africa typical *T. achine* is the wet form, the normal dry form being *T. ignifer*, Butl. (=*antevippe*, Trim. [nec Boisd.]), and this type of seasonal coloration probably holds good throughout the greater part of its range; but in the equatorial forest-belt it is possible that the dry-season form is represented by the *T. antevippe* of Boisduval, which differs from that of Trimen in having the underside of hind wings pure white and without any grey irroration. Specimens of this variation occur occasionally in S. Africa as intermediate seasonal forms; but it does not appear to establish itself until near the Equator, and this offers a somewhat interesting parallel to the case of *T. evippe*, referred to above. I append a few notes on the variations of *T. achine* which have been honoured with specific names.

T. harmonides (Swaziland), *ithonus* (Swaziland), and *haevernickii* (Transvaal) are all specimens of the normal S.-African winter form (=*ignifer*, Butl.), being differentiated on slight variation of unstable seasonal markings. *T. simplex* represents the extreme dry-season form, in which almost every trace of the black markings above has disappeared; it occurs on the inland plateaux of S. Africa, and I have taken it sparingly in the Transvaal and Mashunaland, finding at the same time every gradation into the normal dry form of *T. achine*, the females being quite indistinguishable. The single specimen in the British Museum is ticketed "Durban, Natal," but I very much doubt the accuracy of the record. *T. damarensis*, from Damaraland and Swaziland, is identical with this form. *T. hippocrene* is founded on dry-season specimens in which the underside irroration has become obsolescent, thus showing an approach to the summer form. *T. zera*, from Abyssinia, Mt. Kenia, V. Nyanza, and Zululand, is an interesting intermediate form in which the black borders of the upperside are almost as well marked as in lighter specimens of typical *T. achine*, and occasionally there is the faintest suspicion of the inner mar-

ginal black bars, while on the underside the pink tinge is much fainter than in the full winter form, and the irroration is very sparse. *T. hyperides*, from Swaziland and V. Nyanza, is a step further in the development of the wet-season colouring, having the black inner marginal stripe more distinct and the underside of hind wings being white; this, again, merges through *T. hero* into typical *T. achine*. The series of specimens included under *T. subvenosus* in the British Museum is an eloquent proof of the difficulty experienced by Mr. Butler himself in discriminating his own species, for they are in truth a "job lot." The species was founded on a specimen of *T. achine*, which is rather lightly marked above, and has the underside of hind wings white, with the neuration finely black throughout. But the present series shows every development of the upperside black markings, so that some specimens have a strong inner marginal band, while others have none, in spite of the fact that Mr. Butler has founded species on the relative development of this very character. The undersides are equally variable, ranging from the type with black neuration to a specimen in which there is no trace of black, but which is exactly similar to the type on its upperside, thus showing the complete inutility of black neuration as a specific character. *T. trimeni* I cannot distinguish from typical *T. achine*. *T. gavisa* represents the fullest wet-season development of this species, in which all the black markings above and below are strongly developed, and it occurs in suitable localities from Abyssinia to Natâl; that is to say, in a moist and wet climate *T. gavisa* would probably represent the wet-season form of the species, whereas in a drier and cooler place it would be *T. achine*. For instance, the former is prevalent in the quasi-tropical coast-belt of Natal, but as we go further inland towards the plateaux both forms occur and every intergrade between them, until finally *T. achine* predominates. *T. laura*, from Central East Africa, is a variation of *T. gavisa*, in which the inner marginal black bars are very faint, or even absent; *T. carteri*, founded on a single female from Accra, being evidently the same form, of which I have seen every gradation through *T. helle* to *antevippe* (Boisd.). The tendency of several species of *Teracolus* on approaching the equatorial belt to lose their discal black markings is very curious and interesting. The only noteworthy distinction in *T. fumidus*, Swinh., from the Transvaal, is the trace of a transverse black bar on upperside of hind wings, a very variable character, not unfrequently appearing more or less faintly in specimens of *T. achine*, but never well developed.

63. TERACOLUS LAIS.

Teracolus lais, Butler, Proc. Zool. Soc. p. 145 (1876).

This is a distinct little species of the *T. achine* group from S.W. Africa, and may be distinguished from its allies by the small, very oblique, orange, apical patch, which has a distinct border of black along its inner edge. I have only seen dry-season specimens.

64. Teracolus evenina.

Anthopsyche evenina, Wallengren, K. Sv. Vet.-Akad. Handl.; Lep. Rhop. Caf. p. 12 (1857).

Anthopsyche deidamia, Wallengren, Wien. ent. Monats. p. 35 (1860).

Callosune casta, Gerstäcker, Arch. f. Nat. xxxvii. p. 357 (1871).

Callosune deidamioides, Aurivillius, K. Sv. Vet.-Akad. Förhandl. p. 45 (1879).

Callosune inornata, Westwood, App. Oates' Mat. Ld. ed. i. p. 338 (1881).

Teracolus sipylus, ♂ (*nec* ♀), Swinhoe, Proc. Zool. Soc. p. 444, pl. xl. fig. 11 (1884).

Teracolus callidia, H. G. Smith, Ent. Mo. Mag. xxiii. p. 32 (1886).

This species extends practically throughout the S.-African subregion except in the neighbourhood of Natal and Zululand. On the western side it is not recorded further north than Damaraland, but on the east it extends to Somaliland. *T. sipylus* (=*callidia*) is the extreme development of the wet form, and *T. deidamioides* represents the dry-season brood. The type of *T. inornata* is a very lightly-marked dry-season male. *T. casta* probably represents the dry-season form in the moister parts of Central Africa, having a dry-season upperside combined with a white underside, the ends of nervules being occasionally blackened in the latter part. *T. evenina* varies extremely in size in accordance with the dryness or humidity of the localities it frequents, some males from Namaqualand in Mr. Trimen's collection being hardly larger than typical *T. evagore* (Klug).

65. Teracolus cinctus.

Teracolus cinctus, Butler, Ann. Mag. N. H. (5) xii. p. 105 (1883).

The two males in the British Museum from Victoria Nyanza present much affinity to *T. pallene* (Hopff.), but with my present available material I must regard them as distinct [1]. *T. cinctus* forms an interesting link between the *T. achine* and *evagore* groups.

66. Teracolus yerburii.

Teracolus yerburii, Swinhoe, Proc. Zool. Soc. p. 441, pl. xxxix. fig. 12 (1884).

Teracolus swinhoei, Butler, ibid. p. 491 (1884).

A purely Arabian species, being the representative there of the African *T. daira*. *T. swinhoei* is founded on a single female from Arabia, which is clearly only a yellow variety of *T. yerburii*.

[1] "Among Mr. Millar's *Teracoli* I found two males of *T. pallene* (Hopff.), which he had caught in Natal. In my paper I kept *T. cinctus*, Butl., distinct from that species; but I now think I was wrong in doing so, and that it should fall as a synonym of *T. pallene*." [See No. 70, *infra*].—G. A. K. Marshall, *in litt.*, 20th August, 1896.

67. Teracolus dalila.

Anthopsyche dalila, Felder, Reise Nov., Lep. p. 188 (1865).

I have not seen a specimen of this species, which is recorded from Bogos in East Africa. Judging by the description it may prove to be identical with *T. daira*.

68. Teracolus daira.

Pontia daira, Klug, Symb. Phys., Ins. pl. viii. figs. 1–4 (1829).
Teracolus xanthus, Swinhoe, ♀ (*nec* ♂), Proc. Zool. Soc. p. 440, pl. 39. fig. 11 (1884).
Teracolus odysseus, Swinhoe, ♂ (*nec* ♀), ibid. p. 441, pl. 40. fig. 3 (1884).

A North-east African species, being recorded from Dongola and Somaliland; the male seems to hold an intermediate position between *T. yerburii* and *thruppii*, but the female is very distinct from that of any other species. In defining *T. xanthus* and *odysseus* Col. Swinhoe has undoubtedly confused the sexes of two species, for the male *T. odysseus* clearly belongs to the female *T. xanthus*, and in my opinion they constitute the dry-season form of *T. daira*. Moreover, the male *T. xanthus* and the female *odysseus* are referable to one species, viz., the variable *T. evagore* (Klug).

69. Teracolus thruppii.

Teracolus thruppii, Butler, Proc. Zool. Soc. p. 770, pl. 47. fig. 10 (1885).
Teracolus jacksoni, E. M. Sharpe, Ann. Mag. N. H. (6) v. p. 336 (1890).

Recorded from Somaliland and British East Africa. I cannot see sufficient grounds for separating *T. jacksoni* from this species.

70. Teracolus pallene.

Anthocharis pallene, Hopffer, Peters' Reis. Mossamb. Ins. p. 358, pl. 23. figs. 7 & 8 (1862).

This species differs chiefly from the following in having a continuous black border along inner edge of apical patch at all seasons. Hopffer's type is from Tette, and I have seen specimens from Nyasaland, Namaqualand, and S. Matabeleland.

71. Teracolus evagore.

Pontia evagore, Klug, Symb. Phys., Ins. pl. viii. figs. 5 & 6 (1829).
Anthocharis antigone, Boisduval, Sp. Gén. Lép. i. p. 572 (1836).
Anthocharis phlegetonia, Boisduval, ibid. p. 576 (1836).
Anthocharis delphine, Boisduval, ibid. p. 577 (1836).
Anthocharis eione, Boisduval, ibid. p. 578 (1836).
Anthocharis nouna, Lucas, Expl. Alg., Zool. iii. p. 350, pl. i. fig. 2 (1849).
Anthopsyche eucharis, Wallengren (*nec* Fabr.), K. Sv. Vet.-Akad. Handl.; Lep. Rhop. Caf. p. 15 (1857).

Anthopsyche heuglini, Felder. Wien. ent. Monats. iii. p. 272 (1859).
Anthopsyche stygia, Felder, Reis. d. Nov., Lep. p. 188 (1865).
Teracolus interruptus, Butler, Proc. Zool. Soc. p. 724 (1871).
Teracolus subfumosus, Butler, ibid. p. 139, pl. vi. fig. 3 (1876).
Teracolus flaminia, Butler, ibid. p. 140 (1876).
Teracolus lycoris, Butler, ibid. p. 140, pl. vi. fig. 1 (1876).
Teracolus lyæus, Butler, ibid. p. 141, pl. vi. fig. 2 (1876).
Teracolus friga, Butler, ibid. p. 142 (1876).
Teracolus galathinus, Butler, ibid. p. 142 (1876)
Teracolus gelasinus, Butler, ibid. p. 143 (1876).
Teracolus lucullus, Butler, ibid. p. 143, pl. vi. fig. 4 (1876).
Teracolus glycera, Butler, ibid. p. 144 (1876).
Callosune pseudetrida, Westwood, App. Oates' Mat. Ld. ed. i. p. 340 (1881).
Callosune ramaquebana, Westwood, App. Oates' Mat. Ld. p. 341, pl. E. figs. 5 & 6 (1881).
Teracolus minans, Butler, Ent. Mo. Mag. xviii. p. 229 (1882).
Teracolus coniger, Butler, ibid. xviii. p. 229 (1882).
Teracolus xanthus, Swinhoe, ♂ (*nec* ♀), Proc. Zool. Soc. p. 440, pl. xxxix. fig. 10 (1884).
Teracolus odysseus, Swinhoe, ♀ (*nec* ♂), ibid. p. 441 (1884).
Teracolus saxeus, Swinhoe, ibid. p. 441, pl. xl. figs. 1 & 2 (1884).
Teracolus jamesi, Butler, ibid. p. 771 (1885).
Teracolus comptus, Butler, ibid. p. 94 (1888).
Teracolus bifasciatus, E. M. Sharpe, Ann. Mag. N. H. (6) v. p. 336 (1890).
Teracolus emini, Butler, ibid. (6) vii. p. 47 (1891).

This widespread little species is certainly the most variable of all the *Teracoli*, as is well shown by the above lengthy list of synonyms. In May 1893 I found the dry-season form of this species very plentiful in the Northern Transvaal, and they there exhibited much greater variation than in either Natal or Mashunaland, more especially the females, which presented a wonderful variety of coloration. Most of these forms have been raised to specific rank by Mr. Butler, but he has based his species chiefly on the relative development of the variable seasonal black markings in the male. We thus get a graduated series from the lightly-marked *T. subfumosus*, through *T. lycoris*, *flaminia*, *friga*, *lyæus*, *ramaquebana*, to *galathinus*, in which the upperside markings approach to those of the wet-season form of the species, represented by *T. phlegetonia* (Boisd.). All these forms exhibit the tinted and irrorated underside colouring, which in South Africa, at all events, is always characteristic of the dry-season form. I have, however, seen very few specimens of this type from Central Africa, and these appear to have been captured in the dry belt of country referred to by Mr. Scott Elliot in his interesting book on that region. It is therefore possible that in the more humid and forest-clad areas the dry-season form may be represented by *T. antigone* (Boisd.), which differs from South-African specimens in having

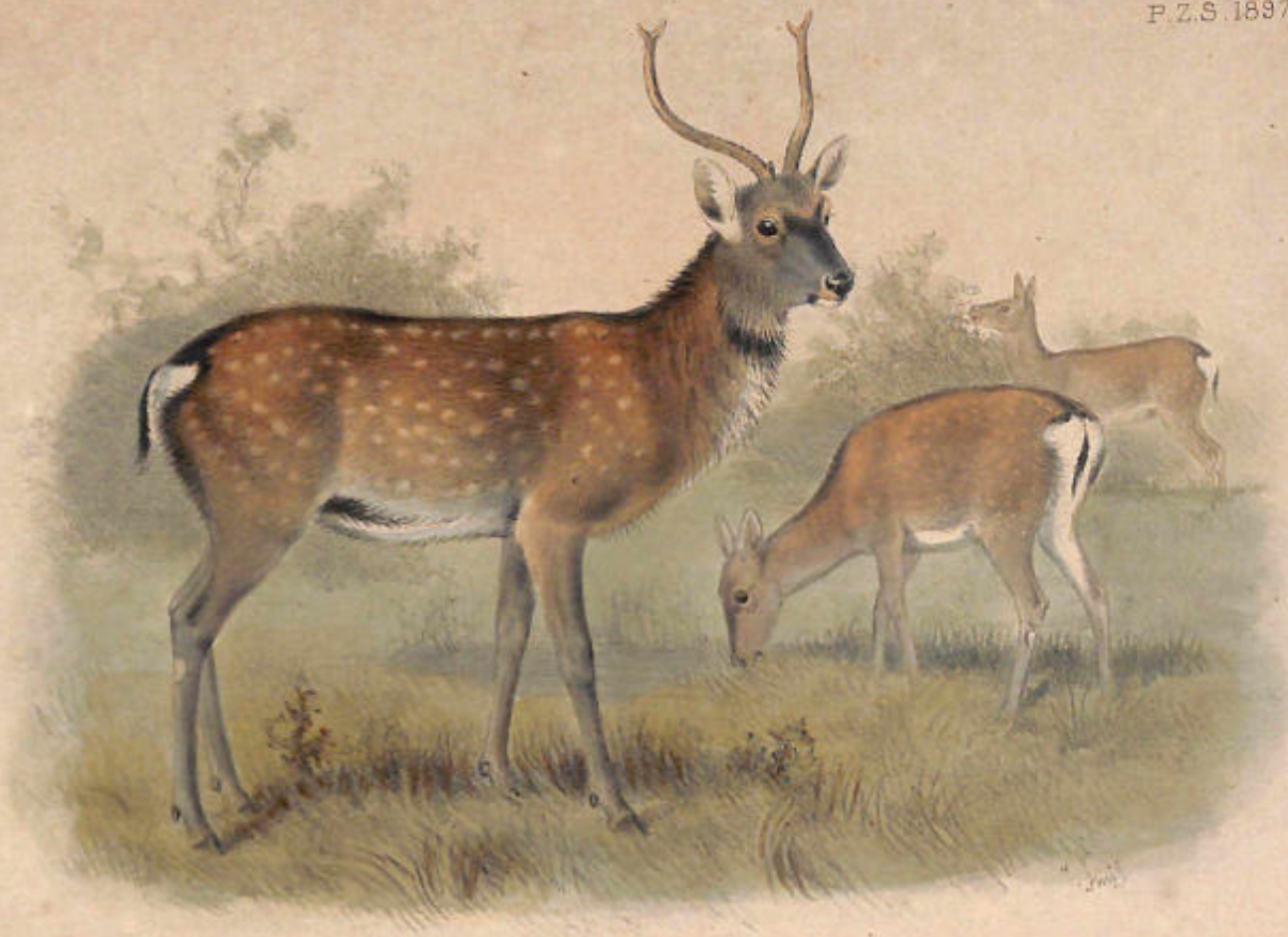
a pure white underside, and here, too, we can find every gradation of colouring linking it to *T. phlegetonia*. But I can find no sufficient reason for separating *T. nouna* (Luc.) from *antigone*, the only difference being that the black borders are reduced and the variable inner marginal bar and the black spot on inner edge of apical patch, both of which are evanescent in *T. antigone*, have quite disappeared in *nouna*. The latter, again, seems to me identical with *T. jamesi*, Butl., *heuglini* (Feld.), and *evagore* (Klug). In the arid climate of Arabia *T. evagore* appears to be the normal wet-season form, the dry-season form being probably *T. saxeus*, Swinh., which only differs in having a pink underside. Of the two specimens of *T. gelasinus* in the British Museum, one has the underside pure white while the other is sparsely irrorated with grey; on the upperside of fore wings they have no inner marginal bar, but the spot on inner edge of patch is distinct. They thus form an interesting link between *T. antigone* and the southern dry form, being also intermediate in locality, as they come from Angola. With regard to some of the other variations which have been described as species: *T. minans* is a variable form ranging across the Continent in Central Africa; it is white below, and the upperside markings show practically every gradation from *T. evagore* to *phlegetonia*. *T. comptus*, from Kilimanjaro, has the transverse bar narrow and sometimes very faint, the spot in apical patch ill-defined, and the marginal spots in hind wing separate but distinct. *T. coniger*, from the West Coast (Accra), is very similar, but has the transverse bar a little stronger and the nervular spots in hind wing larger and triangular in shape. *T. glycera* is founded on a single male of *T. minans* (labelled ? Africa), which while retaining the inner marginal bar has lost the black spot in patch; the border in hind wings is broad and somewhat diffuse inwardly. *T. bifasciata* I cannot distinguish from *T. minans*, and, as I have noted above, the male of Col. Swinhoe's *T. xanthus* and the female of *T. odysseus* are clearly attributable to this form. *T. interruptus*, from Angola and S.W. Africa, much resembles *T. comptus*, but has the spot in apical patch better defined and the nervular spots in hind wing are united into a broad border. *T. lucullus*, from Angola and V. Nyanza, are only lightly marked specimens of *T. phlegetonia*, and *T. emini* is founded on a single male from Central Africa, in which the black borders are a little deeper than in typical *T. phlegetonia*.

72. TERACOLUS NIVEUS.

Teracolus niveus, Butler, Proc. Zool. Soc. p. 177, pl. xviii. fig. 1 (1881).

Teracolus candidus, Butler, ibid. p. 178, pl. xviii. fig. 2 (1881).

An insular form of *T. evagore*, confined to the island of Socotra. It is a variable species, showing a strong tendency to lose the red apical patch, and the more extreme examples in this direction have been separated by Mr. Butler under the name *T. candidus*, but without sufficient justification, I think.



J. Smit. del. et lith.

PEKIN DEER IN WINTER PELAGE (♂&♀)

Mintern Bros. imp.

2. On the Deer allied to *Cervus sica*.

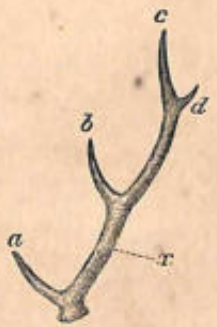
By R. Lydekker, B.A., F.R.S., F.Z.S., &c.

[Received November 27, 1896.]

(Plate I.)

In the last paper that I had the honour of presenting to the Society attention was directed to the very imperfect state of our knowledge regarding the members of the typical group of the genus *Cervus*. In the present communication I propose to show that the prettily-coloured Deer constituting the Pseudaxine[1] group of the same genus are in a still more hopeless state of confusion as regards the delimitation of species. Indeed, these Deer, both by describers and systematists, have been treated badly from a zoological point of view. At the present time the group is represented by a remarkably fine series in the Menagerie at Woburn Abbey; and—thanks to the Duke and Duchess of Bedford—these have afforded me the means of endeavouring to clear up the confusion.

In his paper on the classification of the *Cervidæ*, published in the Society's 'Proceedings' for 1878, the late Sir Victor Brooke gave the following definition of the subgenus *Pseudaxis*[2]:—"Antlers about twice the length of the head, supported on short stout pedestals. Brow-antler (*a*) rather short, directed upwards at a rather acute angle with the beam (*x*). A strong tine (*b*) is



Antler of *Cervus sica*.

developed from the anterior surface of the antler at about half its entire length, and a short tine (*d*) from the posterior surface of its upper third. Lachrymal pit of moderate depth and extent, its antero-posterior diameter being less than that of the three upper molars. Auditory bullæ moderately inflated, compressed, and smooth externally. Rudimentary upper canines present in both sexes. Rhinarium as in *Rusa*, with the exception of the internasal portion,

[1] I propose to substitute the name Sicine Deer for this group.
[2] *T. c.* p. 907.

which is slightly less prolonged upwards. Metatarsal tuft whitish. Tail moderate. Neck maned. In summer spotted; in winter uniform brown. Black bands on each side of the pure white anal disk form a cross with the narrow black streak along the dorsum of the tail. Stature medium. Young indistinctly spotted."

This diagnosis, which has been copied by the writers of all subquent text-books (who of course cannot be expected to verify the statements of those specialists from whom they derive their information), is incorrect in respect to the uniform colour of the coat in winter being common to all the species. Prof. A. Milne-Edwards had previously stated that in *C. mandarinus* (regarded by Brooke as a synonym of *C. manchuricus*) the spotting is permanent; and this had also been indicated by Gray in his description of the deer which was subsequently named *C. hortulorum*. The Woburn specimens show decisively that the latter species is always spotted.

In the aforesaid paper Sir V. Brooke provisionally admitted seven species of the Sicine group, although he suggested that four of them—namely, *C. euopis*, *C. manchuricus*, *C. dybowskii*, and *C. kopschi*—would very probably turn out to be synonyms of *C. sica*, with which, as already stated, *C. mandarinus* was wrongly identified. With regard to *C. caspicus*[1], from the mountains south-west of the Caspian, which was founded on antlers in the collection of Brooke himself, it is practically certain that this form does not belong to the Sicine group at all, of which the range will consequently be confined to North-eastern Asia. Unfortunately, the type antlers are not to be found among Brooke's collection, which has now been presented to the British Museum; but I would suggest that they not improbably belonged to some member of the Elaphine group in the second year of growth. Mr. Thomas informs me that a gentleman well acquainted with the district where these antlers were reported to have been obtained is confident no deer of a Sicine type exists there. *C. caspicus* must therefore be consigned to oblivion.

Next with regard to the true *Cervus pseudaxis* of Eydoux and Souleyet[2], I can only follow Sir V. Brooke, who observes that he has hesitated to identify this with "any species of the subgenus. The specimen is still preserved in the Museum d'Histoire Naturelle at Paris; but though I have often carefully examined it, the absence of the skull, and the great uncertainty of the locality where it was procured, render it impossible to form a decided opinion"[3]. Mr. Sclater[4] has suggested that it really belongs to *C. taëvanus*, in which case that name would have to be superseded; *pseudaxis* being the earliest of all.

As the result of my examination of the Woburn collection, I conclude that apparently four distinct species of the group can be

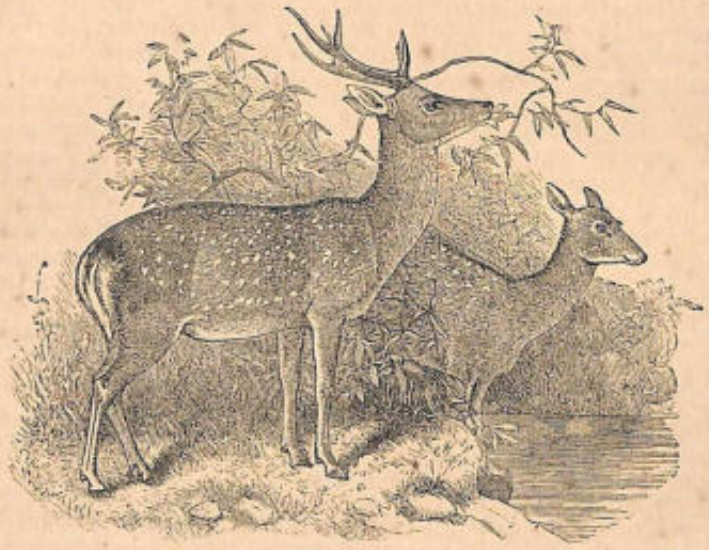
[1] Brooke, P. Z. S. 1874, p. 42; 1878, p. 909.
[2] 'Voyage de *La Bonite*,' Zoology, vol. i. p. 64 (1841-52).
[3] In his description of *C. manchuricus*, Brooke states that the type is in the Paris Museum; but this refers to the true *C. pseudaxis*.
[4] Trans. Zool. Soc. vol. vii. p. 345.

distinguished; and these I proceed to consider *seriatim*, commencing with the

1. *Japanese Deer.*—CERVUS SICA.

A. *Typical Race*—CERVUS SICA TYPICUS.

Cervus sika, Temminck & Schlegel, Japan Mamm. p. 54, pl. xvii. (1847); P. L. Sclater, P. Z. S. 1860, p. 377, and Trans. Zool. Soc. vol. vii. p. 346, pl. xxxv. (1871); Brooke, P. Z. S. 1878, p. 908; P. L. Sclater, List Anim. Zool. Gardens, p. 164 (1883); Powerscourt, P. Z. S. 1884, p. 208; W. L. Sclater, Cat. Mamm. Ind. Mus. pt. ii. p. 183 (1891); P. L. Sclater, List Anim. Zool. Gardens, p. 175 (1896).



Cervus sica typicus, male and female in summer coat.

Rusa japonica, Gray, Ann. Mag. Nat. Hist. ser. 3, vol. vi. p. 218 (1860); P. L. Sclater, P. Z. S. 1860, p. 375, 1862, p. 150, List Anim. Zool. Gardens, p. 164 (1883)—by error *R. javanica*; W. L. Sclater, Cat. Mamm. Ind. Mus. pt. ii. p. 183 (1891).

Pseudaxis sika, Gray, Cat. Rum. Mamm. Brit. Mus. p. 72 (1872); Hand-list Ruminants Brit. Mus. p. 142 (1873).

Cervus euopis, Swinhoe, P. Z. S. 1874, p. 151; Brooke, ibid. 1878, p. 908; P. L. Sclater, List Anim. Zool. Gardens, p. 164 (1883).

Hab. Japan and Northern China.

B. *Manchurian Race*—CERVUS SICA MANCHURICUS.

(?) *Cervus axis*, Radde, Reise Ost-Sibirien, vol. i. p. 286 (1862); *nec* Erxl.

Cervus mantchuricus, Swinhoe, P. Z. S. 1864, p. 169, 1865, p. 1; P. L. Sclater, Trans. Zool. Soc. vol. vii. p. 344, pls. xxxi., xxxii. (1871); Brooke, P. Z. S. 1878, p. 968; P. L. Sclater, List Anim. Zool. Gardens, p. 163 (1883).

Pseudaxis mantchurica, Gray, Cat. Rum. Mamm. Brit. Mus. p. 72 (1872); Hand-list Ruminants Brit. Mus. p. 141 (1873).

Cervus kopschi, Swinhoe, P. Z. S. 1873, p. 574; Brooke, ibid. 1878, p. 909.

Cervus dybowskii, Taczanowski, P. Z. S. 1876, p. 123; Brooke, ibid. 1878, p. 909; *nec* W. L. Sclater, Journ. Asiat. Soc. Bengal, vol. lviii. p. 186, pl. xi. (1889), and Cat. Mamm. Ind. Mus. pt. ii. p. 182 (1891).

Hab. Manchuria (Upper Ussuri), Kiangse, and Newchwang, China.

The name *C. sica* was originally given to the small Deer of Japan, which usually stand about 2 feet 8 inches at the shoulder, and—although profusely spotted on the body with white in summer—turn a uniform blackish-brown in winter. Generally all traces of spots disappear at the latter season, although, as noticed by Mr. Sclater in his monograph in the Society's 'Transactions,' faint indications of them may sometimes be observed. *C. euopis* of Swinhoe, from North China, appears, as mentioned by Brooke, "to differ in no appreciable external characters from ordinary specimens of *C. sica*." This form is included in Mr. Sclater's "List" (1883) under the latter species; although it is remarkable that both in that "List" and the one just issued the habitat of *C. sica* is given as "Japan" only. Specimens at Woburn which probably came from China are indistinguishable from the typical form, which may accordingly be regarded as common to Japan and the mainland.

Other examples at Woburn, which likewise probably came from China—although some may be Japanese—are considerably larger than the typical form, and thus lead on to the variety *manchuricus*. One of them is a very dark-coloured doe, which retains distinct traces of spots on the hind-quarters in the winter coat, and so resembles the still larger so-called *dybowskii*.

It would seem that intermediate forms also occur in Japan, for Sir V. Brooke[1] wrote as follows:—"The Society has within the last few years received living specimens of a *Pseudaxis* from Japan, which are intermediate in size between *P. sika* and *P. mantchuricus*. These have, in my opinion, with excellent judgment, been labelled by the Secretary as *Cervus mantchuricus minor*. I think it probable that, when a larger series of Pseudaxine Deer are brought together, it will be found impossible to separate them into definite species, but that it will be found necessary to regard them as one species of wide geographical range, endowed with a constitution sufficiently elastic to enable it to support very varied conditions."

[1] P. Z. S. 1878, p. 909.

So far as the forms to which the names quoted above refer are concerned, this prophetic opinion is in accord with the conclusions at which I have arrived from my examination of the Woburn herd. It is true that I have not found it possible to measure a series of specimens graduating from the 2 ft. 8 in. of the typical *sica* to the 3 ft. 5 in. of *C. manchuricus* and *C. dybowskii*, but intermediate forms undoubtedly exist; and I find little distinction except size between the largest and the smallest. In his description of *C. manchuricus* Mr. Sclater gives the height at 3 ft. 8 in.; but I think this must be a misprint for 3 ft. 3 or 5 in., which is the height of the "co-type" of *C. dybowskii*. Apparently, the typical *C. manchuricus* is unrepresented at Woburn, unless an immature buck with faint spots in the winter coat, and a similarly marked doe, belong to it.

The type of *C. manchuricus* is figured by Mr. Sclater in pls. xxxi., xxxii. of vol. vii. of the Society's 'Transactions.' The summer coat is well spotted, whereas the winter dress is a rich uniform dark brown on the upper-parts, with light chestnut patches on the shoulders; the under-parts being dark. The tail apparently has but little trace of a black line; and in a specimen of the typical *sica* in winter dress in the British Museum it is almost completely white. In summer the dark median line seems to be more marked, and there may be some black at the tip. As regards *C. kopschi*, from China, of which the type is in the British Museum, I agree with Sir V. Brooke that it is inseparable from *manchuricus*.

I now come to *C. dybowskii*, originally described on the evidence of specimens obtained from the Upper Ussuri district of Manchuria, one of which was presented by the founder of the name, Prof. Taczanowski, to the British Museum, where it has for many years been exhibited in the Mammal Gallery under the name of *manchuricus*. Indeed, it was only the other day that I became acquainted with the fact that it was one of the "co-types" of *dybowskii*. In writing of this Deer, Sir V. Brooke observed, "it is highly probable that, when we know more of this, it will be found inseparable from *C. manchuricus*." It is much to be regretted that Sir Victor did not more carefully study the original description. Had he done so, he would have found that *dybowskii* is absolutely the same as *manchuricus*, and much subsequent misunderstanding would have thereby been saved. When Prof. Taczanowski's original description is carefully studied, it will be found that there is no mention at all of *C. manchuricus*, with which the author appears to have been unacquainted. Such comparisons as are made are with *C. axis* and *C. dama*; consequently no points of difference between this deer and *C. manchuricus* are indicated, and it is pretty evident that the two are identical. It is true that Taczanowski states that the type of his species is of the colour of a Roebuck in the winter coat, with faint tracings of dapplings on the hind-quarters; but he alludes to a lighter race from the same district, and his specimen in the Museum is brown (doubtless

considerably faded) without trace of spots. The faint dappling of the darker race is paralleled by the smaller dark doe at Woburn referred to above.

The story of *C. dybowskii* does not, however, unfortunately by any means end here. In 1889 Mr. W. L. Sclater described the head, with the skin, of a deer purchased in the bazaar at Darjiling, and referred it provisionally to *dybowskii*. Subsequently this head—which was remarkable for the white muzzle—was shown by Dr. Blanford[1] to belong to a new Elaphine Deer described by him as *C. thoroldi*. Thinking that Mr. Sclater would not have identified a white-muzzled deer with *C. dybowskii* unless he knew that the latter had a similar nose[2], I have on two occasions given a white muzzle as the distinctive character of that form. Had I known that the specimen labelled *C. manchuricus* in the British Museum was one of the "co-types" of *dybowskii*, I should not have been led into this error.

Regarding, then, all the forms mentioned above as referable to a single species very variable in point of size, I propose to distinguish the smaller typical race as *C. sica typicus*, and the larger as *C. sica manchuricus*. The latter appears to be confined to the mainland; and the former is to a great extent a smaller island race, although some small examples occur on the mainland. Mr. Thomas informs me that several other Japanese mammals are represented by a larger race or subspecies in China.

2. *Pekin Deer.*—CERVUS HORTULORUM. (Plate I.)

Cervus pseudaxis, Gray, P. Z. S. 1861, p. 236, pl. xxvii. (*nec* Eydoux and Souleyet).

Cervus hortulorum, Swinhoe, P. Z. S. 1864, p. 169.

Hab. Northern China.

The history of this species is somewhat remarkable. In the spring of 1861 the Zoological Society received from the late Mr. R. Swinhoe the skins of three Sicine Deer which had been shot after the taking of the Summer Palace, Pekin (Oct. 12th, 1860), when they would have assumed the winter pelage. These specimens were shortly after transferred to the British Museum, and one a buck (No. 61. 6. 2. 1), was described and figured by Dr. Gray in the P. Z. S. for 1861, under the name of *Cervus pseudaxis*, with the express statement that it was killed in winter. As now mounted it stands 3 ft. 4 in. at the shoulder. The hair is now much faded. In Gray's figure[3] the hair of the body is a chestnut-

[1] P. Z. S. 1893, p. 444.

[2] Mr. Sclater, on p. 187 of his paper, says that *C. dybowskii* is described as having a white muzzle. In the original description it is stated that "il y a une tache blanche, pure, cordiforme, sur le devant du menton."

[3] From a comparison with the original specimen, I find that the colouring of the figure is inexact in several particulars, the under-parts being too white and the distribution of the colours on the neck very badly shown.

brown colour, with numerous distinct white spots of considerable size; and there is a white glandular patch on the outer side of the hind leg just below the hock. The neck is unspotted, and its lower portion is of a slaty-blue colour, above which there is a dark collar, followed by chestnut-brown, the lower part of the face being also bluish grey. The under-parts are whitish; and the tail is white with a narrow black median line, but there is no distinct black cross on the buttocks. This Deer is therefore quite unlike *C. sica* in its winter coat.

The female (No. 61. 6. 2. 2), which has long been exhibited in the Mammalian Gallery as *C. manchuricus*, appears to be similarly coloured, with the exception that there is no slaty blue on the neck, and the belly is greyish, while there is a distinct black cross on the buttocks. Its height at the shoulder is 2 ft. 9 in.

In 1864 Mr. Swinhoe, being satisfied that the buck figured by Gray was not the *Cervus pseudaxis* of Eydoux and Souleyet, proposed for it the name of *C. hortulorum*. In the same letter the name *C. manchuricus* was proposed for the specimens sent home alive at the same time for the Zoological Gardens; and it is quite evident that Swinhoe was satisfied of the distinctness of the two forms.

In his description of *C. manchuricus*, Mr. Sclater[1] stated that Swinhoe seemed to have described the same species of Deer under two names in one letter. Mr. Sclater figures *C. manchuricus* in its dark uniform winter coat, which is indistinguishable from that of the typical *sica*; and had he given fuller attention to Gray's description and figure, it could scarcely have escaped his notice that the winter coat of *C. hortulorum* was spotted on the body, bluish grey on the neck, and light beneath. Sir Victor Brooke[2] followed Mr. Sclater in regarding *hortulorum* as a synonym of *manchuricus*.

When I visited Woburn last summer the Duchess of Bedford pointed out to me three large Sicine Deer obtained from near Pekin at the same time as the type of *C. bedfordianus*, and remarked that these three alone seemed distinguishable from the whole of the other Japanese and Chinese representatives of the *sica* group in the collection. Although I was then somewhat sceptical on the subject, time has shown the correctness of Her Grace's diagnosis. On again visiting Woburn Abbey in the middle of November—by which time all the Deer had acquired their full winter dress—I found that these three Deer (one buck and two does) were still fully spotted on the body, although perhaps rather less so than in the summer. The ground-colour, too, of the body, instead of being blackish- or chocolate-brown, was chestnut-brown; and the lower part of the neck and the face—especially in the buck—of a leaden bluish-grey, while there was a dark collar on the upper throat. The limbs were uniform

[1] Trans. Zool. Soc. vol. vii. p. 345.
[2] P. Z. S. 1868, p. 908.

brownish grey. The under-parts were light-coloured; and there was a distinct white spot on the hind leg below the hock. Compared with the type of *C. hortulorum*, the buck differs by the greater amount of black and white on the buttocks; but as it is identical in other respects, while the Woburn does are in all respects similar to the one in the British Museum, there appears no doubt as to their specific identity. It was, of course, impossible to determine the height of these Deer, but it was decidedly greater than that of a Fallow Deer, and probably about 3 ft. 4 in. Indeed, the Pekin Deer appeared to be taller than any of the Woburn Sicines; but whether they are superior in this respect to the type of *C. sica manchuricus* I am not certain, as there do not seem to be any Deer at Woburn precisely resembling the latter in stature. Be this as it may, *C. hortulorum* appears to be a more "leggy" animal than any of the varieties of *sica*. Its bright colour, its numerous spots at all seasons, the leaden-blue colour of the base of the neck and face of the bucks, the light under-parts, and its large size serve amply to distinguish this well-marked species from all its kindred.

As habits are sometimes an important aid in the discrimination of species, it may be well to mention that the three Pekin Deer at Woburn never associate with the Sicas, but keep more or less to themselves. It may be added that by Christmas the buck at Woburn had developed a very shaggy coat, on which some of the spots are rather less brilliant than they were in autumn, and that the under-parts had turned dark grey.

The Society is indebted to the Duke of Bedford for the loan of the sketches from which the accompanying Plate (Plate I.) is copied.

3. *Mandarin Deer.*—Cervus mandarinus.

Cervus mandarinus, A. Milne-Edwards, Recherches Mamm. p. 184, pls. xxii., xxii. *a*. (1871)[1]; Brooke, P. Z. S. 1878, p. 968.

? *Cervus axis*, Swinhoe, P. Z. S. 1864, p. 169.

Hab. Central China (? Hankow).

In his description of this Deer, Prof. Milne-Edwards remarks that it is distinguished from *C. manchuricus* by the more profuse spotting of the summer coat, and the retention of a large, although somewhat smaller, number of distinct spots in the winter dress on the body—the ground-colour of the latter being dark chestnut-brown, and the neck and under-parts also brown; while there is a very thick frill of long hairs on the throat. It is also mentioned that the colour of the summer coat is much brighter than in *manchuricus*. These observations are fully borne out by the two plates accompanying the memoir, which illustrate the type specimen at both seasons. From these it appears that the tail is

[1] The date on the titlepage of the volume is 1868–74, but Prof. Milne-Edwards has communicated to me the date of the part containing the description of this species.

longer than in *manchuricus*, and in the winter dress is reddish with but little white.

In his oft-quoted memoir on the *Cervidæ*, Sir V. Brooke gives *mandarinus* as a synonym of *manchuricus*, without a single word as to the persistence of the spotting in winter. And the influence of one so well-known as an authority on the group has led to *mandarinus* being ignored as a species by all subsequent writers, although there seems little doubt that it is really a distinct form.

In his letter in the P. Z. S. for 1864 already quoted, Mr. Swinhoe wrote as follows:—"In the gardens of Messrs. Jardine, Matheson, & Co., in Hong Kong, I saw several bucks and does of *C. sica* and *C. taëvanus*, as also of *C. axis* in winter dress. The bucks of the two former had manes about the neck; *C. sica* was spotless, *C. taëvanus* with indistinct spots, while *C. axis* was of a rich yellowish-brown colour, with distinct white spots. The latter had long, thin, reddish tails, and, I think, are identical with the true *C. axis*. They are from Hankow, interior China." Now as Mr. Swinhoe must be presumed to have been well acquainted with both *manchuricus* and *hortulorum*, and as *C. axis* is unknown beyond India, it appears highly probable that these Hankow Deer were really *mandarinus*. The "long, thin, reddish tails" appear to accord well with Milne-Edwards's figure of the latter in winter dress.

4. *Formosan Deer.*—Cervus taevanus.

Cervus taiouanus, Blyth, Journ. Asiat. Soc. Bengal, vol. xxix. p. 90 (1860); P. L. Sclater, P. Z. S. 1860, p. 376.

Cervus taëvanus, P. L. Sclater, P. Z. S. 1862, p. 152, pl. xvi.; Swinhoe, ibid. p. 362; P. L. Sclater, Trans. Zool. Soc. vol. vii. p. 345, pls. xxxiii., xxxiv. (1871); Brooke, P. Z. S. 1878, p. 909; W. L. Sclater, Cat. Mamm. Ind. Mus. pt. ii. p. 183 (1891).

Pseudaxis taivanus, Gray, Cat. Rum. Brit. Mus. p. 70 (1872), & Hand-list Rum. Brit. Mus. p. 141 (1873).

Hab. Formosa.

Sir V. Brooke observes a discreet silence as to the right of this form to rank as a species, giving none of its distinctive features. According to Mr. Sclater's description and figures, the Formosan Deer appears to be of medium height (2 ft. 11 in.); the general colour of the summer dress being paler than in *sica*, and the black of the caudal disc forming a more distinct transverse bar. It is also described as having somewhat longer fur, and a white tail with a broader black median line on the upper surface; and the spots are stated to show a tendency to persist in winter. A female in the British Museum has, however, a chocolate-brown ground-colour in the summer dress. As regards form, the latter specimen appears to be a relatively lower-built animal than either *sica* or *mandarinus*. On this point, Dr. Gray observes that although the Formosan Deer, when contrasted with the Sicines from other

districts, can be readily recognized, yet to describe its distinctive characteristics in words is almost impossible.

In the Woburn collection there are a buck and doe—place of origin uncertain—which seem to differ from the other Sicines, and are therefore probably referable to this species. When first shown to me in the summer, they appeared distinct from all the *sica* forms, but I forget their exact coloration. In the winter coat the ground-colour is dull rufous-brown, with distinct spots, although less strongly marked than in *C. mandarinus*. The general form is also different from that of *C. sica*, being apparently lower. The tail I had no opportunity of describing.

If these Deer be really from Formosa, they seem to indicate the right of *C. taëvanus* to rank as a distinct species.

Assuming the foregoing conclusions to be approximately correct, the Sicine Deer may be diagnosed as follows:—

1. *Cervus sica*.—Japan and China.

Spotted in summer, uniformly coloured or nearly so in winter. Winter coat dark blackish brown, with the hairs annulated; chestnut patches on the shoulders; tail mainly white, frequently with a narrow black dorsal line, and sometimes dark terminal tuft; under-parts dark.

A. *C. sica typicus*. Size small (2 ft. 10 in.).—Japan and China.
B. *C. sica manchuricus*. Size larger (3 ft. 4 or 5 in.)—Manchuria.

2. *Cervus hortulorum*.—Northern China.

Profusely spotted at all seasons, but somewhat less so in winter. Bucks in winter with the ground-colour of the body chestnut-brown; neck without spots, bluish grey at base, then a blackish collar followed by chestnut; face bluish grey; a white spot on outer side of leg below hock; thighs and fore legs greyish brown; under-parts greyish white; tail rather short, white with black dorsal stripe. Limbs relatively long.

3. *Cervus mandarinus*.—Interior of China (? Hankow).

Spotted at all seasons. Colour darker than in last, and spots less abundant in winter coat. In winter coat, neck and limbs uniformly coloured, like body; under-parts dark; no white spot on leg; tail longer, mainly reddish, with but little white.

4. *Cervus taëvanus*.—Formosa.

Marked with large spots on a chestnut ground in summer; less distinctly spotted in winter. In winter, neck chestnut, and no white spot on leg; under-parts apparently somewhat lighter than upper; tail white, with a very broad dorsal black stripe; dark median line on back very strongly marked. Limbs relatively short.

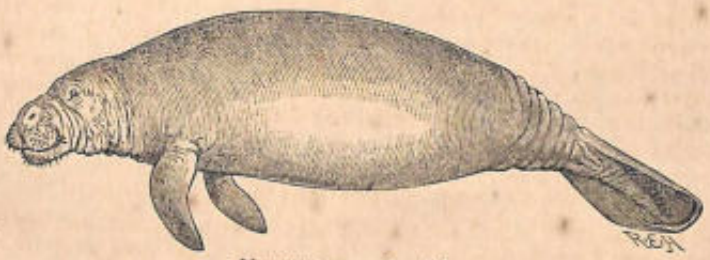
3. Notes upon the Anatomy of a Manatee (*Manatus inunguis*) lately living in the Society's Gardens. By Frank E. Beddard, M.A., F.R.S., Prosector to the Society.

[Received January 18, 1897.]

The young male Manatee acquired by the Society in 1896 died, on Oct. 29th of the same year, from what appeared to me to be a very pronounced form of pleurisy. In the course of my experience at the Society's Gardens I have never seen so enormous a development of pus as this animal showed in and outside of one (the left) lung. When the organ was cut open—it could be seen, before the diaphragm was removed, to be extraordinarily distended—a mass of pus, without any odour and of the consistence of a stiff solution of flour and water, was exposed. There were several (perhaps three) pints of this matter. The other lung was apparently healthy and no particular signs of disease were noted elsewhere among the viscera. It is true that the rectum was distended with fæces, but the gut was not in any way pathological in appearance.

As has already been noted[1] the specimen which forms the subject of my communication to the Society is to be distinguished from the better known American species by the total absence of nails upon the hand. The most careful examination after death of the animal failed to show even indications of nails. It appeared

Fig. 1.



Manatus inunguis, ♂ jr.

to me also to differ from *Manatus latirostris*, as described by Murie[2] and Garrod[3], in the comparatively slight development of the two rounded lateral processes of the upper lip, which come together in the middle line when a leaf of its food is seized by the

[1] P. Z. S. 1896, p. 212. See for a comparison of the three existing species of Manatee, Cl. Hartlaub, "Beiträge zur Kenntniss der Manatus-Arten," Zool. Jahrb. i. 1886, p. 1; and for a brief notice of some of the viscera of *Manatus inunguis*, A. von Pelzeln, "Brasilische Säugethiere," Verh. k.k. zool.-bot. Ges. Wien, Beiheft zu Bd. xxxiii. 1883, p. 88 (from Natterer's MS.).

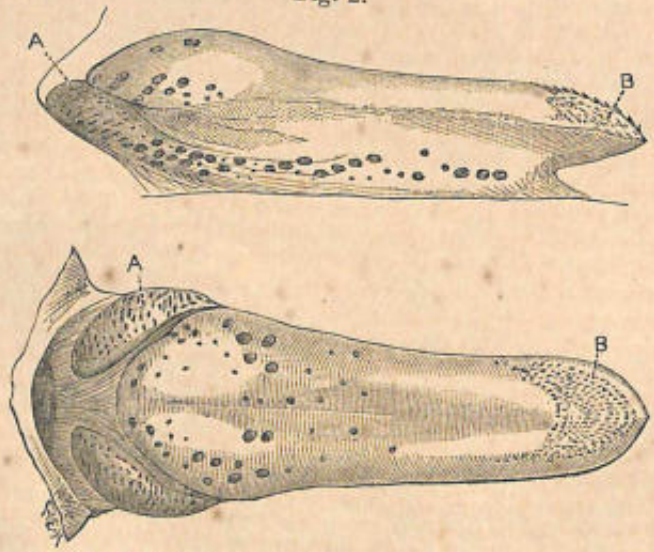
[2] "On the Form and Structure of the Manatee," Trans. Z. S. viii. p. 127.

[3] "Notes on the Manatee, &c.," ibid. x. p. 137.

creature. Otherwise the external characters (see fig. 1, p. 47) are much as in *Manatus latirostris*.

At the time of the death of the animal various circumstances prevented me from at once making a detailed examination of the viscera. They were accordingly placed in carbolized water and left for a day or two. It is fortunate that I was compelled to take this course, as in the other event they would have probably been thrown away before the arrival of a carcass of *M. latirostris*, for which I am indebted to Mr. Gerrard, jun. If I had had only the descriptions and drawings of Dr. Murie and Prof. Garrod to compare my dissections with, I should have come to various erroneous conclusions—not, indeed, on account of any deficiencies in those drawings and descriptions, but simply on account of the variability of certain of the organs and the immense difficulty of detecting minute divergencies between an organ in one animal and its description in another. In addition to the specimen which I obtained from Mr. Gerrard, I found among the Prosector's stores some of the viscera of a small male Manatee, which I imagine to be that which arrived in 1893 in company with the mother, and died a day or two afterwards. But I am not positive about this, and the individual may be that which was obtained by the Society in 1889. In any case the youth of the specimen has enabled me to discriminate between real specific characters and differences probably due to age.

Fig. 2.



Tongue of *Manatus inunguis*. The upper figure represents a lateral the lower the dorsal surface.

A, Mayer's organ; B, recurved papillæ at end of tongue.

Of the alimentary viscera I have had a drawing prepared of the tongue (fig. 2, p. 48), which does not greatly differ from that of the more common American species. It appears to me, however, that the large patch of circumvallate papillæ (Mayer's organ) of the two sides of the tongue are a little more closely approximated than in *M. latirostris*.

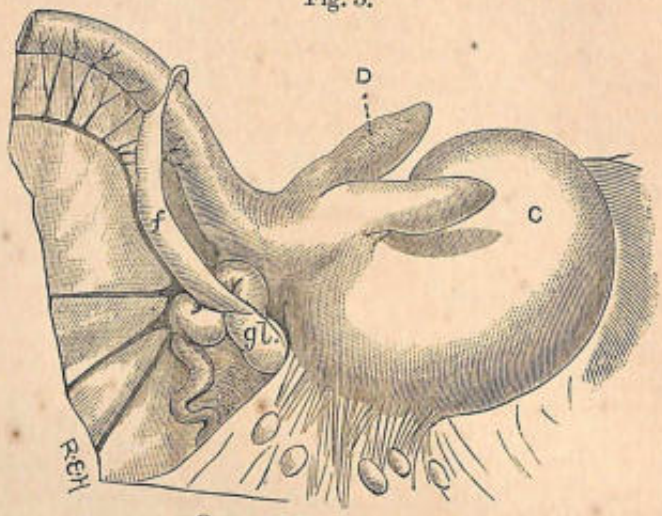
The stomach of *Manatus inunguis* shows a few minute differences from that of *M. latirostris*. The largest compartment of the stomach is much smoother inside than in either of the two *M. latirostris* that I examined; in the smaller spirit-preserved specimen of the latter species, indeed, the wrinkling of the sides of the stomach near to its orifice into compartment IV. was so marked as to suggest the ruminant reticulum. The two lateral diverticula of the stomach are subequal in *M. latirostris*, at least in the larger of the two specimens that I examined and in the individuals described by Murie. But in the small *M. latirostris* and in *M. inunguis* the left is considerably the larger; moreover, this diverticulum is more coiled in the larger *M. latirostris* than in either the small specimen or in *M. inunguis*—a further difference which may perhaps be due to age. The unpaired glandular diverticulum of the cardiac stomach is relatively shorter in the large *M. latirostris*.

The bile-duct and the pancreatic duct open on to prominent papillæ whose relative positions may be a mark of specific distinction. In *M. latirostris* they are rather further apart, and the pancreatic duct is more in front of the orifice of the ductus choledochus than in *M. inunguis*, where the latter is behind but markedly below the former.

As to the intestinal canal, the most remarkable feature is the great length of the large intestine, which is not far short of the small intestine; Peyer's patches are numerous, and in the last foot of the ileum I counted twelve of them varying much in shape and size, but being usually elongated and running in the furrows between the rugæ of the gut, as indeed Dr. Murie has noted in *Manatus latirostris*. At the actual orifice of the intestine into the cæcum a patch of exceptional size is found. The general shape of the cæcum, which is displayed in the accompanying drawing (fig. 3, p. 50), is precisely like that of the other species of Manatee, and I should not have had the drawing prepared were it not for a peculiar fold of mesentery which it is the main purpose of that sketch to illustrate. This fold, which is not referred to by Dr. Murie, lies on either side of the mesentery supporting the ileum and runs nearly to the cæcum. It does not bear a blood-vessel, and the fold of either side is continuous with its fellow by a complete bridge over the front side of the ileum as is indicated in the sketch. Both species are precisely alike in the presence and in the relations of these two mesenteries. On cutting open the cæcum it seemed to me that there was a recognizable difference between the two species. The two orifices of the finger-like appendages of the cæcum were closer together in *M. latirostris* and to the orifice of

the ileum. In my young spirit-preserved specimen there was a very narrow septum indeed between the wide mouths of the finger-like appendages.

Fig. 3.



Cæcum of *Manatus inunguis*.

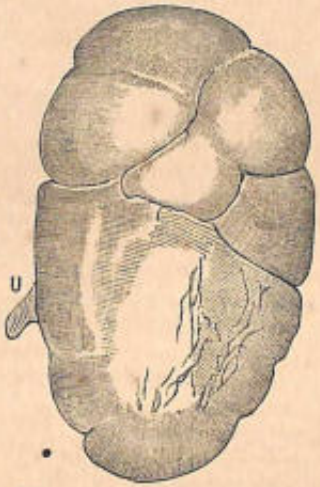
C, cæcum; D, its two diverticula; *f*, fold of mesentery; *gl*, a coiled mesenteric lymphatic gland.

The liver of *Manatus latirostris* has been described without figures by Murie and with figures by Garrod. If I had not had the opportunity of seeing the actual liver myself I should have found certain well-marked differences between the two species which are really non-existent. The organ in fact varies in form to some extent. Garrod's figures agree more closely on the whole with the liver of *M. inunguis* than with that of the individual of *M. latirostris* which I have studied myself. Garrod figures the central lobe of the right half of the organ as being but little separated from its lateral lobe, than which it is much smaller. In my specimens, both of *M. latirostris* and *M. inunguis*, the separation was much more marked. The left lateral lobe of *M. latirostris*, according to Garrod, is fairly notched on its lower border; it agrees, in fact, closely with *M. inunguis*, but not with the *M. latirostris* dissected by myself. On the under surface of the left lateral lobe in *M. latirostris* I found a deep rounded cavity, which appeared to have lodged during life the glandular appendix of the stomach. This was so deep that it very nearly perforated the liver tissue. I observed nothing of the kind in *M. inunguis*. The gall-bladder, as in *M. latirostris*, is large; it was not so fully overlapped by a triangular piece of the right lobe as in *M. latirostris*, as figured by Garrod and observed by myself.

The kidneys of *Manatus latirostris* have been described rather

differently by various observers. Owen states that they are lobulated, thus differing from the Dugong which has non-lobulated kidneys. Murie describes the kidneys in the following words:—"Each renal organ in our female is 5 inches long, the two lying opposite one another. Their figure is simple, with only a superficial indication of lobulation, but in reality absence of division; hilus shallow." I found the kidneys in the larger of the *M. latirostris* examined by me to be six inches in length by three in breadth; they are distinctly lobulated externally (fig. 4), and before

Fig. 4.



Kidney of *Manatus latirostris*.
U, ureter.

the kidney was divided longitudinally the appearances shown in the accompanying drawing were visible. The lobulation after the organ has been cut in half is seen to descend right to the middle reservoir of the organ, the cortical layer dipping down and completely shutting off the compartments of medullary substance. The hilus is on the *side* of the kidney and not on its inner edge. On the other hand, in the small example of *M. latirostris* the kidney, measuring nearly three inches by one and a half in breadth, showed no traces whatever of lobulation, and the hilus was as nearly as possible on the edge of the gland. In *Manatus inunguis* the shape of the organ, as may be gathered from its measurements, is rather different. It measured three and a half inches in length by two and a quarter in breadth, and showed no traces of lobulation. The hilus was on the side as in the large *M. latirostris*. The seeming variability (or is it an unusual change due to age?) of *M. latirostris* is remarkable.

The heart of the Manatee is, as is well known, peculiar by

reason of the marked separation of the two ventricles (not so marked, however, as in the Dugong), and by the conspicuousness of the coronary arteries which ramify over its surface; the organ is also, as has been remarked, small for the size of its possessor. I found that in *M. inunguis* the ductus arteriosus was perfectly permeable and was a tube of some size; in the heart of a young *M. latirostris* a little more than half its size, the ductus was tube-like in form and had an orifice into the pulmonary artery, but was apparently not permeable throughout. In the *M. latirostris* with a heart twice the size, the ductus was absent or rather represented by a flat non-tubular ligament. This seems to indicate a specific difference between the two forms in the relative age at which the ductus arteriosus degenerates. But it is, on the other hand, quite likely that there are variations in respect of this. The right ventricle in all three specimens was less sculptured on its inner surface than the left. It has in all three a moderator band, which is most pronounced in *M. inunguis*. This moderator band in that species is continued forwards after it has become adherent to the ventricular wall to the base of one of the semilunar valves of the pulmonary artery. In the young *M. latirostris* this was so to a less extent; while in the larger *M. latirostris* the moderator band was free from the heart-wall for a less extent and did not run forwards to the base of the valve at all. I observed no differences in the mode of origin of the principal arteries of the aorta in the three specimens.

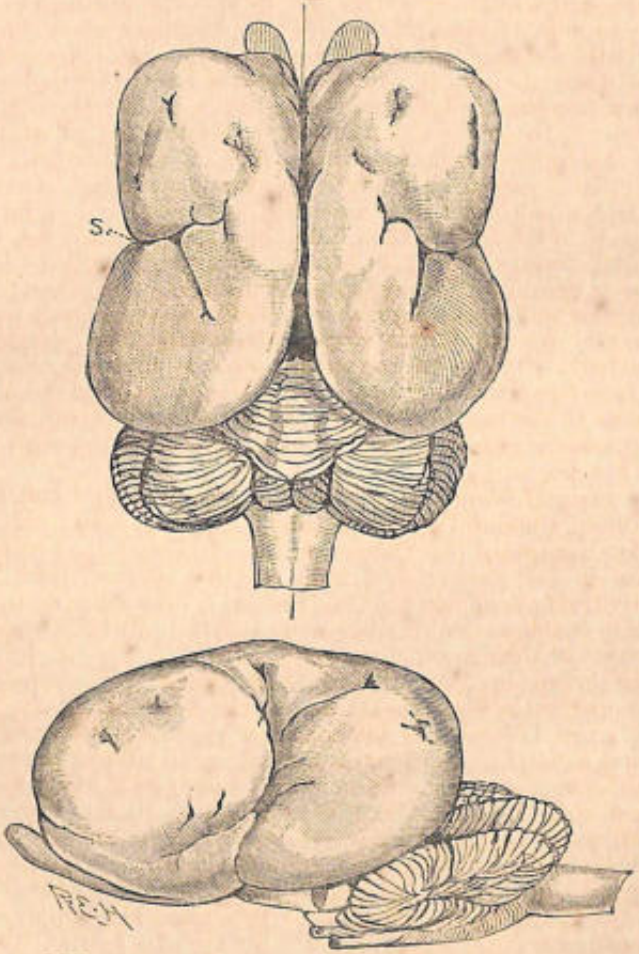
The brain of *Manatus latirostris* has been described and figured by Murie[1], Chapman[2], Garrod[3], and by Murie[4] again. Of these the last-mentioned paper appears to me to contain the best figures. I have in my possession a brain of that species which differs slightly from previously described brains; the drawing (fig. 5, p. 53) will also enable me to compare more satisfactorily the two species in respect of their brain structure.

This organ in fact shows certain slight but characteristic differences in the two Manatees. In the first place there is the shape when the brain is viewed from above: in *M. inunguis* the cerebral hemispheres are markedly longer in proportion to their breadth, the two dimensions being, as nearly as I could measure, 65 mm. and 30 mm.; on the other hand, in my specimen of *M. latirostris* the same measurements were 65 mm. and 37 mm., about the same as those of the brain figured by Garrod. The outline of each hemisphere is more distinctly C-shaped in *M. inunguis*, the C's being of course back to back. The only fissures of the hemispheres in *M. inunguis* are the Sylvian, both of which are Y-shaped above. Seen laterally each fissure runs forward near to its termination; but the forwardly directed part of the fissure is, in my opinion, the rhinal fissure, which does not, at least so

[1] "On the Form and Structure of the Manatee," Tr. Z. S. viii. p. 627.
[2] "Observations on the Structure of the Manatee," Proc. Acad. Nat. Sci. Philad. 1875, fig. 452.
[3] "Notes on the Manatee, &c.," Tr. Z. S. x. p. 137.
[4] "Further Observations on the Manatee," ibid. xi. p. 19.

conspicuously, exist to mark off the temporal lobe posteriorly. In *M. latirostris*, on the other hand, the Sylvian fissure is plainly seen to be continuous with a V-shaped rhinal fissure separating off the pallium, the wedge-shaped tract of brain (very elephantine!), thus

Fig. 5.



Brain of *Manatus inunguis*. The upper figure represents the dorsal aspect, the lower a lateral view.

S, Sylvian fissure.

exposed when the organ is viewed laterally, being itself divided by a continuation of the Sylvian fissure. On the upper surface of the brain, moreover, there is, as indicated in Murie's figure, a short transverse furrow not present in *M. inunguis*.

4. Revision of the West-Indian Micro-Lepidoptera, with Descriptions of new Species. By the Rt. Hon. Lord Walsingham, M.A., LL.D., F.R.S.

[Received November 5, 1896.]

About two years ago I received a communication from Baron W. von Hedemann asking me to examine and determine a collection of Micro-Lepidoptera which he had made in the Danish West Indies. Although at first very unwilling to undertake the task, anticipating, not without reason, that there would be a large amount of new material, and that it would involve a very difficult study of the synonymy of described species and of general classification, I felt that such a study must necessarily be very instructive, and that the opportunity should not be lost to enlarge my limited acquaintance with the West-Indian fauna. Moreover, as the Danish Islands lie to the north of those which supplied the material for my previous paper [Proc. Zool. Soc. Lond. 1891, pp. 492–549 (1892)], they promised to afford some connecting links with the rich fauna of North America, already somewhat known to me. As to the instruction to be derived, and as to the difficulty of the work undertaken, my calculations were not at fault; moreover, the rediscovery of Clemens's genus *Cycloplasis*, with some other decidedly North-American forms, has been of special interest in connexion with the subject of distribution. The amount of material to be dealt with was largely increased by the reception of a further collection from the same islands made by Mr. F. Gudmann. These, together with the Micros collected by Mr. H. H. Smith in Grenada (from the Godman and Salvin collection), and others received from Dr. Rendall, Mr. T. D. A. Cockerell, Mr. W. Schaus, Mr. F. W. Urich, and the late Monsieur E. Ragonot, form the materials of this paper. It is in fact a second edition of the former one, bringing the West-Indian catalogue of Micro-Lepidoptera up to date, on the lines of the new system of classification put forward by Mr. E. Meyrick in his 'Handbook of British Lepidoptera,' which marks an epoch in the study of these small and often obscure forms.

When the paper was commenced I was working upon the old lines, with such modifications only as had become obviously necessary as the general study of the subject has advanced; but the publication of Mr. Meyrick's book supplied a want, and his system seemed to be so near at least to that which I was already working up to by an independent course of study and reasoning, that no effort was required to induce me to accept in the main his sequence of the different families and genera; this has been adopted so far as possible, with the one notable exception of the position and value of the *Tortricidæ*, which cannot, in my opinion, be rightly separated from the *Tineina*, and should take a place

rather in the middle than at either end of the series of families which form this group.

The adoption of Mr. Meyrick's system, of course, involved great changes in generic nomenclature, for which he had given no reasons. In some cases where his alterations have been accepted, the reasons for such acceptance are here set forth: in all cases where I have been unable to accept his generic names I have fully discussed and explained how the names here adopted have been arrived at. For any further explanation on this point, the reader may now refer to the code of rules compiled by Mr. Durrant and myself, which has lately been published by Messrs. Longmans under the title 'Rules for regulating Nomenclature with a view to secure a strict application of the Law of Priority in Entomological Work.'

In my previous paper 132 species were enumerated as occurring in the West Indies: of these 10 were simply mentioned as "sp."; these are now deducted, as are also *Scoptonoma tipuloides*, Wlsm. (now regarded as belonging to the *Pyralidina*); *Pterophorus aspilodactylus*, Wkr. (now regarded as a worn specimen of *P. agraphodactylus*, Wkr.); *Cænogenes pusilla* (Z.), Wlsm. (wrongly identified, and described in the following pages as *Hypoclopus parvus*, sp. n.); *Psecadia adustella*, Z. (= *Tamarrha gelidella*, Wkr.); *Psecadia ingricella*, Mschl. (= *Ethmia confusella*, Wkr.); *Cosmopteryx lespedezæ*, Wlsm. (= *Cosmopteryx attenuatella*, Wkr.: Walker referred this species to *Gelechia*, which must be my excuse for the creation of the synonym); *Cosmopteryx gemmiferella* (Clem.?), Mschl. (recorded with doubt by Möschler, and here omitted as being probably synonymous with *attenuatella*, Wkr.). These deductions reduce my former list to 115 species (132−10−7). To this total is now added 34 species already described, and these, together with 153 new species, raise the total of the West-Indian Micro-Lepidoptera to 302 species (115+34+153). Nineteen genera are characterized as new.

The species recorded from each of the islands are as follows:—Cuba, 23; Jamaica, 31; Haiti (or San Domingo), 50; Portorico, 37; St. Croix, 57; St. Thomas, 114; St. Jan, 3; St. Martin, 1; Guadeloupe, 1; Dominica, 7; Martinique, 1; St. Lucia, 2; St. Vincent, 43; Grenada, 60; Trinidad, 8; Curaçao, 1.—West Indies, 302.

Of these species, 27 occur in the United States, 4 in Central America, and 28 in South America; 5 are found also in Europe, 3 in India and also in other parts of Asia, while one extends to Malaysia; 5 occur in Australia, and 4 in Africa. The larvæ of 49 species are known, of which number 34 have been bred in the West Indies.

What is now specially wanted is some knowledge of the Micros of the more northern islands stretching towards the coast of Florida, as well as from the peninsula of Florida itself. There is strong reason to believe that very beautiful and distinct forms of these insects are to be found in Cuba, Portorico, and Haiti, and also in Florida—such as have been already received include some

remarkably fine and distinct species; and I trust that the publication of this paper may induce collectors to supply material from these more northern localities, with which we are at present so little acquainted.

The collections made by von Hedemann and Gudmann are for the most part in beautiful condition, the specimens well set and mounted, and a large proportion of them bred. Full data have been given by which the life-history of each bred species can be followed, and this information has added much to the value of the specimens; unfortunately, the note-books in which descriptions of the different larvæ had been written were lost.

I must express my indebtedness to my two Danish correspondents for their kindness in allowing me to keep a large number of duplicates, which will eventually find their way to the British Museum with the remainder of my collections; and Baron von Hedemann has also been kind enough to examine for me such types of Fabricius's West-Indian species as are extant in the Copenhagen Museum. I must also return my thanks to my other correspondents whose names are mentioned above, especially to Messrs. Godman and Salvin for placing much valuable material in my hands.

I. PYRALIDINA.

I. PTEROPHORIDÆ.

1. Trichoptilus, Wlsm.

1. Trichoptilus centetes, Meyr.

Trichoptilus centetes, Meyr. Tr. Ent. Soc. Lond. 1886, 16–17 [1]; 1887, 266 [2]; Wlsm. Pr. Z. Soc. Lond. 1891, 494–5, 542 (1892) [3].

[? = *Pterophorus oxydactylus*, Wkr. Cat. Lp. Ins. B. M. XXX. 944 (1864). *Aciptilia oxydactyla*, Wlsm. Pr. Z. Soc. Lond. 1885, 885 (1886). *Pterophorus oxydactylus*, Moore, Lp. Ceyl. III. 528–9, Pl. 209. 16 (1887); Swinh. & Cotes, Cat. Moths Ind. 669. No. 4549 (1889). *Trichoptilus oxydactylus*, Wlsm. Pr. Z. Soc. Lond. 1896, 277 (1896).—Ceylon; India, IX., XII.; Arabia, II.–III., IX., XII.]

Hab. New Guinea, XI.[1] Queensland [2]. **West Indies** [3]—St. Croix, 22 IV.–18 V. (*Gudmann, Hedemann, Pontoppidan*); St. Thomas, 13 III.–25 III. (*Gudmann, Hedemann*); St. Vincent [3].

Bred by Mr. Gudmann at St. Croix, but the food-plant has not been identified.

2. Sphenarches, Meyr.

2. Sphenarches caffer, Z.

= *anisodactylus*, Wkr. [10]; n. syn. = *diffusalis*, Wkr.; = *walkeri*, Wlsm. [10]; = *synophrys*, Meyr. [10]

Pterophorus caffer, Z. Hndl. Kngl. Svensk. Vet.-Ak. 1852, 118 [1]. *Oxyptilus caffer*, Z. Lin. Ent. VI. 348–9 (1852) [2]; Wkr. Cat. Lp.

Ins. B. M. XXX. 934 (1864) [5]. *Oxyptilus anisodactylus*, Wkr. Cat. Lp. Ins. B. M. XXX. 934–5 (1864) [4]. *Pterophorus diffusalis*, Wkr. Cat. Lp. Ins. B. M. XXX. 945 (1864) [3]. *Oxyptilus caffer*, Wlsm. Tr. Ent. Soc. Lond. 1881, 279 [6]. *Oxyptilus walkeri*, Wlsm. Tr. Ent. Soc. Lond. 1881, 279–80 [7]. *Sphenarches synophrys*, Meyr. Tr. Ent. Soc. Lond. 1886, 17–8 [8]. *Oxyptilus anisodactylus*, Moore, Lp. Ceyl. III. 528 (1887) [9]. *Sphenarches caffer*, Meyr. Tr. Ent. Soc. Lond. 1887, 268 [10]. *Oxyptilus anisodactylus*, Swinh. & Cotes, Cat. Moths Ind. 668. No. 4542 (1889) [11]. *Sphenarches caffer*, Cotes, Ind. Mus. Notes, II. 20, figg. (1891) [12]; Wlsm. Ind. Mus. Notes, II. 20–1 (1891) [13]; Cotes, Ind. Mus. Notes, II. 163 (1893) [14].

Larva. "Calabash" (Gambia) [13]; in pods of *Dolichos lablab* (India) [12–14].

Hab. S. Africa—Caffraria [1–3, 13], Natal, XI.–XII. [5, 13] E. Africa [13]. W. Africa—Gambia [13]. Asia—Japan [13], Ceylon [4, 9–11, 13], India [12–14], Burma [13]. Australasia—New South Wales, II. [10], Queensland (Moreton Bay) [5], New Hebrides [8], Tonga Ids. [8] **West Indies**—St. Thomas, 20 III. (*Gudmann*); Grenada (Balthazar, 250 ft., windward side, 15–20 IV.—*H. H. Smith*).

Oxyptilus periscelidactylus, Fitch, from the United States, belongs to the genus *Sphenarches*, and is at least very closely allied to *caffer*, Z.

3. Platyptilia, Hb.

3. Platyptilia pusillidactyla, Wkr.

= *tecnidion*, Z. [3]

Oxyptilus pusillidactylus, Wkr. Cat. Lp. Ins. B. M. XXX. 933 (1864) [1]. *Platyptilia tecnidion*, Z. Hor. Soc. Ent. Ross. XIII. 468–9, Pl. VI. 162 (1877) [2]. *Platyptilia pusillidactyla*, Wlsm. Pr. Z. Soc. Lond. 1891, 495, 542 (1892) [3]. *Amblyptilia pusillidactyla*, Hdm. Stett. Ent. Ztg. LVII. 8 (1896) [4].

Hab. **West Indies**—Jamaica [1, 3]; St. Croix, [4] 22 IV. (*Gudmann*); St. Thomas, II. [2, 3, 4]; Grenada (Balthazar, 250 ft., and La Force Estate, 350 ft., windward side, 5 IV.–5 V.—*H. H. Smith*).

4. Platyptilia cosmodactyla, Hb.

(? = *acanthodactylus*, Z. [7]) = *direptalis*, Wkr. [7]

Alucita cosmodactyla, Hb. Samml. Eur. Schm. IX. Pl. VII. 35–36 (1816?) [1]. *Amblyptilia cosmodactyla*, Hb. Verz. bek. Schm. 430. No. 4183 (1826) [2], &c. [? *Pterophorus acanthodactylus*, Z. Handl. Kongl. Svensk. Vet.-Ak. 1852, 117 [3].] *Oxyptilus direptalis*, Wkr. Cat. Lp. Ins. B. M. XXX. 934 (1864) [4]. *Amblyptilia cosmodactyla*, Stgr. & Wk. Cat. 342, No. 3131 (1871) [5]. *Ambliptilus cosmodactylus*, Wlsm. Pter. Cal. & Or. 23–5, Pl. II. 2–4 (1880) [6]: Tr. Ent. Soc. Lond. 1881, 277–8 (1881) [7]. *Platyptilia cosmodactyla*, Meyr. Tr. Ent. Soc. Lond. 1890, 486 (1890) [8].

Hab. Europe [1, 2, 5, 6] [larva, *Aquilegia vulgaris*, *Geranium pratense*, *Salvia glutinosa*]. S. Africa—Transvaal [3], Cape Colony [1], Natal,

VII.–VIII., XI.[7] United States—California[6], Oregon[6] (*b.* IV. —*e.* VIII.; larva *Orthocarpus* sp., VI.)[6]. **West Indies**—Jamaica (Cinchona, 5000 ft., IX., *Fawcett*).

I am indebted to Mr. Cockerell for the specimen collected by Mr. Fawcett. There is another specimen in the British Museum, labelled "Jamaica (Cinchona), 90.65, 6.90, W. Fawcett."

4. Ochyrotica, Wlsm.

5. Ochyrotica fasciata, Wlsm.

Ochyrotica fasciata, Wlsm. Ent. Mo. Mag. XXVII. 218 (1891)[1]: Nov. Lp. I. 75–6, Pl. XII. 2 (1892)[2].

Hab. Central America[1,2]. **West Indies**—Grenada (Balthazar, 250 ft., windward side, 20 IV.—*H. H. Smith*). Brazil[1,2].

5. Stenoptilia, Hb.

= *Mimæseoptilus*, Wlgrn.

6. Stenoptilia (?) pumilio, Z.

= * *gilvidorsis*, Hdm. partim. (*nec* Z.).

Mimeseoptilus pumilio, Z. Verh. z.-b. Ges. Wien, XXIII. 324 (1873)[1]. *Stenoptilia ? pumilio*, Wlsm. Pr. Z. Soc. Lond. 1891, 495, 542 (1892)[2]. *Mimæseoptilus gilvidorsis*, Hdm. Stett. Ent. Ztg. LVII. 8–9 (1896)[3].

Hab. United States—Texas[1]. **West Indies**—Jamaica (Monteague, 1100 ft., XI., *Rendall*); St. Croix,[3] 28 IV. (*Hedemann*), V.[3]; St. Vincent[2]; Grenada (windward side—Balthazar, 250 ft., La Force Estate, 350 ft., 5 IV.–5 V.—*H. H. Smith*).

Heer Snellen's opinion on the probable synonymy of *gilvidorsis*, quoted by von Hedemann (*l. c.* No. 3), is quite justified, for I had already examined the two types side by side, and had made a note that *gilvidorsis*, Z., must sink as a synonym of *tenuis*, F. & R. Baron von Hedemann has sent me the three specimens which were determined for him by Snellen: two are *montis-christi*, Wlsm., and the third is *pumilio*; there is at present no evidence that *gilvidorsis* occurs in the West Indies.

[Stenoptilia tenuis, F. & R.

n. syn. = *GILVIDORSIS*, Z.

Mimeseoptilus tenuis, F. & R. Reise Nov., Lep. Pl. CXL. 50 (1875)[1]. *Mimeseoptilus gilvidorsis*, Z. Hor. Soc. Ent. Ross. XIII. 471–2, Pl. VI. 164 (1877)[2].

Hab. Colombia—Bogota[1,2], 12 II.–14 III.[2]]

6. Pterophorus, Geoffr.

Type, *Phalæna* (*Alucita*) *monodactyla*, L.

Pterophorus, Geoffr. Hist. Ins. Par. II. 24–5, 90–3 (1762); Wlgrn. Vet.-Ak. Handl. III. (7) 20 (1859); Wlsm. & Drut. Ent. Mo. Mag. XXXIII. 41–2 (1897).

†*Oidæmatophorus*, Wlgrn. Vet.-Ak. Handl. III. (7) 19 (1859).

[‡*Œdematophorus*, Wlgrn. Bih. Svensk.Vet.-Ak. Handl. III. 85 (1875).]

=§*Leioptilus*, Wlgrn. Vet.-Ak. Handl. III. (7) 21 (1859).

=**Alucita* (L.), Meyr. Tr. Ent. Soc. Lond. 1890, 487.

The type of *Alucita*, L., was fixed as *pentadactyla*, L., by Poda, Ins. Mus.-Græc. p. 94 (1761), and Lamarck, Syst. An. sans Vert. 288 (1801), cited the same species as the type of *Pterophorus*, Geoffr.; but this action was inadmissible, *pentadactyla* having already been constituted the type of *Alucita*. Latreille, Prec. Gen. Ins. 148 (1796), described the genus *Orneodes*, omitting to cite the type; subsequently, however, Hist. Nat. Crust. Ins. III. 418 (1802): XIV. 258 (1805), this omission was remedied, *hexadactyla*, L., being cited as the type. By this action and Poda's the genus *Pterophorus* became monotypical with the type *Alucita monodactyla*, L. In this sense it was used by Wallengren, but Meyrick, Tr. Ent. Soc. Lond. 1890, 487, wrongly employed *Pterophorus* for *pentadactyla*, and *Alucita* for *monodactyla*.

7. Pterophorus inquinatus, Z.

n. syn. =*ambrosiæ*, Mrt.

Œdematophorus inquinatus, Z. Verh. z.-b. Ges. Wien, XXIII. 325 (1873)[1]. *Œdematophorus ambrosiæ*, Mrt. Am. Ent. III. 236 (1880)[2]. *Œdematophorus inquinatus*, Cqllt. Pap. I. 61–2 (1882)[3]; Hdm. Stett. Ent. Ztg. LVII. 9 (1896)[4].

Larva. *Ambrosia artemisiæfolia*[2,3], VII.[3] excl. VIII.[3]

Hab. United States — Texas, 23 VII.[1], Missouri[2]. **West Indies**—Hayti (Cap Haiti, 19 VI.—*Gudmann*); St. Thomas, 7 IV.[4]

8. Pterophorus montis-christi, sp. n.

=*Mimæseoptilus gilvidorsis*, Hdm. Stett. Ent. Ztg. LVII. 8–9 (1896), *partim*.

(*Antennæ* broken.) *Palpi* projecting scarcely beyond the head; pale cinereous. *Head* slightly tufted over the face; hoary grey. *Thoracx* hoary greyish, whitish posteriorly. *Fore wings* hoary grey, sparsely scattered with very minute fuscous speckling, which is also noticeable along the base of the hoary-grey cilia, especially on the dorsum. *Exp. al.* 17 mm. *Hind wings* shining hoary grey, with a bronzy reflection on their cilia. *Abdomen* [in the two specimens before me greasy and discoloured, but obviously paler than the wing-colour, as indicated also by the very pale patch on the posterior portion of the thorax at the base]. *Hind legs* with the spurs very long and slender; pale cinereous.

Type, ♂ Mus. Wlsm.; ♀ Mus. Gudmann.

Hab. **West Indies** — San Domingo (Monte Christi, 19 V. 1894; two specimens, "♂ & ♀ taken in copulâ," *Gudmann*); St. Croix: 2–5 V. (*Hedemann*, two specimens); Grenada (Balthazar, 250 ft., windward side, 15 IV., *H. H. Smith*; one specimen).

9. PTEROPHORUS OSSIPELLIS, sp. n.

Antennæ bone-grey. *Palpi* very short, projecting, slender; bone-white. *Head* and *thorax* bone-grey. *Fore wings* of almost even width throughout; costa straight, second lobe scarcely widened at its middle; uniformly bone-grey, the extreme costa slightly paler throughout; cilia bone-grey. *Exp. al.* 16 mm. *Hind wings* bone-grey with a slightly bluer tinge; cilia bone-grey. *Abdomen* bone-grey. *Legs* white, unspotted.

Type, ♂ Mus. Gudmann.

Hab. **West Indies**—SAN DOMINGO (Puerto Plata, 15 V.; one specimen, *Gudmann*).

10. PTEROPHORUS PARVUS, Wlsm.

Lioptilus ? parvus, Wlsm. Pter. Cal. & Or. 55–7, Pl. III. 12 (1880)[1].

Hab. UNITED STATES — California *e.* VII.[1] **West Indies** — GRENADA (Balthazar, 250 ft., windward side, 15 III.–30 IV.— *H. H. Smith*).

11. PTEROPHORUS THOMÆ, Z.

Leioptilus thomæ, Z. Hor. Soc. Ent. Ross. XIII. 480–1, Pl. VI. 170 (1877)[1]. *Alucita thomæ*, Wlsm. Pr. Z. Soc. Lond. 1891, 495, 542 (1892)[2]. *Leioptilus thomæ*, Hdm. Stett. Ent. Ztg. LVII. 9 (1896)[3].

Hab. **West Indies**—HAYTI (Port-au-Prince, Cap Haiti, 19–24 V.: *Gudmann*); ST. THOMAS, XII.[1,3]

12. PTEROPHORUS PRÆUSTUS, Mschl.

Pterophorus præustus, Mschl. Ab. Senck. Nat. Ges. XV. 346, 354 (1890)[1]. *Alucita præustus*, Wlsm. Pr. Z. Soc. Lond. 1891, 496, 542 (1892)[2].

Hab. **West Indies**—PORTORICO[1,2].

Judging from the description this is probably the same as *thomæ*, Z.

13. PTEROPHORUS BASALIS, Mschl.

Œdematophorus basalis, Mschl. Ab. Senck. Nat. Ges. XV. 345–6, 354 (1890)[1]. *Alucita basalis*, Wlsm. Pr. Z. Soc. Lond. 1891, 495, 542 (1892)[2].

Hab. **West Indies**—PORTORICO[1,2].

14. PTEROPHORUS PALEACEUS, Z.

Leioptilus paleaceus, Z. Verh. z.-b. Ges. Wien, XXIII. 326–7 (1873)[1]. *Pterophorus paleaceus*, Mschl. Ab. Senck. Nat. Ges. XV. 346, 354 (1890)[2]. *Alucita paleaceus*, Wlsm. Pr. Z. Soc. Lond. 1891, 495, 542 (1892)[3].

Hab. UNITED STATES—Ohio[1,3], Texas[1,3]. **West Indies**—PORTORICO[2,3].

15. Pterophorus bipunctatus, Mschl.

=**microdactylus*, Hdm. (nec Hb.).

Pterophorus bipunctatus, Mschl. Ab. Senck. Nat. Ges. XV. 346, 354 (1890)[1]. *Alucita bipunctatus*, Wlsm. Pr. Z. Soc. Lond. 1891, 496, 542 (1892)[2]. *Leioptilus microdactylus*, Hdm. Stett. Ent. Ztg. LVII. 9 (1896)[3].

Hab. United States—Florida (*Morrison*, Mus. Wlsm.). **West Indies**—Portorico[1,2]; St. Croix, 28 IV. (*Gudmann*); St. Thomas, 20 III. (*Gudmann*), IV.[3]; Grenada (Balthazar, 250 ft., windward side, 5–27 IV.—*H. H. Smith*).

I am unable to agree with Heer Snellen, as quoted by Baron von Hedemann (*l. c.* No. 3), that the West-Indian species allied to *microdactylus*, Hb., is actually our common European insect. Baron von Hedemann has sent me the specimen determined for him by Snellen, and I must certainly regard it as distinct. A very noticeable spot occurs on the lower margin of the anterior lobe of the fore wings a little beyond the opposite costal spot, and this is not present in *microdactylus*; moreover, the anterior wings appear to me to be distinctly narrower in proportion to their length. In any case there can be little doubt that it is the *bipunctatus* of Möschler.

16. Pterophorus participatus, Mschl.

Pterophorus participatus, Mschl. Ab. Senck. Nat. Ges. XV. 346, 354 (1890)[1]. *Alucita participatus*, Wlsm. Pr. Z. Soc. Lond. 1891, 496, 542 (1892)[2].

Hab. **West Indies**—Portorico[1,2].

17. Pterophorus agraphodactylus, Wkr.

n. syn.=*aspilodactylus*, Wkr.

Pterophorus agraphodactylus, Wkr. Cat. Lep. Ins. B. M. XXX. 941 (1864)[1]. *Pterophorus aspilodactylus*, Wkr. Cat. Lep. Ins. B. M. XXX. 941–2 (1864)[2]; Butl. Pr. Z. Soc. Lond. 1878, 495[3]. *Lioptilus agraphodactylus*, Wlsm. Pter. Cal. & Or. 46–7, Pl. III. 6 (1880)[4]. *Pterophorus agraphodactylus*, Wlsm. Pr. Z. Soc. Lond. 1891, 496, 542 (1892)[5]. *Pterophorus aspilodactylus*, Wlsm. Pr. Z. Soc. Lond. 1891, 496, 542 (1892)[6].

Hab. United States—Oregon, V.[4] **West Indies**—Jamaica[2,3,6]; San Domingo[1,4,5].

I can only regard the type of *aspilodactylus* as a worn specimen of *agraphodactylus*, and Walker himself suggested that it might be only a variety or a faded example of this species.

II. ORNEODIDÆ.

7. Orneodes, Ltr.

=**Alucita*, Z., auct.

18. Orneodes budactyla, F. & R.

Alucita (*Pelia*?) *eudactyla*, F. & R. Reise Nov., Lep. Pl. CXL.

62 (1875)[1]; Mschl. Ab. Senck. Nat. Ges. XV. 346, 354 (1890)[2]. *Orneodes eudactyla*, Wlsm. Pr. Z. Soc. Lond. 1891, 496, 542 (1892)[3].

Hab. Colombia[1,3]; Brazil[1,3]. **West Indies**—Portorico[2,3].

II. TINEINA.

I. ÆGERIADÆ.

Although I quite agree with Mr. Meyrick as to the location of this family, I am not at present sufficiently acquainted with its literature to attempt to give a complete list of the West-Indian species. There are probably many other species known beside the following:—

8. Sesia, F.

19. Sesia cubana, HS.

Sesia cubana, HS. C.B., Z.M. Ver. Regensb. (sep.) 28 (1865)[1].

Hab. **West Indies**—Cuba[1].

II. GELECHIADÆ.

9. Brachmia, Hb.

= †*Bracluna*, Stph. (*laps. cal.*).
= §*Cladodes*, Hein.
= *Eudodacles*, Snell.
Brachmia, Meyr. (*nec* Stgr. Cat.).

20. Brachmia? fulvidella, sp. n.

Antennæ dull ochreous. *Palpi* dull ochreous, the second and apical joints each with a tawny-reddish shade externally. *Head* and *thorax* whitish ochreous. *Fore wings* whitish ochreous, variable in the colour and quantity of their shading; a female in good condition (which I select as the type) having a tawny-reddish suffusion extending from the base nearly to the termen, around which is a row of six elongate fuscous spots, the pale ground-colour appearing also in a narrow streak along the base of the fold and in a streak along the discal cell, in which are two fuscous blotches, the larger before, the smaller one beyond the middle; cilia whitish ochreous, with a slight vinous gloss, especially around their tips. (In other specimens the dorsal half of the wing is almost entirely whitish ochreous, the reddish suffusion being confined to the costal and apical portions.) *Exp. al.* 15 mm. *Hind wings* pale greyish; cilia with a slight ochreous tinge. *Abdomen* yellowish grey. *Legs* pale ochreous.

Type, ♂ ♀ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 9 III.–20 IV. (*Gudmann, Hedemann*). Six specimens.

"Die Raupe ist sehr dünn und schmal, 16-füssig, in der Mitte am breitesten; dunkel chocoladebraun, mit zwei Reihen feiner weissen Punkte auf jeder Seite des Rückens, so dass auf jedem Segment zwei Punktwarzen sich finden, jede mit einem schwarzen Haar versehen. Kopf rund, schwarzbraun. Das erste Leibsegment durchsichtig fleischfarbig im ersten Drittel, auf den hinteren $\frac{2}{3}$ mit einem Schild von der Farbe des Kopfes. Bauch, Füsse und After von der Farbe des Rückens.

"Raupe auf den Blättern der *Bromelia pinguin*, L., gefunden in einem Gespinnst mit eingewobenen Excrementen und Blattresten. Das Gespinnst befindet sich in der inneren Höhlung des Blattes, dicht an der Blattwurzel. Anscheinend frisst die Raupe nicht die Blätter, sondern nur die Blattreste, die sie in ihr Gespinnst festwebt." (*Gudmann.*)

I am unable to separate from the types three slightly smaller captured females in which the tawny-reddish suffusion is much modified by greyish-fuscous sprinkling, and the pale ochreous ground-colour inclines to pale cinereous.

This species differs from the type of the genus in having veins 7 and 8 coincident, arising from a common stem with 9; but at present I am unwilling to create a new genus for its reception.

10. Aristotelia, Hb., Meyr.

This genus has been separated into sections under various names, such as *Evagora*, Clem., *Apodia*, Hein., *Ergatis*, Hein. The first two names are preoccupied, and *Ergatis* is a synonym of *Aristotelia*.

Aristotelia is used in a more extended sense in this paper than is accorded to it by Meyrick. At present it seems unnecessary to rename the different sections as here given, but this can be done at any future time if the subdivisions founded on neuration should be regarded as of sufficient value; when probably some of Walker's or Chambers's generic names will be found to apply.

The species which have veins 3 and 4 of the hind wings connate are narrow-winged derivatives of *Aristotelia*, and are not allied to *Gelechia*.

§ A. *Fore wings, 7 and 8 stalked, 6 out of 7. Hind wings, 3 and 4 connate.* (=§ *EVAGORA, Clem.*)

21. Aristotelia annulicornis, sp. n.

Antennæ pale straw-ochreous, minutely banded above with greyish fuscous, a distinct blackish band across the middle of the basal joint. *Palpi* pale straw-ochreous, with two smoky-black spots on the outer side of the second joint and a smoky-black ring near the end of the apical joint. *Head* and *thorax* pale straw-ochreous. *Fore wings* pale straw-ochreous, with a slight ferruginous shade along the middle from one-third to two-thirds, and several smoky-black spots and dots: the first at the base of the costa,

small and inconspicuous; at one-third a larger costal spot, with one, immediately above the dorsum, straight below it; at two-thirds a larger costal spot, with a very small one straight below it at the end of the cell, a few smaller ones lying around the apex and apical margin: cilia pale straw-ochreous with a slight vinous gloss. *Exp. al.* 8 mm. *Hind wings* pale grey; cilia with a slight vinous gloss. *Abdomen* yellowish grey. *Legs* whitish ochreous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 12 III.–14 IV. (*Gudmann, Hedemann*). Four specimens.

22. Aristotelia eromene, sp. n.

Antennæ stout; whitish ochreous, faintly annulated towards the apex. *Palpi* stout, second joint almost as long as the apical, smooth-scaled; whitish ochreous, clouded with fuscous externally, especially at the base and apex of the second joint, apical joint with two black annulations. *Head* and *thorax* pale ochreous. *Fore wings* pale ochreous, somewhat shaded with chestnut-brown along the middle; an elongate black costal spot at the base with a smaller one immediately beneath it; a small triangular costal spot before the middle, almost connected with two others placed obliquely beneath it, extending backward to the dorsum; a larger triangular costal spot (also black) before the commencement of the costal cilia; on the dorsum, beneath and before it, a slender black streak lies a little beyond the middle but does not leave the margin; a terminal series of small groups of black scales at the base of the greyish-ochreous cilia. *Exp. al.* 9 mm. *Hind wings* shining, pale grey; cilia shining, pale ochreous. *Abdomen* shining, greyish. *Posterior legs* whitish ochreous, externally smeared with fuscous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 20 III. (*Gudmann*); St. Croix, 2 V.–9 VI. (*Hedemann, Pontoppidan*). Three specimens.

Bred at St. Thomas by Mr. Gudmann from larvæ feeding on *Bromelia pinguin*, L.

This species differs from *annulicornis*, Wlsm., in the first dorsal spot being nearer to the base than the costal spot above it and in the larger size of the outer costal spot, as well as in the darker tone of colouring of the fore wings and in the absence of the annulation on the basal joint of the antennæ.

23. Aristotelia ornatipalpella, sp. n.

Antennæ rather stout, simple; cinereous with a slight indication of dark transverse lines above. *Palpi* smooth; olive-grey, with three black annulations on the second joint and two on the apical joint. *Head* and *thorax* dark olive-grey. *Fore wings* olive-grey, with a slight greenish tinge; a short black basal patch occupying the costal half is followed by a smaller costal patch at one-third, with a black dorsal patch a little beyond it; at the upper extremity

of the latter is a round black spot on the cell, almost connected with it; another small black costal patch lies at the commencement of the costal cilia and a round black dot beneath it at the end of the cell; a few black scales are scattered along the termen at the base of the olive-grey cilia. *Exp. al.* 8 mm. *Hind wings* shining, grey; cilia pale brownish grey. *Abdomen* brownish grey. *Legs* greyish, with dark patches on the spurs; hind tibiæ somewhat hairy above, tarsi faintly spotted.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Grenada (Balthazar, 250 ft., windward side, 27 IV.—*H. H. Smith*). Unique.

24. Aristotelia ostariella, sp. n.

Antennæ bone-white, very faintly annulated. *Palpi* slender, smooth, second joint scarcely thicker than the apical; bone-white, speckled with greyish fuscous. *Head* and *thorax* bone-whitish. *Fore wings* bone-whitish; a small greyish-fuscous spot at the base of the costa is followed by a small triangular costal spot before the middle, forming, with two others below it, a narrow transverse fascia tending slightly outwards to the dorsum; halfway between this and the apex is another greyish-fuscous costal patch with a dark fuscous spot below it at the end of the cell; a few greyish-fuscous scales around the termen at the base of the bone-ochreous cilia. *Exp. al.* 8 mm. *Hind wings* shining, very pale grey; cilia pale greyish ochreous. *Abdomen* greyish ochreous. *Legs* pale whitish ochreous.

Type, ♂ Mus. Gudmann.

Hab. **West Indies**—St. Thomas, 22–31 III. (*Gudmann*). Two specimens.

25. Aristotelia kittella, sp. n.

Antennæ (broken): basal joints black with a white annulation. *Palpi* smooth, very slender, second joint as long as the apical joint and scarcely to be distinguished from it in thickness; black externally with white annulations, one on the second joint and three on the apical. *Head* sooty-black. *Thorax* cream-white, with a black transverse band anteriorly which also crosses the base of the white tegulæ. *Fore wings* cream-white; a small black costal spot at the base, a broad black transverse fascia before the middle, slightly attenuated at its centre, and a triangular black costal spot halfway between the fascia and the apex, this is preceded by a small black spot on the dorsum and followed by a few black scales on the termen below the apex; cilia cream-white. *Exp. al.* 7 mm. *Hind wings* shining, very pale grey; cilia with a slight yellowish tinge. *Abdomen* grey; anal tuft subochreous. *Legs* shining, cream-whitish.

Type, ♂ Mus. Gudmann.

Hab. **West Indies**—Hayti (Port-au-Prince, 22 V., *Gudmann*). Unique.

26. ARISTOTELIA DORSIVITTELLA, Z.

Gelechia (Teleia?) dorsivittella, Z. Verh. z.-b. Ges. Wien, XXIII. 267–8, Pl. III. 20 (1873)[1]. *Gelechia dorsivittella*, Chamb. Bull. U.S. G.G. Surv. IV. 143 (1878)[2]; Riley, Smith's List Lep. Bor. Am. 101. No. 5357 (1891)[3].

Hab. UNITED STATES[2,3]—Texas[1]. **West Indies**—ST. CROIX, 6–14 V. (*Gudmann, Hedemann*).

§ B. *Fore wings, 7 and 8 stalked, 6 out of 7. Hind wings, 3 and 4 separate.*

27. ARISTOTELIA ROSEOSUFFUSELLA, Clem.

= *BELLELA*, Wkr.[16]

Gelechia? roseosuffusella, Clem. Pr. Ac. Nat. Sc. Phil. XII. 162–3, 434 (1860)[1]: Pr. Ent. Soc. Phil. II. 121 (1863)[2]. *Gelechia bellela*, Wkr. Cat. Lp. Ins. B.M. XXIX. 595 (1864)[3]. *Gelechia roseosuffusella*, Stn. Tin. N. Am. pp. x, 40, 113–4, 225 (1872)[4]; Chamb. Can. Ent. IV. 69, 148, 169, 193 (1872)[5]. *Gelechia (Ergatis) roseosuffusella*, Z. Verh. z.-b. Ges. Wien, XXIII. 272–3, Pl. IV. 24 (1873)[6]. *Gelechia roseosuffusella*, Mrt. Can. Ent. VI. 222 (1874)[7]; Chamb. Can. Ent. VI. 231 (1874)[8]. *Gelechia rosasuffusella*, Chamb. Cin. Qr. Jr. Sc. II. 290 (1875)[9]. *Gelechia roseosuffusella*, Chamb. Bull. U.S. G.G. Surv. III. 125[10], 141 (1877)[11]: Can. Ent. IX. 14 (1877)[12]: Bull. U.S. G.G. Surv. IV. 110[13], 146 (1878)[14]: Jr. Cin. Soc. N. H. II. 183 (1880)[15]. *Gelechia (Ergatis) roseosuffusella*, Wlsm. Tr. Am. Ent. Soc. X. 180 (1882)[16]. *Gelechia roseosuffusella*, Riley, Smith's List Lep. Bor. Am. 102. No. 5470 (1891)[17].

Hab. UNITED STATES[1–17], VI.[6], VII.[10], VIII.[9] Larva *Trifolium pratense*[7,13]. **West Indies**—SAN DOMINGO (Monte Christi, 17 V., *Gudmann*).

28. ARISTOTELIA PUDIBUNDELLA, Z.

n. syn. = *INTERMEDIELLA*, Chamb.

Gelechia (Ergatis) pudibundella, Z. Verh. z.-b. Ges. Wien, XXIII. 273–4 (1873)[1]. *Gelechia intermediella*, Chamb. Bull. U.S. G.G. Surv. IV. 89, 144 (1878)[2]. *Gelechia pudibundella*, Chamb. Bull. U.S. G.G. Surv. IV. 146 (1878)[3]. *Gelechia intermediella*, Wlsm. Tr. Am. Ent. Soc. X. 180–1 (1882)[4]. *Gelechia (Ergatis) pudibundella*, Wlsm. Tr. Am. Ent. Soc. X. 181 (1882)[5]. *Gelechia intermediella*, Riley, Smith's List Lep. Bor. Am. 101. No. 5392 (1891)[6]. *Gelechia pudibundella*, Riley, Smith's List Lep. Bor. Am. 102. No. 5454 (1891)[7].

Hab. UNITED STATES[1–7], VII.[1] **West Indies**—HAYTI (Cap Haïti, 18 V., *Gudmann*); ST. CROIX, 28 IV.–7 V. (*Hedemann*), 7 VII. (*Pontoppidan*).

29. Aristotelia trossulella, sp. n.

Antennæ brownish fuscous, annulated with white beyond their basal fourth. *Palpi* long, slender, smooth, apical joint somewhat longer than the second; subochreous, the second joint transversely banded with three brownish bars, the apical joint with slender brownish longitudinal lines. *Head* and *thorax* olive-brown. *Fore wings* bright olive-brown; from the extreme base an oblique leaden-grey line extends downwards to the dorsum at one-fifth; beyond it an oblique black line leaving the costa at one-fifth reaches nearly to the dorsum, accompanied throughout on its outer edge by a pinkish-ochreous line followed by steel-grey scales; a patch of steel-grey scales a little before the middle of the costa scarcely reaches beyond the upper margin of the cell, and is followed beyond the middle by a small pinkish-ochreous costal dot connected by some steel-grey scales with an inwardly oblique pinkish-ochreous line reverting towards the middle of the dorsum, black-margined on its inner edge and with steel-grey scales externally; some spots of steel-grey scales lie a little above the tornus, others being scattered around the termen and the inner extremities of a series of pinkish ochreous spots which, to the number of about seven, follow the margin of the wing at the base of the costal and terminal cilia and are separated by some dark fuscous scales; cilia subochreous along their base, outwardly with two slender grey lines running through them except at the tornus where they are uniformly greyish. *Exp. al.* 10 mm. *Hind wings* grey; cilia paler. *Abdomen* brownish grey. *Legs* whitish ochreous, obliquely banded with greyish fuscous externally.

Type, ♂ Mus. Gudmann.

Hab. **West Indies**—Jamaica (Kingston, 19 VII., *Cockerell*); San Domingo (Monte Christi, 19 V., *Gudmann*). Two specimens.

30. Aristotelia pulicella, sp. n.

Antennæ stoutish, ⅔; greyish, with some darker bands towards the apex. *Palpi*: second joint longer than the apical; whitish, the second joint with two black spots beneath, apical joint with two black rings, one at the base the other before the apex. *Head* and *thorax* whitish grey. *Fore wings* whitish grey, shaded with greyish fuscous, especially along the costal third; this is interrupted on the costa by a pale median space and some pale speckling before the apex; some minute blackish dots are scattered along the line of the fold, with one on the disc before the middle and a few black scales beneath the apex at the base of the yellowish-grey cilia. *Exp. al.* 7 mm. *Hind wings* brownish grey; cilia yellowish grey. *Abdomen* yellowish grey. *Legs* whitish ochreous, the tibiæ broadly banded externally and the tarsi minutely spotted posteriorly with fuscous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 7–8 III. (*Gudmann*, *Hedemann*). Three specimens.

31. ARISTOTELIA CRASSICORNIS, sp. n.

Antennæ stout, somewhat flattened; very pale cinereous. *Palpi* slender, second joint longer than the apical, slightly roughened beneath especially at the extremity of the second joint; whitish, shaded externally nearly to the end of the second joint, apical joint faintly biannulate. *Head* and *thorax* hoary whitish. *Fore wings* hoary whitish, sprinkled with greyish-fuscous scaling; with numerous short, slender, dark fuscous longitudinal streaklets accompanied by a few ferruginous scales, these have a tendency to follow the lines of the cell and of the fold, being only indicated on the costa by a minute streak at the base and two spots, one before the other behind the middle; cilia hoary whitish dusted with fuscous atoms. *Exp. al.* 8 mm. *Hind wings* shining, pale grey; cilia yellowish grey. *Abdomen* shining, iridescent, silvery grey. *Legs* whitish, tarsi unspotted.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—ST. JAN, 13–16 IV. (*Gudmann*). Two specimens, bred from a plant which was not identified.

"Raupe cylindrisch, 16-füssig, bläulich hellgrün mit einem rothen Gürtel, bestehend aus vier dunkelrothen Flecken in der Einschnürung zwischen den Segmenten, und zwei grössere rothe Flecke stehen am Rücken jedes Segments. Kopf hellbraun, Füsse von der Grundfarbe; das letzte Leibsegment bläulich grün, mit einem grossen rothen Flecke auf dem Rücken.

"Die Raupen leben zu zwei, drei oder vier gesellig zwischen zusammengesponnenen Blättern, und alle Excremente werden theils zwischen den Blättern, theils ausserhalb des Randes der Blattwohnung festgesponnen, so dass die Raupen ganz versteckt sind." (*Gudmann*).

§ C. *Fore wings*, 7 *and* 8 *stalked*, 6 *separate*. *Hind wings*, 3 *and* 4 *separate*.

32. ARISTOTELIA PICTICORNIS, sp. n.

Antennæ delicately annulated with white and blackish. *Palpi* very slender, smooth; beautifully marked with alternate rings of white and fuscous throughout. *Head* and *thorax* brownish fuscous. *Fore wings* brownish fuscous, evenly speckled and mottled with ashy grey throughout; a faint indication of a dark spot beyond the middle of the fold and groups of ashy-grey scales around the termen at the base of the ashy-grey cilia, through which run a slender dark dividing line beyond their middle. *Exp. al.* 10 mm. *Hind wings* as broad as the fore wings; pale chestnut-grey; the cilia about the termen grey, along the dorsum inclining to chestnut. *Abdomen* brownish ochreous. *Legs* with alternate rings of white and fuscous.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—ST. CROIX, 2 V. (*Hedemann*). Unique.

11. Eucatoptus, g. n.

(εὐκάτοπτος=easily seen.)

Type, *Eucatoptus penicillata*, Wlsm.

Antennæ (♂), ♂ very shortly ciliate; without pecten.

Maxillary palpi very short.

Labial palpi recurved; apical joint pointed, almost as long as the second; second joint somewhat flattened laterally, not roughly clothed beneath.

Haustellum well developed.

Head and *thorax* smooth.

Fore wings with the costa evenly arched; apex depressed, bluntly pointed; termen oblique, tornus evenly rounded. *Neuration*: 12 veins, 7 and 8 stalked, 7 to costa, 6 separate (6 sometimes out of 7, e. g *chalybeichroa*).

Hind wings hardly 1, elongate, trapezoidal; apex produced, pointed; termen emarginate beneath apex; tornus angular, dorsum straight; cilia 1½; ♂ with long pencil of expansible hairs from the base of the costa (extending almost the length of the cell of the fore wings). *Neuration*: 8 veins; 3, 4, and 5 remote, almost parallel, 6 and 7 remote.

Abdomen slender.

Legs: hind tibiæ thinly haired above.

Closely allied to *Aristotelia*, Hb., from which it is distinguished by the costal hair-pencil of the ♂.

§ A. *Fore wings, 7 and 8 stalked, 6 out of 7. Hind wings, 3 and 4 separate.*

33. Eucatoptus chalybeichroa, sp. n.

Antennæ: basal joint somewhat enlarged and flattened in the ♂; whitish cinereous, very faintly annulated with two darker bands towards the apex. *Palpi*: second joint as long as the apical joint, somewhat roughly clothed; dirty whitish, with two fuscous spots on the second joint externally and two fuscous annulations on the apical joint. *Head* and *thorax* dirty whitish, speckled with cinereous. *Fore wings* brownish cinereous, with a steely gloss throughout and some ferruginous scaling, especially on the outer half; at the extreme base of the costa is a small dark fuscous spot, narrowly connected with an oblique narrow broken fascia of the same colour, extending outwards to the dorsum, which it reaches at about one-fourth the wing-length; beyond this is a minute black spot on the outer half of the fold, the remainder of the wing to the apex being speckled with black scales, some preceded by whitish; on the costa before the apex is an elongate shining whitish spot, followed by black speckling around the base of the terminal cilia which partake of the wing-colour, but tending to pale grey at the tornus, with a dark shade running

around their extreme tips. *Exp. al.* 9 mm. *Hind wings*: ♂ with a strong expansible hair-pencil at the base of the costa; shining pale steel-grey; cilia with a slight yellowish tinge. *Abdomen* shining pale brownish cinereous. *Legs* whitish cinereous, much speckled with greyish fuscous.

Type, ♀ Mus. Wlsm.; ♂ Mus. Gudmann.

Hab. **West Indies**—St. Thomas, 4–8 IV. (bred from *Acacia arabica*—*Gudmann*).

§ B. *Fore wings*, 7 *and* 8 *stalked*, 6 *separate*. *Hind wings*, 3 *and* 4 *separate; with costal hair-pencil in* ♂.

34. Eucatoptus penicillata, sp. n.

Antennæ greyish. *Palpi*: second joint smooth but somewhat stout; white, but spotted externally with greyish fuscous, the apical joint biannulate with the same. *Head* whitish ochreous. *Thorax* light ochreous. *Fore wings* ochreous, mottled with greyish fuscous and metallic steel-grey, with creamy-white streaks and spots; an oblique greyish-fuscous patch, edged with blackish scales externally, extends from the base of the costa nearly to the dorsum and is immediately followed by a triangular whitish streak of equal length; two small whitish spots on the costa beyond it are followed around the termen by short streak-spots through the terminal cilia; two small black dots lie on the cell, the first at one-half, the other at its end; the steel-grey mottling appears to accompany the paler markings, except in the case of one patch near the tornus; a rosy tinge appears beyond the edge of the cell and between the black dots upon it; cilia rosy greyish. *Exp. al.* 10 mm. *Hind wings*: ♂ with a conspicuous, long, brownish ochreous, expansible hair-pencil arising near the base of the costa; pale grey, cilia brownish grey. *Abdomen* brownish grey. *Legs* whitish, faintly spotted externally.

Type, ♀ Mus. Gudmann; ♂ Mus. Wlsm.

Hab. **West Indies**—Hayti (Cap Haïti, 20 V., *Gudmann*); San Domingo (Monte Christi, 12 V., *Gudmann*); St. Croix, 28 IV. (*Hedemann*); St. Thomas, 12–31 III. (*Gudmann*, *Hedemann*).

35. Eucatoptus rubidella, Clem.

= *rubensella*, Chamb.[9]; =**pudibundella*, Chamb. (nec Z.).

Gelechia? rubidella, Clem. Pr. Ac. Nat. Sc. Phil. XII. 163, 434 (1860)[1]: Pr. Ent. Soc. Phil. II. 121 (1863)[2]; Stn. Tin. N. Am. pp. x, 40, 115, 225 (1872)[3]. *Gelechia rubensella*, Chamb. Can. Ent. IV. 193–4 (1872)[4]; Mrt. Can. Ent. VI. 222 (1874)[5]. *Gelechia pudibundella*, Chamb. Can. Ent. IX. 23 (1877)[6]. *Gelechia rubensella*, Chamb. Bull. U.S. G.G. Surv. IV. 89, 147 (1878)[7]. *Gelechia rubidella*, Chamb. Bull. U.S. G.G. Surv. IV. 147 (1878)[8]. *Gelechia* (*Ergatis*) *rubidella*, Wlsm. Tr. Am. Ent. Soc. X. 180–1 (1882)[9]. *Gelechia rubensella*, Pack. U.S. Dept. Agr. Rp. Ent. V.

220, No. 387 (1890)[10]. *Gelechia rubidella*, Riley, Smith's List Lep. Bor. Am. 102. No. 5471 (1891)[11].

Hab. UNITED STATES [1-11], VIII.[4] Larva *Quercus* [5,10]. **West Indies**—ST. CROIX, 24–6 IV. (*Hedemann*); ST. THOMAS, 9 III. (*Gudmann*).

36. EUCATOPTUS LYCOPERSICELLA, sp. n.

Antennæ mouse-grey, faintly annulated. *Palpi* rather short, somewhat stout, smooth; greyish fuscous externally, with four white bands; uniformly whitish on their inner side. *Head* and *thorax* mouse-grey. *Fore wings* greyish fuscous, evenly sprinkled with mouse-grey and some ferruginous; without describable markings, except a series of small groups of blackish scales around the termen at the base of the cilia, which are the same colour as the wing, except at the tornus where they are plain greyish. *Exp. al.* 9 mm. *Hind wings*: ♂ with a long ochreous hair-pencil above from the base of the costal margin; grey, cilia the same. *Abdomen* greyish. *Legs* whitish ochreous, laterally banded with greyish fuscous externally; hind tibiæ with ochreous hairs above.

Type, ♀ Mus. Wlsm.; ♂ Mus. Gudmann.

Hab. **West Indies**—ST. CROIX, 3–5 V. (*Gudmann*). Two specimens.

"Die Raupe lebt an *Lycopersicum* in einem umgeschlagenen Blattrande, von welcher Wohnung es, wenn es frisst, geht *minirend* in das Blatt hinein." (*Gudmann.*)

12. GENIADOPHORA, gen. n.

(γενειάς=a beard; φορεῖν=to bear.)

Type, *Pœcilia extranea*, Wlsm.

Antennæ more than $\frac{2}{3}$; basal joint long and slender.

Maxillary palpi minute.

Labial palpi recurved, divergent; apical joint as long as second; second joint with a divided comb-like brush beneath, extending also less conspicuously above it at its outer end.

Haustellum moderate.

Ocelli present.

Head and *thorax* smooth.

Fore wings narrow, elongate, apex slightly rounded, termen obliquely rounded. *Neuration*: 12 veins, 7 and 8 stalked, 7 to apex, the others separate.

Hind wings narrower than the fore wings, apex acute, termen obliquely bisinuate, dorsum parallel with costa. *Neuration*: 8 veins, 3 remote from 4, 6 and 7 separate, 5 approximated to 4.

Legs: hind tibiæ with long fine hairs above.

37. GENIADOPHORA EXTRANEA, Wlsm.

Pœcilia extranea, Wlsm. Pr. Z. Soc. Lond. 1891, 521–2, 546 (1892)[1].

Hab. **West Indies**—ST. VINCENT, V.[1]; GRENADA (*H. H. Smith*).

13. Xenolechia, Meyr.

38. Xenolechia glandiferella, Z.

= *sella*, Chamb. [3]

Gelechia (*Anacampsis*) *glandiferella*, Z. Verh. z.-b. Ges. Wien, XXIII. 275–6, Pl. IV. 25 (1873) [1]. *Gelechia sella*, Chamb. Can. Ent. VI. 238 (1874) [2]. *Gelechia glandiferella*, Chamb. Can. Ent. IX. 14 [3], 24 (1877) [4]: Bull. U.S. G.G. Surv. IV. 144 (1878) [5]; Riley, Smith's List Lep. Bor. Am. 101. No. 5382 (1891) [6].

Hab. United States [1–6], VII. [1, 2], VIII. [1], IX. [2] **West Indies**—Grenada (Mount Gay Estate, 300 ft., leeward side. 25–30 VIII.—(*H. H. Smith*).

Professor Riley (*l. c.* No. 6) sunk *Gelechia pallidochrella*, Chamb., as a synonym of this species, but under his number 5439 he retained it as a distinct species. Although it is obvious that *pallidochrella* is closely allied to *glandiferella*, I am not quite convinced that it is synonymous with it.

14. Gelechia, Hb.

39. Gelechia flammulella, sp. n.

Antennæ pale brownish. *Palpi* long, recurved, overarching the head, the second and third joints of almost equal length and stoutness; whitish, banded with chestnut-brown above (three bands on the second and two on the apical joint). *Head* hoary-greyish. *Thorax* whitish ochreous; tegulæ shaded with brown. *Fore wings* brownish ochreous along the costal, tawny-brown along the dorsal half, without any dividing line, the two colours blending beyond the middle; from the costa at the base a dark chocolate-brown shade curves downwards and outwards, ending in a conspicuous dash along the lower edge of the cell before the middle, its upper edge narrowly margined with whitish throughout, a minute dot of the same dark colour at the lower angle of the cell; the whole wing suffused with a rich vinous gloss; cilia brownish ochreous. *Exp. al.* 13·5 mm. *Hind wings* broader than the fore wings; grey; cilia inclining to brownish ochreous. *Abdomen* shining, yellowish grey; with a fuscous spot on the sides of each segment beneath. *Legs* with the hind tibiæ hairy above; shining, whitish with a slight ochreous tinge, two or three spots on the outer sides of the tibiæ; the two anterior pairs of legs are whitish, with numerous brownish fuscous bands.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—St. Thomas, 6–11 III. (*Gudmann*, *Hedemann*). Two specimens.

40. Gelechia perspicua, sp. n.

Antennæ with the basal joint very long and slender; dark brown, faintly annulated with whitish ochreous. *Palpi* very long, recurved, slender, the apical joint as long as the second; dark brown, mottled

with whitish ochreous. *Head* whitish, mottled with dark brown. *Thorax* dark brown, with faint whitish specklings at the tips of the scales; a silvery spot behind at the base of the abdomen. *Fore wings* dark brown, much mottled with whitish ochreous, mingled with iridescent green reflections; the paler colouring does not extend to the base but only to the sinuate oblique outer edge of a strongly-marked dark basal patch, the green metallic reflections being especially noticeable beyond its outer margin; below the middle of the costal margin is a small ocelloid spot with a dark brown centre, and the pale upper margin is preceded by a smaller one and followed by a third spot a little more distant from it, which forms the outer extremity of a dark brown shade; three patches of raised whitish-ochreous scales, the first on the disc before the middle, and two below the disc almost reaching the dorsum, the one before the other behind the middle; the apical portion of the wing is much mottled and contains a paler costal patch at one-fourth from the apex; cilia dark brown, at the apex mottled with whitish ochreous and tending to dull grey at the tornus. *Exp. al.* 13 mm. *Hind wings* very transparent, the veins indicated by greyish brown, the intermediate spaces except at the apex with bright steel-blue iridescence; cilia brownish grey. *Abdomen* greyish brown. *Hind legs* dark brown, spotted and banded with whitish ochreous.

Type, ♂ Mus. Gudmann.

Hab. **West Indies**—HAYTI (Cap Haïti, 18 V., *Gudmann*). Unique.

This species has somewhat the appearance of *Xenolechia humeralis*, Z.

41. GELECHIA TRANSLUCIDA, Wlsm.

Bryotropha translucida, Wlsm. Pr. Z. Soc. Lond. 1891, 520, 545 (1892)[1].

Hab. **West Indies**—DOMINICA[1]; ST. VINCENT[1]; GRENADA (Balthazar, 250 ft., windward side, 27 IV.; Mount Gay Estate, 300 ft., leeward side, 3–10 IX.—*H. H. Smith*).

In the original description, by a clerical error, the type was recorded as a ♀; it is a ♂.

42. GELECHIA SPHENOPHORA, sp. n.

Antennæ brownish grey. *Palpi* brownish fuscous; apical joint with a pale ochreous spot at its apex. *Head* and *thorax* brownish grey. *Fore wings* olive-brown, inclining to ferruginous at the base, the lighter basal patch is bounded externally by an oblique cuneiform ochreous streak, tending outwards from the costa at one-fifth from the base and reaching to the fold; a small ochreous spot lies at the end of the discal cell, and a larger, rather paler, costal spot at the commencement of the costal cilia; around the termen are four or five ill-defined pale ochreous spots before the commencement of the olive-brown cilia. *Exp. al.* 10 mm. *Hind wings* blue-grey; cilia brownish grey. *Abdomen* brownish grey. *Legs* whitish

ochreous, obliquely banded on the tibiæ and broadly annulated on the tarsi with brownish grey.

Type, ♂ ♀ Mus. Wlsm.

Hab. **West Indies**—Grenada (Mount Gay Estate, 300 ft., leeward side, 1–5 X.; Balthazar, 250 ft., windward side, 5 IV.–8 V.—*H. H. Smith*). Four specimens.

43. Gelechia crocipunctella, Wlsm.

Lita crocipunctella, Wlsm. Pr. Z. Soc. Lond. 1891, 520–1, 546 (1892)[1].

Hab. **West Indies**—St. Vincent[1].

44. Gelechia leucocephala, sp. n.

Antennæ dark fuscous. *Palpi* white, the second joint with a single dark spot at its base; apical joint with two dark annulations, the first at the base, the other just before the apex. *Head* and face white. *Thoraæ* pale ochreous; tegulæ brownish fuscous. *Fore wings* pale ochreous, with dark brownish-fuscous mottlings or ill-defined patches; the first at the base reaching the costa, but not the dorsum, is connected narrowly on the costa and along the fold with a second, which is larger and extends nearly to the middle of the wing but does not cross the fold, this is also narrowly connected along the costa with a smaller costal patch at two-thirds from the base, a few dark fuscous scales lying at the end of the cell below it; cilia pale ochreous, some dark fuscous scaling lying at their base along the termen and apex. *Exp. al.* 10 mm. *Hind wings* pale shining grey; cilia pale greyish ochreous. *Abdomen* pale ochreous. *Legs* whitish ochreous.

Type, ♂ Mus. Gudmann.

Hab. **West Indies**—St. Thomas, 6 III. (*Gudmann*). Unique.

45. Gelechia capitella, F.

n. syn. = *robustella*, Wkr.; n. syn. = *rivulella*, Mschl.

Alucita capitella, F. Ent. Syst. III. (2) 330. No. 2 (1794)[1]. *Phalæna* (*Alucita*) *capitella*, Turton, Syst. Nat. III. 379 (1806)[2]. *Gelechia robustella*, Wkr. Cat. Lp. Ins. B. M. XXIX. 597 (1864)[3]. *Gelechia rivulella*, Mschl. Ab. Senck. Nat. Ges. XV. 344, 354 (1890)[4]. *Gelechia robustella*, Wlsm. Pr. Z. Soc. Lond. 1891, 519, 545 (1892)[5]. *Gelechia rivulella*, Wlsm. Pr. Z. Soc. Lond. 1891, 519, 545 (1892)[6].

Hab. **West Indies**—Jamaica[3,5]; Portorico[4,6]; [St. Croix (?="Americæ Insulis, *Dr. Pflug*"[1]), *Wlsm.*]; St. Thomas, 6 III.–5 IV. (*Gudmann*, *Hedemann*).

Bred by Baron von Hedemann, but the plant not identified. "It was bred from a very small plant growing on very dry sandy places, where also the moth was to be found in abundance" (*Hdm.*).

Fabricius obtained this species from Dr. Pflug, who died in St. Croix, which island is probably indicated by "in Americæ

Insulis." Fabricius's description is sufficiently good to leave little doubt that he had *robustella*, Wkr., before him. I have examined Walker's type, and consider Möschler's description of *rivulella* to refer to the same species.

46. Gelechia bosquella, Chamb.

n. syn. = *costipunctella*, Mschl.

Œcophora basqueella, Chamb. Can. Ent. VII. 92 (1875)[1]. *Gelechia basqueella*, Chamb. Can. Ent. VII. 124 (1875)[2]. *Gelechia? bosquella*, Chamb. Bull. U.S. G.G. Surv. IV. 87, 142 (1878)[3]. *Gelechia (Bryotropha?) bosquella*, Wlsm. Tr. Am. Ent. Soc. X. 178 (1882)[4]. *Gelechia costipunctella*, Mschl. Ab. Senck. Nat. Ges. XV. 344, 354 (1890)[5]. *Gelechia bosquella*, Riley, Smith's List Lep. Bor. Am. 100. No. 5329 (1891)[6]. *Gelechia costipunctella*, Wlsm. Pr. Z. Soc. Lond. 1891, 519, 545 (1892)[7].

Hab. United States[1-4, 6]. **West Indies**—Jamaica (Monteagne, 1100 ft., XI., *Rendall*); Portorico[5, 7]; St. Croix, 23 IV. (*Hedemann*); St. Thomas, 10 IV. (*Gudmann*); Grenada (Balthazar, 250 ft., windward side, 5–10 IV.—*H. H. Smith*).

Three specimens which cannot be separated from *bosquella* received from Texas, although like many of the insular forms they are slightly smaller. They also agree well with Möschler's description of *costipunctella*, and I have little doubt that he had this species before him.

47. Gelechia donatella, Wkr.

Gelechia donatella, Wkr. Cat. Lp. Ins. B. M. XXIX. 596–7 (1864)[1]; Wlsm. Pr. Z. Soc. Lond. 1891, 519, 545 (1892)[2].

Hab. **West Indies**—Jamaica[1, 2].

48. Gelechia exclarella, Mschl.

Gelechia exclarella, Mschl. Ab. Senck. Nat. Ges. XV. 343–4, 354 (1890)[1]; Wlsm. Pr. Z. Soc. Lond. 1891, 519, 545 (1892)[2].

Hab. **West Indies**—Portorico[1, 2].

49. Gelechia biniveipunctata, sp. n.

Antennæ fuscous above, banded with white beneath, the annulations more widely separated towards the apex than on the stem. *Palpi*: apical joint as long as the second, the latter slightly roughened beneath; whitish, the second joint shaded externally at the base with fuscous, a fuscous spot at its apex; apical joint with two broad fuscous bands. *Head* and *thorax* cream-white, laterally shaded with brownish fuscous. *Fore wings* tawny brown, with two white costal spots, the first small at half the wing-length, the second larger at the commencement of the costal cilia; an ochreous band beginning at the base follows the dorsum to the end of the fold, where it terminates in a slight rounded projection above the fold; its upper edge is indented about the middle by a dark

tawny-brown spot, blending with the ground-colour above it; three shining steel-grey bands can be traced with the lens, the first commencing on the costa at one-fifth and tending obliquely outwards to the fold; the second, commencing at the first costal spot, runs almost straight to the fold, and slightly encroaches on the ochreous band beneath it; the third, slightly preceding the second costal spot at its lower extremity, reaches to the dorsum at the termination of the ochreous band; cilia tawny brown, with an admixture of steel-grey scales. *Exp. al.* ♂ 8; ♀ 10 mm. *Hind wings* steel-grey; cilia yellowish grey. *Abdomen* brownish grey. *Legs* pale cinereous; tarsi faintly spotted.

Type, ♂ ♀ Mus. Wlsm.

Hab. **West Indies**—Grenada (Balthazar, windward side—*H. H. Smith*). Three specimens.

50. Gelechia postpallescens, sp. n.

Antennæ brownish fuscous with whitish annulations. *Palpi*: apical joint as long as the second joint; whitish, with a fuscous spot externally on the basal half of the second joint. *Head* and *thorax* creamy ochreous, the latter margined at the sides with brownish fuscous. *Fore wings* narrow; brownish fuscous, sparsely sprinkled with ochreous scales; a creamy-ochreous dorsal streak occupies one-third the width of the wing and runs from the base through the tornal cilia; a small creamy-ochreous costal spot lies at one-fourth from the apex, and a few pale ochreous scales are visible at the base of the brownish-fuscous terminal cilia. *Exp. al.* 9 mm. *Hind wings* and cilia grey. *Abdomen* brownish grey. *Legs* whitish ochreous; tarsi minutely spotted with fuscous.

Type, ♀ Mus. Wlsm.

Hab. **West Indies**—Grenada (Balthazar, 250 ft., windward side, 15 IV.—*H. H. Smith*). Unique.

51. Gelechia jamaicensis, sp. n.

Antennæ creamy white, with greyish-fuscous annulations. *Palpi*: apical joint as long as the second joint, the latter slightly roughened beneath; cream-white, the second joint doubly barred with fuscous externally, the apical joint biannulate with fuscous. *Head* creamy white. *Thorax* pale ochreous, whitish anteriorly. *Fore wings* pale ochreous, with a slight admixture of creamy-white and some ferruginous shading; sprinkled and suffused with greyish fuscous above the fold and along the costa (especially on its outer two-thirds, where it extends to half the width of the wing), presenting a peppered or irrorated appearance; this irroration is continued around the termen and in the base of the greyish cilia; two dark ferruginous-brown ocellated spots before the middle of the wing, the first at the commencement of the outer third of the fold, the other above and very slightly beyond it (in some specimens these spots are hardly noticeable, while in others the upper one is preceded and followed by similar spots). *Exp. al.* 8 mm.

Hind wings and cilia brownish grey. *Abdomen* greyish ochreous. *Hind legs* creamy-whitish, with greyish-fuscous tibial shades and tarsal spots.

Type, ♂ ♀ Mus. Wlsm.

Hab. **West Indies**—Jamaica (Kingston, VII. 1892—*T. D. A. Cockerell*). Seven specimens. "So abundant round the lamp in my house during the past week as to amount to a pest, getting into the drinking water, &c.," Ckrll. *i. l.* 18 VII. 1892.

52. Gelechia gudmannella, sp. n.

Antennæ pale brownish cinereous. *Palpi* whitish cinereous, shaded externally. *Head* and *thorax* pale brownish cinereous. *Fore wings* pale brownish cinereous, sparsely speckled with black; on the cell before the middle is a minute elongate black streaklet, followed by a second in the same line with it at the end of the cell; a small black spot on the fold lies below the first streaklet, and on the costal and apical portion a few slender pale lines are traceable along the veins, but these are very inconspicuous; around the termen and apex minute groups of blackish scales mark the base of the cilia, through the upper portion of which runs a slender dark line, the cilia being otherwise scarcely paler than the ground-colour. *Exp. al.* 8–10 mm. *Hind wings* shining greyish; cilia paler, with a slight ochreous tinge; on the costal margin near the base appears a slight thickening of cuticle, with a small brownish-ochreous hair-pencil. *Abdomen* pale brownish cinereous. *Legs* whitish cinereous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—San Domingo (Puerto Plata, 16 V.—*Gudmann*); St. Croix, 27 IV. (*Gudmann*); St. Thomas, bred from *Solanum*, 24–25 III. (*Gudmann*, *Hedemann*).

15. Didactylota, Wlsm.

= § *Dactylota*, Snell.

53. Didactylota bicolor, Wlsm.

Didactylota bicolor, Wlsm. Pr. Z. Soc. Lond. 1891, 522, 546 (1892)[1].

Hab. **West Indies**—St. Vincent[1].

16. Polyhymno, Chamb.

= *Copocercia*, Z.

54. Polyhymno luteostrigella, Chamb.

= *fuscostrigella*, Chamb.[3]

Polyhymno luteostrigella, Chamb. Can. Ent. VI. 247–8 (1874)[1]. *Polyhymno fuscostrigella*, Chamb. Can. Ent. VIII. 30–1 (1876)[2]. *Polyhymno luteostrigella*, Chamb. Bull. U.S. G.G. Surv. IV. 161 (1878)[3]; Jr. Cin. Soc. N.H. II. 198, 203, fig. 26 (1880)[4]; Beut.

Ent. Am. V. 37 (1889)[5]; Wlsm. Tr. Ent. Soc. Lond. 1891, 95, 96, Pl. VII. 78 (1891)[6]; Riley, Smith's List Lep. Bor. Am. 104, No. 5586 (1891)[7].

Hab. United States[1-7], VIII.[1] **West Indies**—Jamaica (Monteague, 1100 ft., XI.—*Rendall*); St. Thomas, 12 III.–2 IV. (*Gudmann*, *Hedemann*).

55. Polyhymno laterestriata, sp. n.

Antennæ white, faintly shaded with greyish ochreous beyond the base. *Palpi* white. *Head* white. *Thorax* greyish; tegulæ white. *Fore wings* shining silvery white, the extreme apical portion bright orange; a very oblique brownish-grey costal streak, followed by a scarcely less oblique white one, runs through the orange space nearly to a conspicuous white-margined black spot at the apex, and is met by a more slender oblique streak from the dorsum, also followed by a parallel white streak, wider than the one above it, and nearly divided at its middle by a slender dark line reverting from the tornus; cilia on their upper half with a shining bronzy shade at their base and a grey line running through them obliquely downwards from the apex; on their lower half whitish. *Exp. al.* 10 mm. *Hind wings* whitish grey; cilia white, a reduplicated dark line running through them across the apex. *Abdomen* whitish, shaded with grey above, with a series of oblique lateral grey streaklets on either side; anal tuft whitish. *Legs* white; hind tarsi shaded and spotted with greyish fuscous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 30 III.–10 IV. (*Hedemann*). Two specimens.

56. Polyhymno sciurella, sp. n.

Antennæ white. *Palpi* shining white. *Head* and *thorax* shining white. *Fore wings* shining bluish white, with an elongate bright orange patch preceding the apex and reaching the costa but not the dorsum; this is preceded by a slight greyish shade, which does not extend along its upper edge and is followed by a strong black apical spot; before and below the spot is an outwardly curved greyish shade, partly enclosing an elongate silver-white oblique streak along the tornus; alternate orange and greyish-fuscous lines diverge downwards from the apex through the upper half of the cilia, which are plain greyish white about the tornus. *Exp. al.* 8 mm. *Hind wings* pale blue-grey; cilia whitish grey, with two slender dark lines crossing them at the apex. *Abdomen* silvery, with a remarkably long and dense pale ochreous anal tuft in the male. *Legs*: hind tibiæ pale ochreous; tarsi white, the spurs tipped and the tarsi biannulate with greyish fuscous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 22–24 III. (*Gudmann*, *Hedemann*). Three specimens.

57. POLYHYMNO? GODMANI, Wlsm.

Polyhymno? godmani, Wlsm. Pr. Z. Soc. Lond. 1891, 525, 546 (1892)[1].

Hab. **West Indies**—SAN DOMINGO (Puerto Plata, 16 V.—*Gudmann*); ST. VINCENT[1].

17. ANACAMPSIS, Crt.

= *TACHYPTILIA*, Hein., Stgr. & Wk., Meyr., &c.

The type of *Anacampsis* is *Tinea populella*, Cl., as specified by Curtis, Br. Ent., expl. Pl. 189 (1827). For many years this generic name has been separated from its type and used for the *anthyllidella* group, for which there is no justification, and *Tachyptilia*, Hein., which has usurped the place of the true *Anacampsis*, Curtis, must sink as its synonym.

58. ANACAMPSIS PLUMBEOLATA, sp. n.

Antennæ greyish. *Palpi* very slender, strongly recurved, smooth, the apical joint slightly longer than the second; greyish, with a black spot at their base externally. *Head* and *thorax* smooth; leaden grey. *Fore wings* shining, leaden grey, with five blackish spots—one on each side of the fold near its base, one resting on the middle of the fold, with another immediately above and slightly beyond it, the fifth at the end of the cell; a scarcely perceptible outwardly angulated paler band crosses the wing at one-fourth from the apex, terminating in a white spot at the commencement of the costal cilia, whence a row of blackish spots extends around the apex and termen; cilia pale leaden grey. *Exp. al.* 10·5 mm. *Hind wings* broader than the fore wings; brownish grey, cilia the same. *Abdomen* brownish grey. *Legs* whitish ochreous.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—ST. CROIX, 4 V. (*Hedemann*). Unique.

59. ANACAMPSIS CORNIFER, sp. n.

Antennæ greyish ochreous, faintly annulated with fuscous. *Palpi* slender, curved, the second joint comparatively short, closely clothed; whitish, with a distinct black patch on its outer side covering the basal two-thirds; apical joint slender, naked, twice the length of the second, yellowish white. *Head* and *thorax* greyish ochreous. *Fore wings* greyish ochreous, indistinctly speckled with fuscous, a black dot at the extreme base of the costa, two fuscous dots in the fold, two on the discal cell, a slight fuscous costal shade above the end of the cell, followed by a pale ochreous spot, a few fuscous scales lying around the apex and termen; there is a slight greyish suffusion across the middle of the wing, and beyond it from the pale costal spot a curved band, paler than the ground-colour, is indistinctly traceable across the wing; cilia greyish ochreous. *Exp. al.* 10–11 mm. *Hind wings*

brownish grey, with slightly paler cilia. *Abdomen* and *legs* brownish grey.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—St. Croix, 5–12 V. (*Gudmann, Hedemann*); St. Thomas, 20 III.–18 IV. (*Gudmann, Hedemann*). Six specimens.

Bred by Mr. Gudmann at St. Croix from larvæ feeding on *Croton flavens*.

In a specimen, which I regard as undoubtedly a variety of this species, the discal and plical dots are not traceable, the wing-surface being merely speckled with fuscous. It appears to be somewhat variable.

60. Anacampsis mangelivora, sp. n.

Antennæ greyish fuscous. *Palpi* long, recurved, slender, the apical joint much longer than the second; second joint smooth, clothed with closely-appressed black scales nearly to its apex, which is hoary; apical joint hoary, sprinkled with blackish scales. *Head* and *thorax* greyish fuscous, with hoary speckling. *Fore wings* greyish fuscous, with profuse hoary speckling; a dark fuscous elongate spot on the costa before the middle is preceded and followed by some hoary whitish scaling, of which there is also a slight patch at the commencement of the costal cilia; cilia hoary greyish. *Exp. al.* 14 mm. *Hind wings* brownish grey; cilia hoary grey. *Abdomen* brownish grey. *Legs* hoary greyish; hind tarsi annulate with dirty whitish.

Type, ♀ Mus. Gudmann.

Hab. **West Indies**—St. Thomas (bred from *Rhizophora mangel*, 21 IV.—*Gudmann*). Unique.

"Raupe zwischen zwei zusammengesponnenen, flach auf einandern liegenden Blättern von *Rhizophora*; flach, Kopf sehr gross, dunkelbraun. Der Körper gegen das After abnehmend in Breite, Grundfarbe schmutzig grün, mit drei sehr feinen lila-farbenen Rückenlinien; Bauch hellgelb, 16-füssig; nach der letzten Häutung wird sie fleischfarbig, Bauch etwas heller, Kopf dunkel-braun." (*Gudmann*).

61. Anacampsis quinquepunctella, sp. n.

Antennæ cinereous, faintly banded with fuscous. *Palpi* with the second joint somewhat triangular; dark brownish fuscous externally, white within and along the outer edge at its extremity; apical joint slender, naked, more than twice as long as the second; white. *Head* and *thorax* dull fawn-grey. *Fore wings* dull fawn-grey, with five greyish-fuscous spots; one above and one beneath the fold at one-fourth, one on the fold at its outer third with another on the cell a little above and beyond it and a small one at the end of the cell; half-way between this and the apex is an outwardly angulated, pale cinereous, narrow fascia; a small dark fuscous spot lies at the extreme base of the costa; cilia pale cinereous, darker towards the apex. *Exp. al.* 10–12 mm. *Hind*

wings almost concolorous with the fore wings, but with a slight brownish-grey tinge; cilia pale cinereous. *Abdomen* shining, brownish grey. *Legs* pale cinereous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Grenada (Balthazar, windward side, 5–15 IV.—*H. H. Smith*). Three specimens.

62. Anacampsis lapidella, sp. n.

Antennæ stone-grey. *Palpi* whitish; second joint somewhat triangular, with a brownish-fuscous shade, not reaching to its outer margin, externally; apical joint long, slender, erect. *Head* and *thorax* brownish fuscous. *Fore wings* stone-grey, sprinkled with brownish-fuscous scales, with a series of three brownish-fuscous discal spots; the first diffused downwards across the fold at about one-fifth, the second a little beyond a smaller plical spot beneath it, the third at the end of the cell, of irregular shape and somewhat diffused; above and a little beyond this is a small costal spot preceding an inverted pale cinereous costal streak, which forms the upper extremity of an ill-defined, narrow, pale cinereous fascia crossing the wing nearly parallel with the termen; cilia ochreous, speckled along their base with brownish fuscous and with a line of the same colour running through them around the apex and also along the termen. *Exp. al.* 13 mm. *Hind wings* brownish cinereous; cilia somewhat paler, with a reduplicated shade-line running through them. *Abdomen* brownish cinereous. *Hind legs* whitish cinereous, shaded externally with brownish fuscous; hind tibiæ densely hairy above.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Grenada (Balthazar, windward side, 15 IV.—*H. H. Smith*). Unique.

63. Anacampsis insularis, sp. n.

Antennæ greyish fuscous. *Palpi*: the second joint with a closely-appressed triangular tuft above; greyish fuscous; apical joint twice as long as the second, with two pale annulations. *Head* and *thorax* greyish fuscous. *Fore wings* greyish fuscous, with dirty whitish costal blotches reaching nearly half across the wing—one elongate, oblique, before the middle; another smaller, not oblique, on the middle; a third before the apex nearly meeting at its lower extremity a smaller one arising from a little beyond the tornus; some dark fuscous spots along the fold are connected by a dark line, and an irregular dark line along the outer part of the cell connects a small median spot with one a little below the apex; cilia bone-whitish, slightly spotted along their base. *Exp. al.* 8 mm. *Hind wings* greyish fuscous. *Abdomen* greyish fuscous. *Legs* greyish fuscous, spotted with bone-white.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—St. Thomas, 24 III. (*Hedemann*); St. Jan, 27 III. (*Gudmann*). Two specimens.

64. ANACAMPSIS DESECTELLA, Z.

Gelechia (*Tachyptilia*) *desectella*, Z. Hor. Soc. Ent. Ross. XIII. 362–3, Pl. V. 122 (1877)[1]. *Tachyptilia desectella*, Wlsm. Pr. Z. Soc. Lond. 1891, 523, 546 (1892)[2].

Hab. **West Indies**—CUBA [1, 2].

18. ACOMPSIA, Hb.

Type, (*Tinea*) *cinerella*, Cl. (Dp.).

ACOMPSIA, Hb. Verz. bek. Schm. 409 (1826); Stph. Ill. Br. Ent., Haust. IV. 222–3 (1834); Dp. Hist. Nat. Lp. Fr. XI. 19 (1838) [*nec* Meyr. HB. Br. Lp. 633–4 (1895)].

= *BRACHYCROSSATA*, Hein. Schm. Deutsch. Tin. 323–4 (1870); Stgr. & Wk. Cat. 300 (1871).

= *RECURVARIA* (Hw.). Meyr. HB. Br. Lp. 606–7 (1895).

Westwood [Syn. Gn. Br. Ins. 110 (1840)], writing under the heading "*Acampsia*," cites *tinctella*, Hb. (214), as the type. Staudinger and Wocke refer Hübner's figure of *cinerella* (173=†137 Stgr.) to Clerck's species of this name; but it certainly looks more like an *Œcophora*, and Westwood may have been justified in considering it to be the same species as *tinctella*, Hb. (214), otherwise *tinctella* could not be a possible type of *Acompsia*, not being cited by Hübner. In either case Westwood's specification is inadmissible, being subsequent to Duponchel's citation of *cinerella*, Cl. (= *ardeliella*, Hb. 437), as the type of Hübner's genus *Acompsia*. Haworth's genus *Recurvaria* was not published until 1828, and *Acompsia*, Hb. (1826), is therefore entitled to precedence. The fourth part of Haworth's Lp. Br., pp. 513–609, is usually considered to have been published in 1829, but the completed work is reviewed, Mag. N. H. I. 348–9 (September 1828).

Brachycrossata, Hein., must of course sink as a synonym whichever name is used for this genus; and there appears to be no justification for Meyrick's use of *Acompsia* for the *Œcophora* of Staudinger and Wocke's Catalog (HB. Br. Lp. 633–4), nor for the employment of *Recurvaria*, Hw. (in lieu of *Acompsia*, Hb.), for *Brachycrossata*, Hein.

65. ACOMPSIA ANGULIFERA, sp. n.

Antennæ greyish cinereous. *Palpi* smooth, slender, recurved; hoary grey, with a minute dark spot above near the apex. *Head* and *thorax* hoary greyish. *Fore wings* hoary greyish, with slight greyish-fuscous speckled shading; at the base of the costa is a small elongate blackish spot; on the fold at one-fourth from the base is a blackish transverse spot, followed by a smaller length-spot in the fold; at the middle of the costa is an outwardly oblique greyish fuscous shade, mixed with some chestnut scales, terminating in a slender curved line on the outer end of the cell; before the apex is a slender hoary whitish transverse fascia, slightly angulated outwards on the middle and preceded by a greyish-fuscous shade

mixed with some chestnut; the pale fascia is connected at each extremity with an internally dark margined pale line which passes around the base of the cilia, interrupted only at the extreme apex and forming a triangular pattern; a reduplicated slender fuscous and chestnut line runs through the hoary cilia along the termen. *Exp. al.* 9 mm. *Hind wings* and cilia leaden grey. *Abdomen* greyish. *Legs* hoary, speckled with greyish fuscous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Croix, 7 V.–11 V. (*Gudmann, Hedemann*); Grenada (Balthazar, windward side, 5–27 IV.—*H. H. Smith*). Eight specimens.

Bred by Mr. Gudmann from a plant which was not identified.

66. Acompsia psoricopterella, Wlsm.

Brachycrossata psoricopterella, Wlsm. Pr. Z. Soc. Lond. 1891, 523–4, 546 (1892)[1].

Hab. **West Indies**—St. Vincent[1].

19. Helcystogramma, Z.

=*Brachycrossata* (Hein.), *Sect. B*, Wlsm. Tr. Ent. Soc. Lond. 1891, 98–9.

67. Helcystogramma obseratella, Z.

Gelechia (*Helcystogramma*) *obseratella*, Z. Hor. Soc. Ent. Ross. XIII. 371–3, Pl. V. 127 (1877)[1]. *Helcystogramma obseratella*, Wlsm. Pr. Z. Soc. Lond. 1891, 523, 546 (1892)[2].

Hab. **West Indies**—Cuba[1, 2].

20. Trichotaphe, Clem.

68. Trichotaphe trigonella, Wlsm.

Trichotaphe trigonella, Wlsm. Pr. Z. Soc. Lond. 1891, 523, 546 (1892)[1].

Hab. **West Indies**—S. Croix, 15 V. (*Gudmann*); St. Vincent[1]. Bred by Mr. Gudmann, but the food-plant not determined.

69. Trichotaphe tegulella, sp. n.

Antennæ whitish ochreous, annulated with umber-brown. *Palpi* much flattened laterally, smooth, second joint with closely appressed clothing; umber-brown, on their inner side brownish ochreous. *Head* and *thorax* pale umber-brown; tegulæ conspicuously pale ochreous. *Fore wings* dark purplish fuscous, with an elongate blackish spot on the outer third of the fold, separating the dark upper portion of the wing from the narrow dorsal portion, which, below and beyond the fold, is throughout pale ochreous; a small white spot lies at the end of the cell and a larger white costal spot before the apex, this is connected with the tornus by a narrow broken line of ochreous scales; along the termen is a narrow blackish band preceded by a curved line of

white dots parallel with the margin and followed by the purplish-grey cilia. *Exp. al.* 14 mm. *Hind wings* greyish brown; cilia grey, with a dark dividing shade near the base. *Abdomen* greyish brown. *Legs* greyish brown, faintly spotted with whitish ochreous, paler on their inner sides throughout.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Grenada (Balthazar, windward side, 15 III.–10 IV.—*H. H. Smith*). Three specimens.

21. Malacotricha, Z.

70. Malacotricha zingarella, sp. n.

Antennæ nearly as long as the fore wing; greyish. *Palpi* rather long, slender, curved; the second joint with long hair-like scales above; white. *Head* subochreous above, face white. *Thorax* subochreous. *Fore wings* narrow, elongate, the costa depressed about the middle, apex somewhat rounded, termen very oblique; ochreous, mottled with brick-red and streaked with steel-blue, with three black dots along the termen; cilia steel-grey. (It is difficult to describe the exact distribution of the colours, the brick-red occurring between the ochreous spaces, also between some steel-blue lines that mark the course of the apical nervules and along the terminal margin separating the three black dots from the cilia; the steel-blue is especially noticeable about the costal portion of the wing, where it runs in slender lines through the brick-red and ochreous spaces.) *Exp. al.* 9 mm. *Hind wings* and cilia pale grey. *Abdomen* subochreous. *Legs* whitish.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Croix, 1 V. (*Gudmann*); St. Thomas, 11–21 III. (*Hedemann*). Four specimens.

"The larva mines in the fleshy leaves of *Coccoloba uvifera*. Mr. Gudmann has bred this species in numbers" (*Hedemann*).

"Raupe 16-füssig, nach hinten zu stark zugespitzt, gelbgrün mit durchscheinenden Darmkanal, zwischen den Segmenten stark eingeschnürt. Kopf braun, rund, kann bis zur Hälfte in die Haut des ersten Segments eingezogen werden; Afterklappe mit dunklem Schild von der Farbe des Kopfes.

"Die Minen sassen meistens nur am Rande des Blattes und öfters sehr viele in demselben Blatte. Verpuppung in der Mine." (*Gudmann.*)

22. Drepanoterma, g. n.

(δρέπανον = a scimitar; τέρμα = an end.)

Type, *Drepanoterma lacticaudellum*, Wlsm.

Antennæ as long as the fore wings, biciliate (1).

Labial palpi recurved, long, smooth, flattened, divergent; apical joint scarcely half the length of the second.

Maxillary palpi very short.

Haustellum long.

Head with appressed scales.

Thorax smooth.

Fore wings narrow, elongate, of approximately even width throughout, somewhat securiform, apex slightly uncate, termen oblique, tornus angular. *Neuration*: 11 veins (7 and 8 coincident), 2 and 3 stalked.

Hind wings trapezoidal, slightly broader than the fore wings, dorsum sinuate, tornus obtusely angular, not incised beneath the apex, costa straight, abdominal angle developed. *Neuration*: 8 veins, 6 and 7 connate, 3 and 4 from a short stalk, 5 approximated to 3+4.

Abdomen somewhat flattened, anal tuft rather strongly developed.

Legs: hind tibiæ somewhat roughly (but not thickly) clothed.

Allied to *Strobisia*, Clem., but easily separated by the length of the antennæ, the shape of the termen, and the longer palpi.

71. Drepanoterma lacticaudellum, sp. n.

Antennæ dark fuscous, very faintly annulated; basal joint whitish beneath. *Palpi* bronzy brown, apical joint tipped with white. *Head* and *thorax* dark purplish. *Fore wings* shining ferruginous, the basal third transversely blotched and striated with dark purplish fuscous and dark ferruginous, the apex and termen also shaded with dark purplish fuscous and illuminated with steel-grey patches; cilia whitish ochreous, with dark grey streaks running through them (to the number of five or six), at the tornus purplish fuscous. *Exp. al.* 12 mm. *Hind wings* dark coppery grey with iridescent reflections at the base of the cell; cilia coppery grey. *Abdomen* dark purplish fuscous, anal tuft conspicuous, whitish ochreous. *Legs* shining creamy whitish, tarsi and tibiæ shaded with greyish.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Grenada (Chantilly Estate, 350 ft., windward side, 13 IV.—*H. H. Smith*). One specimen taken on the banks of a stream.

23. Menesta, Clem.

72. Menesta? cinereocervina, Wlsm.

Gelechia cinereocervina, Wlsm. Pr. Z. Soc. Lond. 1891, 519–20, 545 (1892)[1].

Hab. **West Indies**—St. Vincent[1].

The neuration of the fore wings of this species as recorded (*l. c.* 519) is erroneous. I find on a re-examination of the two original specimens that they have only eleven veins, not *twelve*, and therefore wish to amend my original description as follows:—

Fore wings with 11 veins (7 and 8 coincident), 7+8 approximated to 9, running to the costa.

With this correction *Gelechia cinereocervina* differs from *Menesta tortriciformella*, Clem., in having 6 and 7 of the hind wings connate instead of stalked, and in not having biciliate antennæ; but for the moment I am unwilling to separate them generically.

24. Ypsolophus, F.

[It is doubtful whether this generic name is rightly employed, but not having concluded the study of its history I have adopted it in the sense in which it is used by Heinemann, Staudinger and Wocke, &c.]

73. Ypsolophus manellus, Mschl.

Ypsolophus manellus, Mschl. Ab. Senck. Nat. Ges. XV. 344–5, 354 (1890)[1]; Wlsm. Pr. Z. Soc. Lond. 1891, 525, 546 (1892)[2].

Hab. **West Indies**—Portorico[1, 2].

74. Ypsolophus rusticus, Wlsm.

Ypsolophus rusticus, Wlsm. Pr. Z. Soc. Lond. 1891, 525–6, 546 (1892)[1].

Hab. United States—Texas[1], 13 VI. **West Indies**—St. Vincent[1]; Grenada (Mount Gay Estate, 300 ft., leeward side, 25 VIII.–10 IX.—*H. H. Smith*).

75. Ypsolophus piperatus, Wlsm.

Ypsolophus piperatus, Wlsm. Pr. Z. Soc. Lond. 1891, 526, 546 (1892)[1].

Hab. **West Indies**—S. Thomas, 31 III.–9 IV. (*Gulmann, Hedemann*); St. Vincent[1].

"Larva mining in the leaves of a *Solanea*" (*Hedemann*). "On a papilionaceous plant with pink cluster-flowers" (*Gudmann*).

76. Ypsolophus indignus, Wlsm.

Ypsolophus indignus, Wlsm. Pr. Z. Soc. Lond. 1891, 526–7, 546 (1892)[1].

Hab. **West Indies**—St. Croix, 4 V. (*Hedemann*); St. Thomas, 10 III. (*Gulmann*); St. Vincent[1]; Grenada (Balthazar, 250 ft., windward side, 5–30 IV.—*H. H. Smith*).

77. Ypsolophus juventellus, sp. n.

Antennæ ochreous, delicately annulated with umber-brown. *Palpi* white on their inner sides, the triangularly-tufted second joint umber-brown externally to two-thirds of its length. *Head* and *thorax* whitish ochreous. *Fore wings* umber-brown, with a broad whitish-ochreous band extending from the base to the termen along the dorsal half of the wing, its upper edge indented at and beyond the middle by two slight projections of the darker ground-colour; three umber-brown spots on the termen above the tornus are followed by the whitish-ochreous cilia, through which runs an evenly curved line of umber-brown, giving the apex a rounded appearance; a small oblique white dot lies on the costa before the apex, the dorsum is slightly shaded with umber-brown. *Exp. al.* 9 mm. *Hind wings* and cilia bluish grey. *Abdomen* grey. *Legs*

whitish ochreous, shaded and banded on the tarsi with umber-brown.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—JAMAICA (Monteague, 1100 ft., XI.—*Rendall*). Unique.

78. YPSOLOPHUS? STRATELLUS, sp. n.

Antennæ biserrate towards the apex; fuscous, annulate with pale cinereous, basal and adjacent joints brownish ochreous. *Palpi* (missing). *Head* cinereous. *Thorax* leaden grey above, brownish ochreous at the sides, with two lateral ferruginous spots posteriorly. *Fore wings* brownish ochreous on the costal half, the dorsal half dark ferruginous blending to tawny fuscous; on the pale costal half the ground-colour blends and varies with many different tints, a shining leaden-grey suffusion along its lower edge reaching nearly to the apex is repeated near the base of the costa—the costa itself (especially on its outer half) becoming pale rusty brown rather than brownish ochreous: the dark dorsal half also varies in tone and colour, its upper edge (which although nearly straight is slightly indented a little beyond the middle) is rich reddish ferruginous throughout, blending to dark tawny fuscous along the dorsum and becoming even darker towards the termen and tornus; a leaden-grey line around the apex and termen is followed by the parti-coloured cilia, which are dark tawny grey on their dorsal half with three pale ochreous spots along their base and pale brownish ochreous on their costal half with rusty-brown spots near their base. *Exp. al.* 16 mm. *Hind wings* dark tawny grey, semitransparent with bluish reflections towards the base; cilia subiridescent bluish, or brownish grey. *Abdomen* bronzy grey. *Legs* brownish grey, with an æneous tinge externally.

Type, ♀ Mus. Wlsm.

Hab. **West Indies**—TRINIDAD (*F. W. Urich*). Unique.

The palpi are unfortunately missing in the type, but I have little doubt that it is a true *Ypsolophus* allied to *flavivittellus*, Clem., with which it agrees in neuration and general appearance.

25. LATHONTOGENUS, g. n.

(Λαθών = unknown; γένος = genus.)

Type, *Lathontogenus adustipennis*, Wlsm.

Antennæ ♂, uniserrate.

Labial palpi recurved, divergent; apical joint less than half as long as the second, acute; second joint laterally compressed, smooth beneath, clothed on the upper side towards its apex with a somewhat triangular tuft, which does not extend to the basal half.

Maxillary palpi distinct.

Haustellum rather short.

Ocelli obsolete.

Head and *thorax* smooth.

Fore wings narrow, elongate, apex not depressed, termen oblique and evenly rounded, not sinuate beneath apex, tornus not apparent. *Neuration*: 11 veins (2 and 3 coincident); 7 and 8 stalked out of 6, 7 to costa slightly before apex; 4 approximated to 2+3; 1 furcate at base.

Hind wings as broad as the fore wings; costa sinuate from before middle, clothed almost from the base with cilia of even length; strongly and angularly excavate beneath the produced apex, tornus rounded, dorsum straight, abdominal angle developed. *Neuration*: 8 veins; 3 and 4 connate or stalked, 5 approximated to 6, 6 and 7 somewhat approximated.

Legs: hind tibiæ with long hairs above and shorter ones beneath.

Allied to *Mesophleps*, Hb., but differing in neuration and in the structure of the palpi. I have been unable to refer this form to any of the genera proposed by Chambers.

79. LATHONTOGENUS ADUSTIPENNIS, sp. n.

Antennæ whitish ochreous, faintly annulated. *Palpi* whitish ochreous, the second joint reddish brown externally except the outer end of the fringe on its upper side. *Head* and *thorax* whitish ochreous. *Fore wings* whitish ochreous at the base and a little way along the costa (with the exception of a narrow fawn-brown line along the extreme margin from the base), blending into pale fawn-ochreous over the remaining wing-surface; an umber-brown shade extending from before the middle of the costa to the apex; three faint fawn-grey spots are visible, the first on the middle of the fold, the third at the end of the cell, and the second equidistant between them on the cell; cilia fawn-ochreous. *Exp. al.* 10–18 mm. *Hind wings* and cilia grey. *Abdomen* pale fawn-ochreous. *Legs* pale fawn-ochreous, tarsal joints transversely shaded.

Type, ♂ ♀ Mus. Wlsm.

Hab. West Indies—ST. CROIX, 27 IV.–5 V. (*Gudmann, Hedemann*); ST. THOMAS, 11–19 III. (*Gudmann, Hedemann*); GRENADA (windward side, Balthazar, 250 ft., 15–27 IV.; leeward side, Mount Gay Estate, 300 ft., 25–30 VIII.—*H. H. Smith*).

The specimens from St. Thomas and St. Croix are uniformly smaller (10–13 mm.) than those from Grenada (14–18 mm.); but I consider them to be the same species.

III. ŒCOPHORIDÆ.

26. ETHMIA, Hb.

Type, *Tinea aurifluella*, Hb. (=**pyrausta*, Hb.).

ETHMIA, Hb. Verz. bek. Schm. 163 (1822?).

n. syn. = *PSECADIA*, Hb. (1826); = *ANESYCHIA*, Hb. (1826); = *DISTHYMNIA*, Hb. (1826); = *MELANOLEUCA*, Stph. (1829);

= *Ædia*, Dp. (1836); = *Chalybe*, Dp. (1836); = *Azinis*, Wkr. (1863).

80. Ethmia confusella, Wkr.

= *strigosella*, Wkr.[3]; n. syn. = *ingricella*, Mschl.

Hyponomeuta confusellus, Wkr. Cat. Lp. Ins. B. M. XXVIII. 531 (1863)[1]. *Cryptolechia strigosella*, Wkr. Cat. Lp. Ins. B. M. XXIX. 710 (1864)[2]. *Psecadia ingricella*, Mschl. Ab. Senck. Nat. Ges. XV. 343, 354, (Pl.) fig. 19 (1890)[3]. *Psecadia* (*Cryptolechia*) *strigosa*, Ckrl. Jr. Inst. Jamaica, I. 33 (1891)[4]. *Psecadia confusella*, Wlsm. Pr. Z. Soc. Lond. 1891, 527, 546 (1892)[5]. *Psecadia ingricella*, Wlsm. Pr. Z. Soc. Lond. 1891, 527, 546 (1892)[6].

Hab. **West Indies**—Cuba (*Tring Mus.*): Jamaica[4,5,6], 19–21 VII.; Hayti (Port-au-Prince, *excl.* 6 VI.—*Gudmann*); San Domingo[1,2,3]; Portorico[3,6]; St. Croix, 6 V. (*Gudmann*); Dominica[3]; Grenada (windward side, Balthazar, 250 ft. 5–30 IV.; leeward side, Mount Gay Estate, 300 ft., 1–5 X.—*H. H. Smith*). Colombia—Bogota[5].

81. Ethmia subsimilis, sp. n.

Antennæ stout; dull greyish cinereous. *Palpi* smooth, recurved to the vertex, the apical joint shorter than the second; dirty whitish, with a greyish spot externally near the end of each joint. *Head* and *thorax* smoky whitish. *Fore wings* smoky whitish, with greyish-fuscous spots; a broken greyish-fuscous shade extends from near the base to beyond the middle of the costa, a series of spots and shades of a similar colour extending from before the middle of the costa to the dorsum beyond its middle in an outwardly curved and broken line; between this and the base are about ten greyish-fuscous spots irregularly scattered along and below the fold, two near the base on either side of the fold being somewhat darker than the others; beyond the fasciaform central shade are several ill-defined greyish-fuscous markings above and below the outer end of the cell, followed by a marginal series of about six rather darker spots not extending along the base of the costal cilia; a greyish-fuscous shade runs along the middle of the smoky-whitish cilia. *Exp. al.* 15 mm. *Hind wings* pale stone-grey, somewhat darkened towards their outer extremities; cilia smoky whitish. *Abdomen* stone-grey. *Hind tibiæ* smoky whitish, somewhat speckled and shaded.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Jamaica, 17 VII. (*Cockerell*). Unique.

This species differs from *Ethmia confusella*, Wkr., in the shape of the fore wings, which are somewhat squarer at the apex; the series of marginal dots do not revert along the costa as in that species, and, moreover, the spots and shades, although of the same colour, are not conspicuously arranged longitudinally, which is one of the marked features of the numerous forms of that insect. In size it is, perhaps, even smaller than *ingricella*, Mschl., which I am compelled to regard as a small form of Walker's species.

82. Ethmia joviella, sp. n.

Antennæ brownish cinereous. *Palpi* white, slightly dusky at the extreme apex. *Head* and *thorax* white; tegulæ with a black spot anteriorly. *Fore wings* white, with a slight brownish-cinereous shade along the costal portion; a large quadrate blackish spot at the base of the costa extends narrowly along the extreme margin to a black spot at one-sixth from the base; a second black spot lies a little before the middle of the wing at the upper edge of the cell, and there are three black spots below the fold, one at about one sixth, one at about one-half, and one below these two nearer to the first than to the second; just above the outer end of the fold opposite the tornus is another spot, less black, more inclining to fuscous; cilia white. *Exp. al.* 14 mm. *Hind wings* greyish brown; cilia white. *Abdomen* greyish brown, shaded with ochreous above at the base; anal tuft inclining to ochreous. *Legs* whitish, tarsi faintly mottled.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Grenada (Mount Gay Estate, 800 ft., leeward side, 1–5 X.—*H. H. Smith*). Unique.

83. Ethmia paucella, Wkr.

Hyponomeuta paucellus, Wkr. Cat. Lp. Ins. B.M. XXVIII. 530–1 (1863)[1]. *Psecadia paucella*, Wlsm. Pr. Z. Soc. Lond. 1891, 527, 546 (1892)[2].

Hab. **West Indies**—San Domingo[1,2].

84. Ethmia notatella, Wkr.

=*xanthorrhoa*, Z.[3]

Psecadia notatella, Wkr. Cat. Lp. Ins. B.M. XXVIII. 536 (1863)[1]. *Psecadia xanthorrhoa*, Z. Hor. Soc. Ent. Ross. XIII. 234–6, Pl. III. 71 (1877)[2]; Btl. Ent. Mo. Mag. XIX. 107 (1882)[3]; Snell. Tijd. v. Ent. XXX. 65 (1887)[4]; Mschl. Ab. Senck. Nat. Ges. XV. 341, 354 (1890)[5]. *Psecadia notatella*, Wlsm. Pr. Z. Soc. Lond. 1891, 528, 546 (1892)[6].

Hab. **West Indies** — San Domingo[1,6]; Portorico[2,5,6]; Curaçao[4,6].

85. Ethmia abraxasella, Wkr.

=*aureoapicella*, Mschl.[5]

Psecadia abraxasella, Wkr. Cat. Lp. Ins. B.M. XXX. 1016–7 (1864)[1]. *Psecadia aureoapicella*, Mschl. Ab. Senck. Nat. Ges. XV. 341–2, 354 (1890)[2]. *Psecadia abraxasella*, Wlsm. Pr. Z. Soc. Lond. 1891, 528, 546 (1892)[3].

Hab. **West Indies**—Cuba (*Tring Mus.*); Jamaica[3], 17 VII.; San Domingo[1,3]; Portorico[2,3].

86. Ethmia exornata, Z.

Psecadia exornata, Z. Hor. Soc. Ent. Ross. XIII. 238–40, Pl. III. 73 (1877)[1]; Wlsm. Pr. Z. Soc. Lond. 1891, 528, 546 (1892)[2].

Hab. **West Indies**—Cuba[1,2]. Peru—Chanchamayo[1,2].

87. Ethmia gelidella, Wkr.

Tamarrha gelidella, Wkr. Cat. Lp. Ins. B.M. XXIX. 817 (1864)[1]. *Psecadia gelidella*, Wlsm. Pr. Z. Soc. Lond. 1891, 528, 546 (1892)[2].

Hab. **West Indies**—Jamaica [1, 2].

88. Ethmia kirbyi, Mschl.

Psecadia kirbyi, Mschl. Ab. Senck. Nat. Ges. XV. 342–3, 354 (1890)[1]; Wlsm. Pr. Z. Soc. Lond. 1891, 528, 546 (1892)[2].

Hab. **West Indies**—Portorico [1, 2].

IV. BLASTOBASIDÆ.

27. Blastobasis, Z.

Type, *Œcophora* (*Scythris*) *phycidella*, Z.

Blastobasis, Z. Lin. Ent. X. 171 (1855); Hein. Schm. Deutsch. Tin. 387 (1870).

Zeller separated *phycidella*, Z., and *roscidella*, Z., from *Butalis* under the name *Blastobasis*, but giving only a brief indication of its characters. Heinemann constituted *phycidella* the type, and described the genus in detail, but with hardly sufficient precision for comparison with other genera now known to occur. It may be well to indicate the characters peculiar to the genus *Blastobasis*, remarking that those species which have been placed in it in the North American lists do not conform in neuration.

Antennæ: ♂ with pecten, strongly notched beyond the basal joint, uniciliate ¾.

Labial palpi recurved, of approximately equal thickness throughout, second joint scarcely longer than the apical.

Maxillary palpi short, projecting.

Haustellum long, well developed.

Head and *thorax* smooth.

Fore wings elongate, lanceolate, somewhat widened at the base, acutely pointed. *Neuration*: 12 veins, 7 and 8 stalked, 7 to costa.

Hind wings with abdominal angle strongly developed, thence evenly tapering to the subacute apex, costa much straighter than dorsum. *Neuration*: 7 veins (4 absent); 5 and 3 stalked (sometimes connate).

Abdomen somewhat flattened.

Legs: hind tibiæ hairy above.

89. Blastobasis argillacea, sp. n.

Antennæ fawn-grey (a pecten on the basal joint beneath). *Palpi* smooth, evenly curved; fawn-grey. *Head* fawn-grey. *Thorax* fawn-grey, with a slight brownish tinge. *Fore wings* fawn-grey, with a brownish suffusion and some greyish-fuscous mottling around the apex and apical margin, a small blackish spot on the cell a little before and above the middle of the wing, from which

an ashy zigzag shade runs to the dorsal margin in the form of the letter Z; two similar spots lie at the end of the cell, the upper one in the same line as the first, the lower one a little beyond and below it; cilia dust-grey. *Exp. al.* 14 mm. *Hind wings* pale brownish grey; cilia with a slight ochreous tinge. *Abdomen* brownish grey, the anal tuft ochreous. *Legs* cinereous.

Type, ♀ Mus. Wlsm.

Hab. **West Indies**—St. Croix, 7 V. (*Gudmann*); St. Thomas, 15 III.–12 V. (*Gudmann, Hedemann*). Five specimens.

Bred by Baron von Hedemann from larvæ feeding in the flowers of a *Bisonia*. All the specimens are females, but I have little doubt that the reception of the male will prove that they are referred rightly to this genus.

90. Blastobasis grenadensis, sp. n.

Antennæ pale cinereous. *Palpi* pale cinereous, shaded externally with fuscous. *Head* and *thorax* greyish, with a slight ochreous tinge. *Fore wings* smoky greyish, paler at the base, the darker shading inclining to form longitudinal lines on the outer half of the wing; with the usual three spots dark fuscous, the first a little above and before the middle, the two outer corresponding to the apical and tornal angles of the cell; cilia at tornus inclining to ochreous, about apex darker. *Exp. al.* ♂ 12; ♀ 15 mm. *Hind wings* greyish, with a slight bronzy sheen; cilia inclining to ochreous. *Abdomen* greyish fuscous; anal tuft paler. *Legs* greyish fuscous, the long hairs on the hind tibiæ inclining to ochreous.

Type, ♂ ♀ Mus. Wlsm.

Hab. **West Indies**—Dominica (*Druce*); Grenada (Balthazar, 250 ft., windward side, 5 IV.–4 V.; Mount Gay Estate, 300 ft., leeward side, 25–30 VIII.; 1–5 X.—*H. H. Smith*). Five specimens.

The specimen from Dominica is not in good condition, but it appears to belong to this species.

91. Blastobasis subolivacea, sp. n.

Antennæ pale cinereous. *Palpi* cinereous, shaded with fuscous externally. *Head* and *thorax* cinereous, the latter slightly shaded with fuscous. *Fore wings* olive-grey with a slight greenish tinge, especially on the basal half, shading to brownish externally; a single black dot before and above the middle is followed by the usual two, the one at the apex and the other at the tornus of cell; costa narrowly inclining to ochreous; cilia greyish, with a slight ochreous tinge at tornus. *Exp. al.* 12 mm. *Hind wings* bronzy brownish, thinly scaled between the upper veins in the ♂, and causing the veins to appear darker, thus giving the wings a streaked appearance; cilia pale greyish ochreous. *Abdomen* brownish grey; anal tuft paler. *Legs* cinereous; hind tarsi faintly grey-spotted.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—St. Thomas, 7 III.–9 IV. (*Gudmann, Hedemann*). Two specimens.

92. Blastobasis triangularis, sp. n.

Antennæ pale fawn-ochreous. *Palpi* dark fuscous, the tips of the joints paler. *Head* cinereous; face slightly ochreous. *Thorax* dusky cinereous. *Fore wings* dusky cinereous; the costa narrowly subochreous throughout, the usual three spots almost obscured by the dusky ground-colour, but traceable in the ordinary positions—the first before and slightly above the middle, the other two corresponding to the apical and tornal angles of the cell (there is a slight sprinkling of scattered subochreous scales over the wing-surface in a bred specimen); cilia cinereous, with a slight ochreous tinge. *Exp. al.* 10–12 mm. *Hind wings* thinly scaled between the upper veins in the ♂; brownish fuscous, with a faint purplish gloss; cilia inclining to ochreous. *Abdomen* brownish fuscous; anal tuft ochreous. *Legs* cinereous; hind tarsal joints inclining to ochreous.

Type, ♂ Mus. Hedemann; ♀ Mus. Gudmann.

Hab. **West Indies**—St. Thomas, 11 III.–15 IV. (*Gudmann, Hedemann*). Two specimens.

Bred by Baron von Hedemann from a black larva feeding on a low plant which was not identified.

The ♀ has the hind wings much paler and less marked, and of a greyer tinge; the anal tuft is ochreous, as in the ♂.

93. Blastobasis gracilis, sp. n.

Antennæ and *palpi* bone-colour, the latter slightly shaded externally. *Head* and *thorax* bone-colour. *Fore wings* bone-colour, with a slight vinous tinge, sparsely sprinkled and mottled with pale brownish fuscous; the usual three dots are fairly conspicuous, but the first of these, scarcely before the middle, is preceded by a slight indication of another spot immediately above the middle of the fold; the termen shows a very faint indication of a broken fuscous line; cilia bone-grey. *Exp. al.* 11 mm. *Hind wings* shining pale bone-grey; cilia with a slight vinous gloss. *Abdomen* bone-grey; anal tuft bone-colour. *Legs* pale cinereous; hind tibiæ slightly shaded externally.

Type, ♂ ♀ Mus. Wlsm.

Hab. **West Indies**—Grenada (Balthazar, 250 ft., windward side, 5–27 IV.—*H. H. Smith*). Four specimens.

28. Pigritia, Clem.

94. Pigritia? biatomella, sp. n.

Antennæ stoutish, greyish ochreous, the basal joint with a thick tuft of mixed black and ochreous scales beneath. *Palpi* fuscous, sometimes ochreous at the junction of the second and terminal joints, internally pale ochreous. *Head* ochreous, much mixed with black. *Fore wings* smoky at the base, pale greyish ochreous beyond, more or less suffused with fuscous, with a small black dot at the end of the cell, a second near the dorsum immediately below it; cilia pale greyish. *Exp. al.* 9 mm. *Hind wings* and cilia pale

greyish. *Abdomen* greyish; anal tuft pale ochreous. *Legs* pale ochreous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 15 III.–14 IV. (*Gudmann, Hedemann*). Eight specimens.

95. Pigritia mediocris, sp. n.

Antennæ greyish, with a pecten at the base in the ♂. *Palpi* very slender, recurved, greyish, with whitish lines along them above and beneath. *Head* grey. *Thorax* and *fore wings* olivaceous ochreous, the latter with a few greyish-fuscous scales sprinkled over the dorsum and the outer end of the cell; with a narrow line of the same immediately below the costa reaching from the base to half the wing-length, a line of similar scales runs along the termen, sprinkling the paler cilia; with a small dot before the anal angle. *Exp. al.* 8 mm. *Hind wings* and cilia pale grey. *Abdomen* pale olivaceous ochreous, tending to greyish posteriorly. *Legs* cinereous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Croix, 26 IV.–6 V. (*Hedemann*); St. Thomas, 12 III. (*Gudmann*). Six specimens.

29. Auximobasis, Wlsm.

96. Auximobasis insularis, sp. n.

Antennæ greyish; the basal joint with a closely-packed shield of scales. *Palpi* porrect, scarcely recurved, greyish fuscous externally, an ashy ring around the end of the second joint. *Head* ashy grey. *Thorax* greyish fuscous; the tegulæ paler. *Fore wings* pale greyish fuscous, with an angular spot at the base of the costa, ochreous edged with dark fuscous; before the middle of the wing is an outwardly angulated dark fuscous band, and beyond the middle, at about one-third from the apex, a line of dark fuscous mottlings, forming a second band much less conspicuous than the first; cilia ashy grey. *Exp. al.* 12 mm. *Hind wings* pale grey; cilia with a slight ochreous tinge. *Abdomen* and *legs* ashy grey; anal tuft ochreous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Croix, 18 V. (*Pontoppidan*); St. Thomas, 6 III.–15 IV. (*Gudmann, Hedemann*).

This species differs from *variolata*, Wlsm., in the less attenuated form of the hind wings, which have also a more obtuse apex.

97. Auximobasis variolata, sp. n.

Antennæ with a distinct basal pecten; cinereous. *Palpi* on the outer sides brownish, with a pale band around the junction of the second and apical joints. *Head* ashy grey. *Thorax* pale brownish. *Fore wings* ashy grey, with pale brownish mottlings and dark fuscous spots and speckles, these latter consist of two ill-defined

spots, one on each side of the fold before its middle, the upper one further removed from the base than the lower; a larger ill-defined spot on the middle of the dorsum, with a smaller one on the costa a little before it, between these a black dot on the cell, followed by some black speckling and two smaller parallel black dots at the end of the cell; cilia ashy grey. *Exp. al.* 11–15 mm. *Hind wings* pale grey; cilia with a slight brownish tinge. *Abdomen* grey. *Legs* cinereous, banded at the sides with greyish fuscous.

Type, ♂ ♀ Mus. Wlsm.

Hab. **West Indies**—St. Croix, 8 VI. (*Pontoppidan*); St. Thomas, 11 III.–18 IV. (*Gudmann, Hedemann*). Twelve specimens.

This species differs from *insularis*, Wlsm., in the more acute and attenuated apex of the hind wings.

98. Auximobasis persimilella, Wlsm.

Auximobasis persimilella, Wlsm. Pr. Z. Soc. Lond. 1891, 534–5, 547, Pl. XLI. 9 *a–c* (1892)[1].

Hab. **West Indies**—St. Vincent [1].

99. Auximobasis brevipalpella, sp. n.

Antennæ cinereous, basal joint hoary. *Palpi* cinereous, stained with fuscous externally, except at the tips of the second and apical joints. *Head* and *thorax* hoary grey. *Fore wings* hoary grey, sprinkled with fuscous scales; an ill-defined pale fuscous band, slightly before the middle of the wing, is angulated outwardly on the fold and is diffused outwards, leaving the basal portion somewhat paler than the apical; the usual pair of fuscous dots are adjacent to the end of the cell (the first dot usual in these genera is not visible in all specimens); a slight broken fuscous shade follows the margin of the wing around the apex and base of the hoary speckled cilia. *Exp. al.* 12–13 mm. *Hind wings* shining brownish grey; cilia scarcely paler. *Abdomen* brownish grey. *Legs*: hind tibiæ and tarsi cinereous, shaded externally with faint bands of fuscous.

Type, ♂ ♀ Mus. Wlsm.

Hab. **West Indies**—Grenada (Mount Gay Estate, 300 ft., leeward side, 25–30 VIII.; 1–5 X.—*H. H. Smith*). Four specimens.

Scarcely distinguishable from *persimilella*, Wlsm., except by the slightly broader wings and by the distinctly shorter palpi.

100. Auximobasis flaviciliata, sp. n.

Antennæ dirty whitish, the basal joint enlarged with a strong pecten. *Palpi* smooth, erect, the apical joint nearly as long as the second; hoary whitish. *Head* and *thorax* smooth; hoary whitish. *Fore wings* hoary white, minutely grey-speckled, without markings; cilia pale yellowish. *Exp. al.* 12 mm. *Hind wings* very pale

grey, with pale yellowish cilia. *Abdomen* yellowish grey. *Legs* whitish.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—St. Thomas, 21–23 III. (*Gudmann, Hedemann*). Two specimens.

101. Auximobasis constans, sp. n.

Antennæ smoky cinereous. *Palpi*: apical joint scarcely more than half as long as the second joint; hoary cinereous on their inner sides, with a smoky shade externally, except at the apex of the apical and second joints. *Head* and *thorax* griseous. *Fore wings* whitish, with minute smoky speckling; the costa near the base and along the middle with a smoky shade, which also somewhat suffuses the cilia to the apex; the usual three dots are small but clearly defined, the first before and slightly above the middle, the two outer corresponding to the apical and tornal angles of the cell; a series of less clearly defined dark smoky spots on the margin on either side of the apex defining the outline of the cilia; cilia with a slight ochreous tinge about the tornus. *Exp. al.* 10–12 mm. *Hind wings* shining yellowish grey; cilia also slightly tinged with ochreous. *Abdomen* greyish cinereous. *Legs* pale cinereous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 9–27 III. (*Gudmann, Hedemann*). Three specimens.

30. Iconisma, g. n.

(εἰκόνισμα=a copy.)

Type, *Iconisma macrocera*, Wlsm.

Antennæ with strong pecten, without a notch in ♂, fully as long as the fore wings, narrowed immediately beyond the basal joint and somewhat flattened and tæniaform beyond it.

Maxillary palpi short.

Labial palpi slender, projecting, apical joint slightly shorter than the second.

Head and *thorax* smooth.

Fore wings elongate-lanceolate, narrow at the base, somewhat acute. *Neuration*: 12 veins, 7 and 8 stalked, 7 to costa.

Hind wings with the abdominal angle well developed, narrow, tapering rapidly to an acute point. *Neuration*: 8 veins, 3 separate, 4 and 5 stalked.

Abdomen somewhat flattened.

Legs: hind tibiæ hairy above.

So far as neuration is concerned, the European species *Blastobasis anthophaga*, Stgr., should be placed in this genus; but the form of the antennæ differs materially in not possessing the tæniaform character which distinguishes the type, although it agrees with it in having no notch.

102. Iconisma macrocera, sp. n.

Antennæ with the basal joint dirty whitish, brownish cinereous beyond. *Palpi* dull whitish, shaded with fuscous at the sides except at the tips of the second and apical joints. *Head* dull whitish. *Thorax* hoary whitish. *Fore wings* hoary whitish, with three elongate fuscous streaks, the first from the base running below the costa to one-third, the margin above it being also slightly shaded with fuscous; the second also from the base following the fold to the dorsum: the third along the outer portion of the cell, commencing slightly before the middle of the wing and ending with the cell; some scattered fuscous sprinkling around the margins extends into the cilia, which have a slight ochreous tinge except along the costa, where they are whitish. *Exp. al.* 10 mm. *Hind wings* pale greyish; cilia tinged with ochreous. *Abdomen* greyish ochreous. *Legs* pale cinereous.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—St. Thomas, 15 III.–8 IV. (*Gudmann, Hedemann*). Three specimens.

V. XYLORYCTIDÆ.

31. Glyphidocera, Wlsm.

103. Glyphidocera audax, Wlsm.

Glyphidocera audax, Wlsm. Pr. Z. Soc. Lond. 1891, 531–2, 547, Pl. XLI. 8 *a–c* (1892)[1].

Hab. **West Indies**—St. Vincent[1].

104. Glyphidocera dominicella, sp. n.

Antennæ pale fawn-brown. *Palpi*, *head*, and *thorax* fawn-grey. *Fore wings* fawn-grey, sparsely sprinkled with olive-brown; with two olive-brown spots on the disc, one at its outer extremity, the other halfway between this and the base; cilia fawn-grey with a slight ochreous tinge. *Exp. al.* 15 mm. *Hind wings* and cilia brownish olivaceous. *Abdomen* brownish olivaceous. *Legs* scarcely paler than the hind wings.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Dominica (Point Michell, 29 V.). Two specimens.

This species differs from *audax*, Wlsm., in having the base of the costa of the fore wings less abruptly arched, and in the hind wings being more opaque and having paler cilia.

105. Glyphidocera recticostella, sp. n.

Antennæ strongly notched in the ♂ beyond the basal joint, serrate towards the apex; ochreous beneath, shaded with greyish fuscous above. *Palpi* strongly recurved, laterally divergent; greyish fuscous. *Head* and face greyish fuscous. *Thorax* greyish

fuscous with a slight purplish tinge. *Fore wings* greyish fuscous with a slight purplish tinge; a very faint indication of a dark spot at the end of the cell; cilia the same. *Exp. al.* 23–25 mm. *Hind wings* and cilia greyish brown: *Abdomen* greyish brown. *Legs* greyish, spurs and tarsi slightly paler.

Type, ♂ ♀ Mus. Wlsm.

Hab. **West Indies**—Grenada (Balthazar, 250 ft., windward side, 1 IV.–4 V.; Mount Gay Estate, 300 ft., leeward side, 25 VIII.–10 IX.—*H. H. Smith*). Seven specimens.

This species differs from *audax*, Wlsm., in the absence of a distinct humeral angle on the costa at the base of the fore wings. This seems to be also absent in the female of *audax*, and it is possible that this may turn out to be a characteristic of the females of both species, or that the single female of *audax* has been wrongly identified, but I have not sufficient material to decide this point.

32. Antæotricha, Z.

106. Antæotricha suffumigata, sp. n.

Antennæ smoky white. *Palpi* recurved, slender, apical joint nearly as long as the second; white. *Head* and face white. *Thorax* smoky white in front, paler posteriorly. *Fore wings* elongate, subovate; shining white, the extreme costa delicately shaded with smoky brown and also the dorsal third of the wing from the base below the fold and beyond it to the termen above the tornus; cilia white. *Exp. al.* 16–20 mm. *Hind wings* and cilia pale smoky greyish; ♂ with long brush of greyish hairs from base of costa. *Abdomen* smoky white. *Legs* white.

Type, ♂ ♀ Mus. Wlsm.

Hab. **West Indies**—Grenada (Balthazar, 250 ft., windward side, 15 III.–30 IV.; Mount Gay Estate, 300 ft., leeward side, 1–5 X.—*H. H. Smith*). Six specimens.

107. Antæotricha tibialis, Z.

Antæotricha tibialis, Z. Hor. Soc. Ent. Ross. XIII. 307–9, Pl. III. 90 (1877)[1].

Hab. **West Indies**—Trinidad (*Schaus*, *Urich*; Port of Spain, *Hart*). Brazil (?)[1].

108. Antæotricha griseana, F.

= * *walchiana*, Z. (nec Cram.)[8].

Pyralis griseana, F. Ent. Syst. III. (2) 265. No. 96 (1794)[1] Turton, Syst. Nat. III. 352 (1806)[2]. *Stenoma griseanum*, Z. Is. 1839, 195[3]. *Antæotricha walchiana*, Z. Lin. Ent. IX. 391–3, Pl. III. 29–30 (1854)[4]. *Pyralis griseana*, Z. Lin. Ent. IX. 393 (1854)[5]. *Antæotricha walchiana*, Wkr. Cat. Lp. Ins. B.M. XXIX. 773 (1864)[6]. *Antæotricha griseana*, Z. (partim) Hor. Soc. Ent. Ross. XIII. 315 (1877)[7]; Wlsm. & Drnt. Merton Rules 12 (1896)[8].

Hab. **West Indies** ("Americæ meridionalis Insulis")[1,2]—TRINIDAD (*Schaus*). CAYENNE (*Mus. Wlsm.*). BRAZIL[6]—Cametá[4].

The specimens which Zeller described in the 'Isis' as *Stenoma griseanum*, F. (?), and again in the 'Linnæa Entomologica' as *Antæotricha walchiana*, Cram., are before me. They are certainly not *walchiana*, Cram., which was redescribed by Walker as *Cryptolechia lativittella*. In the 'Horæ' Zeller revived Fabricius's name for still another species from Chiriqui with greenish markings towards the apex. If he were justified in doing this, then the species known as *walchiana* (Zeller, nec Cramer) would be nameless. Fabricius's description is hardly precise enough to enable one to identify a species of this group with certainty, but there appears to be no evidence to prove that Zeller was wrong in his first conception of *griseana*, F. Moreover I now record Zeller's original *griseana* from Trinidad, which agrees well with Fabricius's locality "Americæ meridionalis Insulis;" and as Zeller, in 1839, limited the name to this form, I think the concluding sentence of paragraph 15 of the Rules compiled by the German Zoological Society may be held to apply with the addition of the words in brackets: "In doubtful cases the decision of the author who makes the [*first*] separation [*or restriction*] shall be followed."

[I add the synonymy of the species not occurring in the West Indies, referred to above, and have proposed a new name for Zeller's latest conception of *griseana*, F.

ANTÆOTRICHA WALCHIANA, Cram. & Stoll.

(nec *WALCHIANA*, Z.); n. syn. = *LATIVITTELLA*, Wkr.

Phalæna (*Tortrix*) *walchiana*, Cram. & Stoll, Pap. Exot. IV. 191, 252 (Essai Syst. Lp.), 27, Pl. 384. F. (1782)[1]. *Tortrix? walchiana*, Wkr. Cat. Lp. Ins. B.M. XXVIII. 325 (1863)[2]. *Cryptolechia lativittella*, Wkr. Cat. Lp. Ins. B.M. XXIX. 720–1 (1864)[3].

Hab. VENEZUELA[3]; SURINAM[1,2]; BRAZIL[3] (Espiritu Santo, *Schmidt*; Corcorado, *Schaus*; and Sta. Catherina, *Mus. Wlsm.*).

ANTÆOTRICHA ZELLERI, Wlsm. & Drnt.

= ? *GRISEANA*, Z.[2]

Antæotricha griseana, Z. Hor. Soc. Ent. Ross. XIII. 315–6, Pl. IV. 95 1877)[1]. *Antæotricha zelleri*, Wlsm. & Drnt. Merton Rules 12 (1896)[2].

Hab. PANAMA—Chiriqui[1].]

109. ANTÆOTRICHA? SINUATA, F.

= § *DENTELLA*, F.[2]

Alucita dentella, F. Ent. Syst. III. (2) 343. No. 49 (1794)[1].
Ypsolophus sinuatus, F. Sppl. Ent. Syst. 509. No. 20 (1798)[2].
Phalæna (*Alucita*) *dentella*, Turton, Syst. Nat. III. 383 (1806)[3].

"*dentella*. 49. *A.* alis obscure cinereis: vitta media dentata fusca.

"Corpus parvum, cinereum. Alæ obscure cinereæ vitta lata, interne dentata in medio alæ. Pedes albi.

"*Habitat* in Americæ Insulis, Dom. v. Rohr."[1] = **West Indies**[1-3].

33. Diastoma, Mschl.

110. Diastoma squamosa, Wlsm.

Diastoma squamosa, Wlsm. Pr. Z. Soc. Lond. 1891, 524, 546 (1892)[1].

Hab. **West Indies**—St. Vincent[1].

34. Anadasmus, g. n.

(*ἀναδασμός* = a division.)

Type, *Cryptolechia soraria*, Z.

Antennæ $\frac{2}{3}$, basal joint somewhat enlarged, without pecten; ♂ biciliate (2).

Labial palpi strongly recurved, second joint thickened, with appressed scales beneath, apical joint shorter than the second.

Maxillary palpi well developed, appressed to the haustellum.

Haustellum thickly scaled.

Head with appressed scaling, side tufts spreading, margined with hairs posteriorly.

Thorax smooth.

Fore wings: costa arched at the base, thence almost straight to the slightly depressed and rounded apex, termen almost perpendicular, tornus rounded. *Neuration*: 12 veins, all separate, 8 to costa, 5 approximated to 4, and 6 to 7, 2 from near lower angle.

Hind wings broader than the fore wings, costa hardly depressed beyond middle (without long hair tuft in ♂), apex rounded, slightly sinuate beneath apex, thence evenly rounded; cilia short. *Neuration*: 8 veins, 6 and 7 very closely approximated towards origin, 3 and 4 almost connate, 1 *b* furcate at base.

Abdomen rather stout.

Legs: hind tibiæ clothed with short rough scales.

Closely allied to *Gonioterma*, Wlsm., from which it differs in vein 8 of the fore wings attaining the costa.

111. Anadasmus immundus, Z.

Cryptolechia immunda, Z. Lin. Ent. IX. 360–1 (1854)[1]; Wkr. Cat. Lp. Ins. B.M. XXIX. 711 (1864)[2]; Z. Hor. Soc. Ent. Ross. XIII. 259 (1877)[3].

Hab. **West Indies**—Trinidad (*Schaus*). Brazil[1,2].

112. Anadasmus albanus, F.

= § *lacteella*, F.[2]; n. syn. = *tenera*, Z.

Tinea lacteella, F. Ent. Syst. III. (2) 313. No. 116 (1794)[1]. *Pyralis albana*, F. Sppl. Ent. Syst. 476. No. 31–2 (1798)[2]. *Cryptolechia tenera*, Z. Lin. Ent. IX. 364–5 (1854)[3], X. 153–4 (1855)[4]; Hor. Soc. Ent. Ross. XIII. 259, 263–4 (1877)[5].

Hab. **West Indies** (= in Americæ Insulis)[2]. S. America[1]—Panama, Chiriqui[5]; Venezuela, La Guayra[4]; Cayenne (*Mus.*

Wlsm.); Brazil—Pará[3] (*Mus. Wlsm.*); Santa Catherina (*Mus. Wlsm.*).

Fabricius probably changed the name *lacteella* to *albana* because Schiffermüller had already published a *Tinea lactella*. Zeller (*l. c.* No. 3) considered *tenera* distinct from Fabricius's species, principally from the antennæ not agreeing with the original description (*l. c.* No. 1), but this was emended (*l. c.* No. 2); and Zeller, while not admitting that *tenera* was a synonym of *albana* in the 'Horæ,' was evidently coming round to the opinion that his species was not distinct from that of Fabricius. I have a very large amount of material (mostly undescribed) belonging to this family, and the only species to which Fabricius's description can be applied is *tenera*, Z.; I am therefore not disposed to maintain these two names as representing distinct species.

35. Gonioterma, g. n.

(*γωνία* = angle; *τέρμα* = a boundary.)

Type, *Phalæna (Tortrix) burmanniana*, Cram. & Stoll.

Antennæ $\frac{2}{3}$, basal joint somewhat enlarged, without pecten; ♂ biciliate ($1\frac{1}{2}$).

Labial palpi strongly recurved, second joint thickened with appressed scales beneath, apical joint shorter than the second.

Maxillary palpi well developed, appressed to the haustellum.

Haustellum thickly scaled.

Head smooth, but with lateral hair-tufts often meeting above it.

Thorax smooth.

Fore wings: costa arched at the base, thence straight almost to the apex, which is slightly depressed and rounded, termen almost perpendicular, tornus rounded. *Neuration*: 12 veins all separate, 8 to termen below apex, 5 approximated to 4, and 6 to 7, 2 from near lower angle.

Hind wings broader than the fore wings, costa depressed beyond middle (without long hair-tuft in ♂), evenly rounded from the apex to the abdominal angle, cilia short. *Neuration*: 8 veins, 6 and 7 closely approximated, 3 and 4 separate but closely approximated, 1 *b* furcate at base.

Abdomen rather stout.

Legs: hind tibiæ clothed with short rough scales.

Allied to *Anadasmus*, Wlsm., but differing in vein 8 of the fore wings attaining the termen.

113. Gonioterma isabella, F. & R.

Cryptolechia isabella, F. & R. Reise Nov., Lp. Pl. 139. 24 (1875)[1].

Hab. **West Indies**—Trinidad (*Schaus*). Brazil—Amazons[1].

114. Gonioterma? parvellum, F.

Alucita parvella, F. Ent. Syst. III. (2) 343–4. No. 50 (1794)[1]

Tinea parvella, F. Sppl. Syst. Ent. 500. No. 109 (1798)[2]. *Phalæna* (*Alucita*) *parvella*, Turton, Syst. Nat. III. 383 (1806)[3].

"*parvella*. 50. *A.* alis obscure cinereis: maculis duabus costalibus fuscis.

"Statura parva præcedentis. Alæ incumbentes, cinereæ, maculis duabus costalibus fuscis.

"*Hab.* in Americæ Insulis, Dom. v. Rohr."[1] = **West Indies**[1–3].

This appears to be allied to *burmanniana*, Cram. & Stoll.

VI. ELACHISTIDÆ.

I. *COLEOPHORINÆ*.

36. Coleophora, Hb.

115. Coleophora pulchricornis, sp. n.

Antennæ white, beautifully ringed throughout with black; basal joint not tufted. *Palpi* dusky whitish, shaded externally with fawn-colour; second joint with a slight projecting point of scales beneath its apex. *Head* and *thorax* dull fawn-grey. *Fore wings* dull fawn; with a whitish ochreous costal streak throughout, widening towards the apex, and including the costal cilia; joining this from the end of the cell are three whitish-ochreous streaks following the veins; along the cell from before the middle and extending a little beyond its outer end is a longitudinal streak composed of mixed whitish-ochreous and black scales running parallel with the costa; beneath it, commencing at the base and terminating before the end of the fold, is a similar slender streak in which black predominates; some whitish ochreous scales lie around the dorsum and termen at the base of the greyish cilia. *Exp. al.* 10 mm. *Hind wings* and cilia dark brownish grey. *Abdomen* brownish grey. *Legs* whitish.

Type, ♀ and case Mus. Wlsm.

Hab. **West Indies**—St. Croix, 5 V. (*Hedemann*); St. Thomas, 12 III.–15 IV. (*Gudmann*, *Hedemann*). Three specimens.

Case cylindrical, mouth bent over but not projecting beyond the level of its lower side, apex triangular, its three angles somewhat flattened, the whole dull greyish ochreous; *long.* 13 mm.

Bred by Baron von Hedemann, but the plant not identified. The larva was found on stone fences by Mr. Gudmann.

This species belongs to the group of *troglodytella*, Dp. &c., and is very similar to some of the European species; the mouth of the case is, however, more distinctly at a right angle to the case itself, and it is somewhat stouter in proportion to its length.

116. Coleophora picticornis, sp. n.

Antennæ stout, shorter than the fore wings; white, with four greyish-fuscous bands towards the apex. *Palpi* somewhat long and slender, slightly recurved, smooth, apical joint slightly shorter

than the second; white. *Head* coppery fawn-brown, with a white line on either side running back from the base of the antennæ; face and tongue whitish ochreous. *Thorax* coppery fawn-brown. *Fore wings* coppery fawn-brown, with a shining white streak along the costa from the base to the costal cilia, the extreme costa edged with bright ochreous throughout, including the costal cilia; cilia coppery fawn-brown with a slight ochreous tinge. *Exp. al.* 10 mm. *Hind wings* brownish grey; cilia coppery fawn. *Abdomen* dark brownish grey, anal tuft subochreous. *Legs* pale cinereous, hind tibiæ somewhat clothed above.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Hayti (Port-au-Prince, 23 V., *Gudmann*); St. Thomas, 10 IV. (*Hedemann*); Grenada (Balthazar, 250 ft., windward side, 15 IV.—*H. H. Smith*). Four specimens.

II. *BATRACHEDRINÆ.*

37. Pammeces, Z.

117. Pammeces lithochroma, sp. n.

Antennæ (broken), basal joint elongate, enlarged posteriorly, with a distinct long pecten; stone-white. *Palpi* long and strongly recurved, laterally ascending, second joint rather strongly tufted above at its end; apical joint long and thin, slightly shorter than the second joint; pale stone-grey sprinkled with blackish atoms. *Head* and *thorax* smooth; stone-grey. *Fore wings* stone-grey, sprinkled with blackish atoms, especially along the costa; a minute black spot on the middle of the fold, another on the dorsum at its outer end, the latter somewhat elongate; a third minute elongate black spot lies at the end of the cell, and a few black dots around the termen at the base of the stone-grey cilia. *Exp. al.* 16 mm. *Hind wings* pale grey; cilia stone-grey. *Abdomen* stone-grey. *Legs* stone-whitish; hind tibiæ hairy above.

Type, ♂ Mus. Gudmann.

Hab. **West Indies**—San Domingo (Puerto Plata, 16 V.—*Gudmann*). Unique.

The antennæ were between two and three times the length of the fore wings (*Gudmann*).

118. Pammeces? pallida, sp. n.

Antennæ longer than the fore wings, with a distinct pecten on the basal joint; dirty white. *Palpi*: the second joint with a sloping brush above at its end, apical joint slender, naked, less than half the length of the second; white, with a smoky shade on the second joint externally. *Head* and *thorax* white. *Fore wings* shining white, with two or three small fuscous spots along the fold, and four minute fuscous dots on the costa along the base of the smoky white cilia. *Exp. al.* 13 mm. *Hind wings* shining, very pale

grey; cilia dull smoky white. *Abdomen* whitish. *Legs* white; hind tibiæ hairy above.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—St. Thomas, 10 IV. (*Hedemann*). Unique.

This species differs from *albivitella*, Z., and *lithochroma*, Wlsm., in the much shorter apical joint of the palpi.

38. Syntomactis, Meyr.

[Meyr. Tr. N. Z. Inst. XXI. 173 (1889).]

119. Syntomactis? cervinella, sp. n.

Antennæ longer than the fore wings; pale fawn-ochreous. *Palpi* somewhat recurved, slender, smooth, the apical joint nearly as long as the second; pale fawn-ochreous. *Head* and *thorax* pale fawn-ochreous. *Fore wings* very narrow, elongate; pale fawn-ochreous, speckled with brownish fuscous in a line along the fold with another above it, as well as around and about the apical portion of the wing; the more conspicuous dots being one at the outer third of the fold, one at the end of the cell, and one in the same line beyond it; cilia pale fawn-ochreous. *Exp. al.* 12 mm. *Hind wings* and cilia pale yellowish grey. *Abdomen* shining pale fawn-ochreous. *Legs* scarcely paler, unspotted; hind tibiæ with long pale hairs above.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—St. Croix, 24 IV. (*Gudmann*); St. Thomas, 11 III. (*Hedemann*). Two specimens.

This species appears to differ from *Syntomactis*, Meyr., only in its longer antennæ. I am not at present disposed to create a new genus for its reception. *Zarathra* differs in its very much longer palpi.

39. Batrachedra, Stn.

120. Batrachedra albistrigella, Mschl.

Batrachedra albistrigella, Mschl. Ab. Senck. Nat. Ges. XV. 345, 354 (1891)[1]; Wlsm. Pr. Z. Soc. Lond. 1891, 538, 548 (1892)[2].

Hab. **West Indies**—Portorico[1, 2].

121. Batrachedra stigmatophora, sp. n.

Antennæ with distinct white and fuscous annulations. *Palpi* slender, slightly recurved; yellowish white. *Head* and *thorax* whitish ochreous. *Fore wings* fawn-ochreous, mottled with whitish ochreous, thus forming an indistinct pale fascia at about one-fourth from the base, broader on the costal than on its dorsal extremity, sprinkled on its inner edge with minute black scales; a second pale space occurs about the middle of the wing, also irregularly sprinkled with minute black scales; towards the apex the costa and dorsum are both blotched with whitish ochreous, a streak of black scales running between the blotches to the apex and through the apical cilia: cilia greyish, whitish ochreous immediately beneath

the apex. *Exp. al.* 8 mm. *Hind wings* grey; cilia pale grey. *Abdomen* ochreous. *Legs* whitish, obliquely blotched with fuscous externally, spurs banded with black.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Hayti (Cap Haiti, 18 V.—*Gudmann*); St. Thomas, 12 III.–17 IV. (*Gudmann*, *Hedemann*). Five specimens.

122. Batrachedra tarsimaculata, sp. n.

Antennæ whitish ochreous, thickly barred above with fuscous, this colour forming three dark annulations before the apex. *Palpi* whitish, second joint with two fuscous spots, apical joint with two fuscous bands, one before the apex, the second near its base. *Head* whitish. *Thorax* dull straw-white. *Fore wings* dull straw-white; a short curved fuscous streak from the base below the fold; a long streak above it, also from the base, running along the costa to one-third the wing-length, thence slightly deviating downwards to the end of the cell; beneath its apex is a small dorsal spot, and above its apex commences on the costa another dark streak, which leaving the pale costal cilia runs to the apex and narrowly through the apical cilia (these markings are all dark fuscous); cilia straw-white, tending to greyish about the tornus. *Exp. al.* 6 mm. *Hind wings* and cilia brownish grey. *Abdomen* shining whitish ochreous. *Legs* straw-white; hind tibiæ obliquely banded externally and their tarsi distinctly biannulate with dark fuscous.

Type, ♀ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 6 III.–9 IV. (*Gudmann*, *Hedemann*). Four specimens.

III. *COSMOPTERYGINÆ.*

40. Cosmopteryx, Hb.

123. Cosmopteryx attenuatella, Wkr.

n. syn. = *LESPEDEZÆ*, Wlsm.

Gelechia attenuatella, Wkr. Cat. Lp. Ins. B. M. XXX. 1019 (1864)[1]. *Cosmopteryx lespedezæ*, Wlsm. Tr. Am. Ent. Soc. X. 198 (1882)[2]. [? = *Cosmopteryx* (? *gemmiferella*, Clem.), Mschl. Ab. Senck. Nat. Ges. XV. 345, 354 (1890)[3]; Wlsm. Pr. Z. Soc. Lond. 1891, 536, 548 (1892)[4].] *Cosmopteryx lespedezæ*, Riley, Smith's List Lep. Bor. Am. 107. No. 5771 (1891)[5]. *Gelechia attenuatella*, Wlsm. Pr. Z. Soc. Lond. 1891, 519, 545 (1892)[6]. *Cosmopteryx lespedezæ*, Wlsm. Pr. Z. Soc. Lond. 1891, 536, 548 (1892)[7].

Hab. United States[2,5]—Texas[7], N. Carolina[7]. Larva *Lespedeza*[2,7]. **West Indies**—Jamaica[1,6]; Hayti (Port-au-Prince, 22 V., *Gudmann*); [? Portorico[3,4]]; St. Croix, 3–31 V. (*Gudmann*, *Hedemann*, *Pontoppidan*); St. Vincent[7]; Grenada (Balthazar, 250 ft., windward side, 15 III.–15 IV. *H. H. Smith*).

Bred by Mr. Gudmann at St. Croix, but the plant not identified. *Cosmopteryx gemmiferella*, Clem., is not known to occur in the

West Indies, and the species recorded by Möschler is probably *attenuatella*, but as it is not described I am unable to identify it; there is, however, no reason for including *gemmiferella* in the West Indian fauna on such a slight and doubtful identification.

124. Cosmopteryx similis, sp. n.

Antennæ smoky white, with a broad darkish band before the apex preceded by a narrow black ring, the apex itself being black; these markings are all outlined in clear white. *Palpi* shining white. *Head* and *thorax* greyish brown, with a central, and two lateral, slender whitish streaks. *Fore wings* greyish brown to fully half the wing-length, a broad pale orange-yellow band preceding the greyish-brown apex and cilia, in which are a triangular clear white costal spot and a slender white line running through the apex; the pale orange space is oblique on its inner margin, and extends backwards a little on the costa, it is preceded by two golden metallic spots, one below the other beyond its middle, the latter being tipped with black; on its outer edge it sends forward a slight projection below the white costal spot into the brown apical portion, this projection being margined above and beneath by golden scales; on the brown basal half of the wing are four slender white streaks, one along the dorsum, one commencing on the base at the costa and diverted very obliquely downwards a little beyond the base, and two intermediate straight streaks, of which the lower is longer than the upper and reaches nearly to the lower of the two metallic spots. *Exp. al.* 8–9 mm. *Hind wings* pale brownish grey; cilia the same. *Abdomen* brownish ochreous. *Legs* whitish clouded with brown.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Croix, 3 V.–24 VI. (*Gudmann, Hedemann, Pontoppidan*); St. Thomas, 8 III.–5 IV. (*Gudmann*). Five specimens.

This species is very nearly allied to *attenuatella*, Wkr., but differs in the more oblique inner margin of the yellow transverse fascia, in the nearer approach to it of the lower streak on the basal patch, and in the broken metallic band which separates this from the fascia, which appears to encroach more considerably upon the dark apical portion of the wing.

125. Cosmopteryx sancti-vincenti, Wlsm.

Cosmopteryx sancti-vincenti, Wlsm. Pr. Z. Soc. Lond. 1891, 536–7, 548 (1892)[1].

Hab. **West Indies**—St. Vincent[1]; Grenada (Chantilly Estate, 350 ft., windward side, 13 IV.—*H. H. Smith*).

126. Cosmopteryx abnormalis, sp. n.

Antennæ blackish, speckled with white and biannulated with white before the apex, a silvery spot on the basal joint. *Palpi* whitish, shaded above with fuscous. *Head* dark slaty grey.

Thorax dark brown. *Fore wings* dark umber-brown, with brilliant silver-white metallic spots—two at one-fourth from the base forming a scarcely broken oblique fascia tending outward from the costa to the dorsum; two on the middle, one costal the other dorsal, both straight; two at one-third from the apex, almost joined, not reaching the costa, with a silvery white streak in the commencement of the costal cilia; beyond these another metallic silvery dot lies at the extreme apex, and a silvery white streaklet at the extremity of the apical cilia; dorsal cilia purplish grey. *Exp. al.* 8 mm. *Hind wings* dark vinous grey; cilia purplish grey. *Abdomen* dark brown speckled with metallic scales. *Legs* dark brown, spurs and tarsal joints whitish.

Type, ♂ Mus. Gudmann.

Hab. **West Indies**—Hayti (Port-au-Prince, 24 V.—*Gudmann*). Unique.

IV. *LAVERNINÆ.*

41. Anybia, Stn.

127. Anybia conspersa, Wlsm.

Anybia conspersa, Wlsm. Pr. Z. Soc. Lond. 1891, 537, 548 (1892)[1].

Hab. **West Indies**—San Domingo (Monte Christi, 17 V.—*Gudmann*); St. Thomas, 8 IV. (*Gudmann*); St. Vincent[1]; Grenada (Balthazar, 250–300 ft., windward side, 20 IV.–8 V.—*H. H. Smith*).

Bred by Mr. Gudmann at St. Thomas, from larvæ feeding "in the pulses of *Abrus precatorius*."

128. Anybia piperatella, sp. n.

Antennæ: the basal joint enlarged on its outer half; dust-grey. *Palpi* dust-grey, the apical joint slightly mottled externally. *Head* and *thorax* dusty grey. *Fore wings* dust-grey, minutely speckled with fuscous; cilia brownish grey. *Exp. al.* 9 mm. *Hind wings* and cilia pale brownish grey. *Abdomen* and *legs* brownish grey; anal tuft in the male ochreous.

Type, ♀ Mus. Wlsm.

Hab. **West Indies**—St. Croix, 8–26 V. (*Hedemann, Pontoppidan*); St. Thomas, 20 III.–14 IV. (*Gudmann, Hedemann*). Seven specimens.

129. Anybia curvipunctella, Wlsm.

Anybia curvipunctella, Wlsm. Pr. Z. Soc. Lond. 1891, 538, 548 (1892)[1].

Hab. **West Indies**—St. Croix, 24–29 IV. (*Hedemann*); St. Thomas, 6 IV. (*Gudmann*); St. Vincent[1]; Grenada (Balthazar, 250–300 ft., windward side, 4–8 V.—*H. H. Smith*).

A series of specimens, evidently of this species, received from St. Croix, St. Thomas, and Grenada, has enabled me to observe

that the semicircular spot on the fold from which the name is taken is somewhat an exceptional marking; it is scarcely traceable in any of the specimens now before me, and in the majority of them is entirely absent. I have, however, no hesitation in identifying them as belonging to the same species.

130. ANYBIA TRIPUNCTATA, sp. n.

Antennæ tawny fuscous. *Palpi* whitish ochreous, shaded with fuscous externally. *Head* and *thorax* tawny fuscous; face shining whitish ochreous. *Fore wings* tawny fuscous with a vinous sheen; three dark fuscous spots, a pair on the outer half of the cell in line with each other, connected by a short whitish ochreous streak, the third on the middle of the fold tipped with whitish ochreous at its outer extremity; cilia greyish with a vinous tinge. *Exp. al.* 8 mm. *Hind wings* and cilia greyish with a slight vinous tinge. *Abdomen* and *legs* whitish ochreous.

Type, ♀ Mus. Hedemann.

Hab. **West Indies**—ST. CROIX, 29 IV. (*Hedemann*); ST. THOMAS, 10 III. (*Gudmann*). Two specimens.

131. ANYBIA METALLIFERA, sp. n.

Antennæ brownish fuscous. *Palpi* pale cinereous. *Head* smooth, greyish; face whitish, shining. *Thorax* and *fore wings* coppery brown, the latter with chalybeous bands and spots; a narrow fascia at one-fourth is followed by a central fascia of the same colour, which is wider toward the dorsum than on the costa; at the tornus is an outwardly curved patch pointing toward a small spot at the apex, another spot occurring on the costa at the commencement of the cilia; these markings are all bluish chalybeous; cilia brownish fuscous. *Exp. al.* 8 mm. *Hind wings* pale coppery brown, with brownish-fuscous cilia. *Abdomen* greyish fuscous, with some chalybeous scales above. *Legs* brownish fuscous.

Type, ♀ Mus. Wlsm.

Hab. **West Indies**—JAMAICA (Monteague, 1200 ft., 1.—*Cockerell*). Unique.

V. *HELIODININÆ.*

42. HELIODINES, Stn.

HELIODINES, Stn. Ins. Br. Lp. Tin. 243 (1854).

=[*CHRYSOESTHIA*, Hb. Verz. bek. Schm. 422 (1826) *partim.*]

† *CHRYSESTHIA*, HS. Schm. V. 314 (1855).

=*ÆTOLE*, Chamb. Can. Ent. VII. 73 (1875).

Herrich-Schäffer's restriction of *Chrysoesthia*, Hb., is subsequent to the publication of *Heliodines* by Stainton, whose name is therefore entitled to stand for the genus of which *roesella*, L., is the type.

132. Heliodines marginata, Wlsm.

Heliodines marginata, Wlsm. Pr. Z. Soc. Lond. 1891, 535, 547 (1892)[1].

Hab. **West Indies**—St. Vincent[1].

133. Heliodines schulzella, F.

Tinea schulzella, F. Ent. Syst. III. (2) 321–2. No. 152 (1794)[1]: Suppl. Ent. Syst. 498. No. 92 (1798)[2]. *Phalæna* (*Tinea*) *schulzella*, Turton, Syst. Nat. III. 376 (1806)[3].

"*schulzella*. 125. *T.* alis auratis: lineis duabus oppositis marginalibus punctorum argenteorum, costa atra.

"Corpus parvum. Antennæ atræ. Caput et thorax atra, nitida, pectoris marginalibus aureis. Abdomen aureum. Alæ aureæ, nitidæ, lineis duabus oppositis e punctis argenteis, altera costæ nigræ adjacente, altera margini tenuiori. Posticæ nigræ.

"*Habitat* in Americæ meridionalis Ins., Dr. Pflug"[1]. = **West Indies**[1,2] (probably St. Croix or St. Thomas, *Wlsm.*).

There appears to be little doubt that the above description was taken from a species of *Heliodines* which differs from any known to me. It appears to be intermediate between *marginata* and *quinqueguttata*, agreeing with the former in having a black costa, but differing from it in the possession of metallic spots; *quinqueguttata* agrees in having the metallic spots, but the costa is not black.

134. Heliodines quinqueguttata, sp. n.

Antennæ simple; shining bronzy grey. *Palpi* short, slender, drooping; shining pale æneous. *Head* smooth; shining bronzy. *Thorax* bronzy grey, golden orange beneath. *Fore wings* to beyond the middle golden orange, with the extreme base and 5 spots (3 subcostal and 2 intermediate dorsal, the dorsal spots alternating with the costal) all shining bronzy metallic, slenderly outlined with black scales in some lights; rather more than the apical third of the wing is shining bronzy metallic, extending farther along the dorsum than along the costa, its inner edge being indented on the cell; cilia bronzy grey. *Exp. al.* 8·5 mm. *Hind wings* shining bronzy; cilia bronzy grey. *Abdomen* shining bronzy brownish, with a bright metallic whitish patch along the first three segments beneath; anal tuft whitish. *Legs* bronzy brownish, with paler shining bands and spurs.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Jamaica (Kingston, 10 XII.—*T. D. A. Cockerell*); St. Thomas, 11 III.–12 IV. (*Gudmann*, *Hedemann*). Five specimens.

Bred by Mr. Cockerell in Jamaica "from galls on *Portulaca* sp.; these galls produced also a *Cecidomya*, which was probably the gall-maker." Mr. Gudmann also bred this species in St. Thomas.

"Raupe hellgrün, mit hellbraunem Kopf; 16-füssig. Vom Kopf bis zum After allmählig an Breite zunehmend; auf dem Rücken finden sich zwei und auf jeder Seite eine Längsreihe sehr feinen

schwarzen, behaarten Punkte, so dass auf jedem Segment sich acht solchen befinden. Die Raupe lebte an einer niedrigen Pflanze mit sehr feinem Gespinnste auf der Unterseite der Blätter, ging aber, wenn es frass, minirend in das Blatt hinein." (*Gudmann.*)

"The moth holds the second pair of legs outstretched as in *Stathmopoda*" (*Hedemann*).

135. Heliodines aureoflamma, sp. n.

Antennæ and *palpi* shining bronzy grey, the latter somewhat paler. *Head* and *thorax* shining bronzy grey, the face and the underside of the thorax shining pale æneous. *Fore wings* golden orange, with two basal streaks, five spots, and two apical streaks all shining chalybeous; the two basal streaks lie along the upper edge of the fold and along the dorsum respectively; the spots are two subcostal before and beyond the middle and three dorsal alternating with them, the second dorsal being between the two subcostal ones; the apical streaks lie one below the costa, the other commencing nearer to the apex and running along the base of the subapical cilia; cilia bronzy grey. *Exp. al.* 8 mm. *Hind wings* bronzy brown; cilia bronzy grey. *Abdomen* bronzy brownish; beneath shining pale æneous. *Legs* shining steel-grey; tibiæ orange.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—St. Thomas, 9 III. (*Hedemann*). Unique.

"The moth holds the second pair of legs outstretched as in *Stathmopoda*" (*Hedemann*).

VI. *HELIOZELINÆ.*

43. Heliozela, HS.

136. Heliozela cuprea, sp. n.

Antennæ with the basal joint elongate, slightly enlarged posteriorly; bronzy cupreous. *Palpi* steel-white. *Head* and face, *thorax* and *fore wings* unicolorous bronzy cupreous; cilia coppery grey. *Exp. al.* 7 mm. *Hind wings* and cilia coppery grey. *Abdomen* dark bronzy cupreous. *Legs* cupreous; tarsal joints paler.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—St. Thomas, 16 III. (*Hedemann*). Unique.

137. Heliozela ahenea, sp. n.

Antennæ purplish grey. *Palpi*, *head*, and *thorax* shining, metallic, brassy; underside of thorax brassy metallic. *Fore wings* brassy metallic, without markings; the scales being laid on in transverse lines give a slightly ribbed appearance under the lens; cilia purplish grey. Underside purplish grey. *Exp. al.* 4 mm. *Hind wings* and cilia purplish grey. *Abdomen* brassy metallic, tending to purplish grey at the anal extremity; underside brassy

metallic. *Legs* whitish; hind tarsal joints banded above with dark grey.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—HAYTI (Port-au-Prince, 24 V.—*Gudmann*); ST. THOMAS, 12 IV. (*Hedemann*). Two specimens.

VII. *SCYTHRINÆ.*

44. ŒCIA, g. n.

(*οἰκεῖος*=belonging to the house.)

Type, *Œcia maculata*, Wlsm.

Antennæ longer than the fore wings, simple, stout; basal joint without pecten.

Labial palpi diverging, smooth; second joint porrect, rather stout; apical joint erect, nearly as long as the second.

Maxillary palpi rudimentary.

Ocelli present.

Haustellum absent.

Head and *thorax* clothed with appressed scales.

Fore wings elongate, costa rather straight, apex slightly depressed, bluntly pointed; termen oblique; tornus not developed. *Neuration*: 12 veins, 7 and 8 stalked, 7 to apex.

Hind wings hardly as broad as the fore wings, costa straight, abdominal angle distinct, dorsum tapering to the pointed apex; cilia 2. *Neuration*: 8 veins, 6 and 7 long-stalked, 3 and 4 remote, 5 almost parallel with 4.

Abdomen slightly flattened.

Legs: hind tibiæ and first joint of the tarsi with long loose hairs above.

Allied to *Endrosis*, Hb., and having apparently the same habits, but differing in having vein 6 of the hind wings present, 3 and 4 separate, and the haustellum absent.

138. ŒCIA MACULATA, sp. n.

Antennæ smoky greyish. *Palpi* pale ochreous. *Head* pale straw-ochreous. *Thorax* pale straw-ochreous, shaded with smoky grey. *Fore wings* pale straw-ochreous, blotched and margined with smoky grey; this colour commencing near the base extends along the fold and along the costa without including the costal cilia and embraces the apex; on the middle of the fold is a stronger blotch of the same colour, slightly diffused downwards to the dorsum; a similar blotch a little above and beyond it scarcely before the middle; a third at the end of the cell extending almost across the wing; cilia pale straw-ochreous. *Exp. al.* 10–12 mm. *Hind wings* shining pale yellowish grey; the cilia with a slight ochreous tinge. *Abdomen* pale ochreous. *Legs* with the tibiæ and tarsi somewhat hairy; whitish ochreous.

Type, ♂ ♀ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 16–18 III. (*Hedemann*). Brazil—Pará (Amazons), 9 X.–10 I. (*Schulz*). Twelve specimens.

"Very common on the inner walls of nearly every house in St. Thomas" (*Hedemann*).

This species so greatly resembles *Tineola uterella*, Wlsm., that, without examining the head and palpi, they might easily be placed in the same series.

VII. HYPONOMEUTIDÆ.

I. *HYPONOMEUTINÆ.*

45. Atteva, Wkr.

Atteva, Wkr. Cat. Lp. Ins. B.M. II. 526 (1854).
=§*Pœciloptera*, Clem. Pr. Ac. Nat. Sc. Phil. XII. 546–7 (1860).
= *Amblothridia*, Wlgrn. Resa Eugen., Zool. Ins. 385 (1861).
= *Corinea*, Wkr. Cat. Lep. Ins. B.M. XXVIII. 542 (1863).
= *Œta*, Grt. Pr. Ent. Soc. Phil. V. 230–1 (1865).
= *Scintilla*, Gn. Ann. Soc. Ent. Fr. (5 s.) IX 287 (1879).
= *Syblis*, Gn. Ann. Soc. Ent. Fr. (5 s.) IX. 288–9 (1879).

Berg [An. Soc. Ci. Argent. X. 99–100 (1880)] seems to have had full justification for uniting all the generic names given above. Moore had already (Pr. Z. Soc. Lond. 1867, 669) sunk *Corinea*, Wkr., and *Amblothridia*, Wlgrn., as synonyms of *Atteva*, Wkr.

139. Atteva punctella, Cram. & Stoll.

=†*pastulella*, F.[2], ‡*pustulella*, F.[3]; *pustulata*, F.[4]; =*subtilis*, Hb.[6]; =*aurea*, Fitch[23]; =*compta*, Clem.[20]; = *gemmata*, Grt.[25]

Phalæna (*Tinea*) *punctella*, Cram. & Stoll, Pap. Exot. IV. 164, 251 (Essai Syst. Lp.) 28, Pl. 372. fig. L (1782)[1]. *Tinea pastulella*, F. Mant. Ins. II. 241. No. 16 (1787)[2]. *Tinea pustulella*, F. Ent. Syst. III. (2) 292. No. 20 (1794)[3]. *Lithosia pustulata*, F. Sppl. Ent. Syst. 462. No. 16 (1798)[4]. *Phalæna* (*Tinea*) *pustulella*, Turton, Syst. Nat. III. 363 (1806)[5]. *Crameria subtilis*, Hb. Verz. bek. Schm. 168. No. 1737 (ante 1826)[6]. *Phycis punctella*, Verloren, Cat. Syst. Lp. Cram. 138, 274 (1837)[7]. *Deiopeia aurea*, Fitch, III. Rp. Ins. N.Y. 168–9 (1856)[8]. *Pœciloptera compta*, Clem. Pr. Ac. Nat. Sc. Phil. XII. 547 (1860)[9]. *Deiopeia aurea*, Morris, Syn. Lp. N. Am. 251–2 (1862)[10]. *Pœciloptera compta*, Morris, Syn. Lp. N. Am. 312 (1862)[11]. *Deiopeia aurea*, Pack. Pr. Ent. Soc. Phil. III. 106 (1864)[12]. *Pœciloptera compta*, Grt. Pr. Ent. Soc. Phil. IV. 319 (1865)[13]. *Œta compta*, Grt. Pr. Ent. Soc. Phil. V. 230–1 (1865)[14]. *Cydosia punctella*, Wkr. Cat. Lp. Ins. B. M. XXXV. 1894 (1866)[15]. *Cydosia aurea*, Grt. & Rbs. List Lp. N. Am. I. p. vii (1868)[16]. *Œta compta*, Riley, I. Rp. Ins. Mo. 1868, 151–3, Pl. II. 22–3 (1869)[17]; Z. Stett. Ent. Ztg. XXXII. 178 (1871)[18].

Œta aurea, Stretch, Ill. Zyg. & Bomb. N. Am. 159–60, Pl. VII. 10 (1872)[19]. *Œta punctella*, Z. Verh. z.-b. Ges. Wien, XXIII. 228–30 (1873)[20]; Riley, Pr. Ac. Sc. St. Louis, III. liii–iv. (1873)[21]. *Œta gemmata*, Grt. Bull. Buff. Soc. N. H. I. 93–4 (1873)[22]. *Œta aurea*, Stretch, Ill. Zyg. & Bomb. N. Am. 159–60, 240–2 (†*aurera*), Pl. VII. 10 (1874)[23]. *Œta punctella*, Chamb. Bull. U.S. G.G. Surv. IV. 159 (1878)[24]. *Scintilla pustulella*, Gn. Ann. Soc. Ent. Fr. (5 s.) IX. 287–8 (1879)[25]. *Atteva punctella*, Berg, An. Soc. Ci. Argent. X. 100–2 (1880)[26]. *Œta compta*, Riley, U.S. Ent. Com. (Dept. Intr.), Bull. VI. 13, 58 (1881)[27]; Pack. U.S. Ent. Com. (Dept. Intr.), Bull. VII. 132 (1881)[28]; Pack. U.S. Ent. Com. (Dept. Agr.), Rp. V. 669 (1890)[29]. *Œta punctella*, Wlsm. Pr. Z. Soc. Lond. 1891, 532, 547 (1892)[30]; Hdm. Stett. Ent. Ztg. LVII. 10–11 (1896)[31].

Larva, *Ailanthus glandulosus*, VII–IX.[17, 18, 20–21, 23–4, 26–30]; *Costel[illegible]a*[31].

Hab. United States (Georgia, Texas, Missouri)[9–14, 16–21, 23, 24, 26, 27–30]; IX.–XI. *hib.*[13, 19, 20, 23]. Honduras (=Himalaya Mts.?)[30]. **West Indies**—Cuba[22]; St. Croix[31]; Trinidad[30]. Surinam[1, 22, 30]; French Guiana (Cayenne)[25, 30]; Colombia[18]; Brazil (Santarem, Villa Nova)[15, 30]; Argentina (Buenos Aires)[26, 30].

Grote seems to have been of the opinion that three species are represented in the above synonymy (which, if distinct, should receive the following names:—*aurea*, Fitch, United States; *gemmata*, Grt., West Indies; *punctella*, Cram., S. America); on the other hand, Riley and Berg considered that these names represent but a single species. I give the synonymy as I find it, withholding my own views until I have had the opportunity of studying more material.

140. Atteva fulviguttata, Z.

=*glaucopidella*, Gn.[3]; =†*fulviguttella*, Wlsm.

Œta fulviguttata, Z. Verh. z.-b. Ges. Wien. XXIII. 231–2 (1873)[1]. *Syblis glaucopidella*, Gn. Ann. Soc. Ent. Fr. (5 s.) IX. 289 (1879)[2]. *Atteva fulviguttata*, Berg, An. Soc. Ci. Argent. X. 106–7 (1880)[3]. *Œta fulviguttella*, Wlsm. Pr. Z. Soc. Lond. 1891, 532, 547 (1892)[4].

Hab. **West Indies**—Jamaica[2–4]. (Australia?)[1, 4].

141. Atteva fastuosa, Z.

Œta fastuosa, Z. Hor. Soc. Ent. Ross. XIII. 225–7, Pl. III. 68 (1877)[1]. *Atteva fastuosa*, Berg, An. Soc. Ci. Argent. X. 109 (1880)[2]. *Œta fastuosa*, Wlsm. Pr. Z. Soc. Lond. 1891, 533, 547 (1892)[3].

Hab. **West Indies**—Cuba[1–3].

142. Atteva siderea, Wlsm.

Œta siderea, Wlsm. Pr. Z. Soc. Lond. 1891, 533, 547 (1892)[1].

Hab. **West Indies**—San Domingo[1].

46. Tamarrha, Wkr.

Tamarrha, Wkr. Cat. Lep. Ins. B. M. XXIX. 816 (1864).

In my previous paper (Pr. Z. Soc. Lond. 1891, 527) I sunk the genus *Tamarrha*, Wkr., as a synonym of *Pseudia*, Hb. In this I was guided by the neuration of *Tamarrha gelidella*, Wkr., which is a true *Pseudia*. At that time I had seen only the type of Walker's other species *nivosella*, which is a female. The male of this species, however, shows a strong costal tuft of diverging hairs near the base of the hind wings, which separates it at once from *Pseudia*. It possesses veins 7 and 8 of the fore wings from a common stem, a character which also somewhat misled me as to its affinities; the length of the cell, however, and the general character of the neuration, together with the roughened head, seem to indicate an alliance with the *Hyponomeutidæ* rather than with the *Œcophoridæ*. I would therefore revive the generic name *Tamarrha*, Wkr., retaining *nivosella* as the type.

143. Tamarrha nivosella, Wkr.

n. syn. = *adustella*, Z.

Tamarrha nivosella, Wkr. Cat. Lp. Ins. B. M. XXIX. 817 (1864)[1]. *Pseudia adustella*, Z. Hor. Soc. Ent. Ross. XIII. 240–1 (1877)[2]; Mschl. Ab. Senck. Nat. Ges. XV. 343, 354 (1890)[3]; Wlsm. Pr. Z. Soc. Lond. 1891, 528, 546 (1892)[4]. *Pseudia nivosella*, Wlsm. Pr. Z. Soc. Lond. 1891, 528, 546 (1892)[5].

Hab. **West Indies**—Cuba (*Tring Mus.*)[1,5]; Jamaica[1,5] (*Schaus*; Kingston, 24 VII., *Cockerell*; Newcastle, *Mus. Ragonot*, "No. 750—1894, Wlsm."); San Domingo[1,5]; Portorico[2,3,4]; Trinidad (*Schaus*).

47. Euarne, Mschl. & Saalm.

144. Euarne obligatella, Mschl.

Euarne obligatella, Mschl. Ab. Senck. Nat. Ges. XV. 340, 354 (1890)[1]; Wlsm. Pr. Z. Soc. Lond. 1891, 533, 547 (1892)[2].

Hab. **West Indies**—Portorico[1,2].

48. Trichostibas, Z.

As nothing has been recorded of the life-history of this genus, I may remark that there are cocoons of *Trichostibas fumosa*, Z., in the Museums of Oxford and Cambridge Universities. In the Oxford Museum is a specimen of the imago with its cocoon and pupa labelled "Amazons, from pink cocoon—Bates" ("193. 1893. Wlsm."). I am not aware that its food-plant is known, but the cocoon is so remarkable that it is worth describing, if only in the hope that collectors in the West Indies or elsewhere may breed some of the species. The cocoon is of a pinkish-red colour, and is formed of a network of stiff threads; it is almost kidney-shaped, and at the anal extremity has a produced neck. It hangs free from a long stiff thread about an inch and a half long, which

is attached to the side before the anterior end; this thread is here trifurcate, one strand going downwards, the other two strands passing around the cocoon and uniting to form a loop at about one-fourth from the anterior extremity. These three strands and their stem appear to be spun first: the upper one probably passes round the whole cocoon and is attached to the loop before mentioned, and on these as a foundation the cross-threads, which traverse the cocoon obliquely, are probably spun, but this can only be determined from observing the habits of the spinning larva. In the Oxford Museum specimen the pupa is protruded from the upper extremity between the loop, which makes it difficult to understand for what purpose the neck at the anal extremity is constructed. The cocoons of a species of *Trichostibas* are figured hanging from branches in 'The Standard Natural History,' published by Cassino & Co., of Boston, Mass. I have only a separate copy of the article "Heterocera," by Professor Fernald, so I am unable to quote the volume—the "Fig. 557.—Cocoons of a Brazilian Tineid," occurs on p. 438, but I cannot find that it is noticed in the text. As Bates collected *Trichostibas fumosa* on the Amazons, there are probably specimens in the British Museum, and if Walker described them he would be most likely to locate the species in the *Lithosiadæ*.

145. TRICHOSTIBAS CALLIGERA, Z.

Trichostibas calligera, Z. Hor. Soc. Ent. Ross. XIII. 231–2 (1877)[1]; Wlsm. Pr. Z. Soc. Lond. 1891, 533, 547 (1892)[2].

Hab. **West Indies**—CUBA[1,2].

146. TRICHOSTIBAS OVATA, Z.

Trichostibas ovata, Z. Hor. Soc. Ent. Ross. XIII. 233 (1877)[1]; Wlsm. Pr. Z. Soc. Lond. 1891, 533, 547 (1892)[2].

Hab. **West Indies**—CUBA[1,2].

147. TRICHOSTIBAS SORDIDATA, Z.

Trichostibas sordidata, Z. Hor. Soc. Ent. Ross. XIII. 233–4 (1877)[1]; Wlsm. Pr. Z. Soc. Lond. 1891, 534, 547 (1892)[2].

Hab. **West Indies**—PORTORICO[1,2].

148. TRICHOSTIBAS ? IOPHLEBIA, Z.

Trichostibas iophlebia, Z. Hor. Soc. Ent. Ross. XIII. 228–9, Pl. III. 69 (1877)[1]. *Trichostibas ? iophlebia*, Wlsm. Pr. Z. Soc. Lond. 1891, 534, 547 (1892)[2].

Hab. **West Indies**—ANTILLES[1,2].

149. TRICHOSTIBAS ? PALLIDICOSTELLA, sp. n.

Antennæ blackish. *Palpi* short, slender, not projecting beyond the face, apical joint as long as the second; black. *Head* and *thorax* pale mouse-grey. *Fore wings* dark mouse-grey, the costa whitish grey throughout; cilia whitish grey, shading to dark

46. Tamarrha, Wkr.

Tamarrha, Wkr. Cat. Lep. Ins. B. M. XXIX. 816 (1864).

In my previous paper (Pr. Z. Soc. Lond. 1891, 527) I sunk the genus *Tamarrha*, Wkr., as a synonym of *Psecadia*, Hb. In this I was guided by the neuration of *Tamarrha gelidella*, Wkr., which is a true *Psecadia*. At that time I had seen only the type of Walker's other species *nivosella*, which is a female. The male of this species, however, shows a strong costal tuft of diverging hairs near the base of the hind wings, which separates it at once from *Psecadia*. It possesses veins 7 and 8 of the fore wings from a common stem, a character which also somewhat misled me as to its affinities; the length of the cell, however, and the general character of the neuration, together with the roughened head, seem to indicate an alliance with the *Hyponomeutidæ* rather than with the *Œcophoridæ*. I would therefore revive the generic name *Tamarrha*, Wkr., retaining *nivosella* as the type.

143. Tamarrha nivosella, Wkr.

n. syn. = *adustella*, Z.

Tamarrha nivosella, Wkr. Cat. Lp. Ins. B. M. XXIX. 817 (1864)[1]. *Psecadia adustella*, Z. Hor. Soc. Ent. Ross. XIII. 240–1 (1877)[2]; Mschl. Ab. Senck. Nat. Ges. XV. 343, 354 (1890)[3]; Wlsm. Pr. Z. Soc. Lond. 1891, 528, 546 (1892)[4]. *Psecadia nivosella*, Wlsm. Pr. Z. Soc. Lond. 1891, 528, 546 (1892)[5].

Hab. **West Indies**—Cuba (*Tring Mus.*); Jamaica[1, 5] (*Schaus*; Kingston, 24 VII., *Cockerell*; Newcastle, *Mus. Ragonot*, "No. 750—1894, Wlsm."); San Domingo[1, 5]; Portorico[2, 3, 4]; Trinidad (*Schaus*).

47. Euarne, Mschl. & Saalm.

144. Euarne obligatella, Mschl.

Euarne obligatella, Mschl. Ab. Senck. Nat. Ges. XV. 340, 354 (1890)[1]; Wlsm. Pr. Z. Soc. Lond. 1891, 533, 547 (1892)[2].

Hab. **West Indies**—Portorico[1, 2].

48. Trichostibas, Z.

As nothing has been recorded of the life-history of this genus, I may remark that there are cocoons of *Trichostibas fumosa*, Z., in the Museums of Oxford and Cambridge Universities. In the Oxford Museum is a specimen of the imago with its cocoon and pupa labelled "Amazons, from pink cocoon—Bates" ("193. 1893. Wlsm."). I am not aware that its food-plant is known, but the cocoon is so remarkable that it is worth describing, if only in the hope that collectors in the West Indies or elsewhere may breed some of the species. The cocoon is of a pinkish-red colour, and is formed of a network of stiff threads; it is almost kidney-shaped, and at the anal extremity has a produced neck. It hangs free from a long stiff thread about an inch and a half long, which

is attached to the side before the anterior end; this thread is here trifurcate, one strand going downwards, the other two strands passing around the cocoon and uniting to form a loop at about one-fourth from the anterior extremity. These three strands and their stem appear to be spun first; the upper one probably passes round the whole cocoon and is attached to the loop before mentioned, and on these as a foundation the cross-threads, which traverse the cocoon obliquely, are probably spun, but this can only be determined from observing the habits of the spinning larva. In the Oxford Museum specimen the pupa is protruded from the upper extremity between the loop, which makes it difficult to understand for what purpose the neck at the anal extremity is constructed. The cocoons of a species of *Trichostibas* are figured hanging from branches in 'The Standard Natural History,' published by Cassino & Co., of Boston, Mass. I have only a separate copy of the article "Heterocera," by Professor Fernald, so I am unable to quote the volume—the "Fig. 557.—Cocoons of a Brazilian Tineid," occurs on p. 438, but I cannot find that it is noticed in the text. As Bates collected *Trichostibas fumosa* on the Amazons, there are probably specimens in the British Museum, and if Walker described them he would be most likely to locate the species in the *Lithosiadæ*.

145. Trichostibas calligera, Z.

Trichostibas calligera, Z. Hor. Soc. Ent. Ross. XIII. 231–2 (1877)[1]; Wlsm. Pr. Z. Soc. Lond. 1891, 533, 547 (1892)[2].

Hab. **West Indies**—Cuba[1,2].

146. Trichostibas ovata, Z.

Trichostibas ovata, Z. Hor. Soc. Ent. Ross. XIII. 233 (1877)[1]; Wlsm. Pr. Z. Soc. Lond. 1891, 533, 547 (1892)[2].

Hab. **West Indies**—Cuba[1,2].

147. Trichostibas sordidata, Z.

Trichostibas sordidata, Z. Hor. Soc. Ent. Ross. XIII. 233–4 (1877)[1]; Wlsm. Pr. Z. Soc. Lond. 1891, 534, 547 (1892)[2].

Hab. **West Indies**—Portorico[1,2].

148. Trichostibas ? iophlebia, Z.

Trichostibas iophlebia, Z. Hor. Soc. Ent. Ross. XIII. 228-9, Pl. III. 69 (1877)[1]. *Trichostibas ? iophlebia*, Wlsm. Pr. Z. Soc. Lond. 1891, 534, 547 (1892)[2].

Hab. **West Indies**—Antilles[1,2].

149. Trichostibas ? pallidicostella, sp. n.

Antennæ blackish. *Palpi* short, slender, not projecting beyond the face, apical joint as long as the second; black. *Head* and *thorax* pale mouse-grey. *Fore wings* dark mouse-grey, the costa whitish grey throughout; cilia whitish grey, shading to dark

mouse-grey at the tornus. Underside unspotted, the pale costa showing on the outer half. *Exp. al.* 26 mm. *Hind wings* leaden grey; cilia paler. *Abdomen* dark leaden grey. *Legs* dark leaden grey, inclining to fuscous.

Type, ♀ Mus. Wlsm.

Hab. **West Indies**—Jamaica (*Coll. Ragonot*).

This is not a true *Trichostibas*; it differs from the type in having veins 4 and 5 of the hind wings connate and vein 2 recurved out of 3 instead of recurved out of the cell, but in the absence of the ♂ I am unwilling to describe it as the type of a new genus.

49. Paratiquadra, g. n.

(*παρά*: *Tiquadra*, nom. gen.)

Type, *Paratiquadra forficulella*, Wlsm.

Antennæ (♂♀): ♂ serrate beneath, uniciliate; rather stout.

Labial palpi rather short, projecting; apical joint much shorter than the second.

Maxillary palpi (broken?).

Haustellum rather short.

Head smooth, slightly roughened posteriorly.

Thorax smooth.

Fore wings: costa arched, apex rounded, termen obliquely rounded. *Neuration*: 12 veins all separate, 7 to apex, 2 from near angle of cell, with an internal vein from between 6 and 7 to between 10 and 11.

Hind wings elongate ovate, evenly rounded from apex; transparent, iridescent; cilia short. *Neuration*: 8 veins all separate, 2 from end of basal third of cell, 3 remote, 3 and 4 widely separated, 4, 5, 6, and 7 almost parallel, but 5 is slightly curved downwards; an internal vein from between 5 and 6 to base.

Abdomen flat, hairy; anal claspers long and curved inwards and upwards, somewhat resembling the analogous organs in the *Forficulidæ*.

Legs smooth.

150. Paratiquadra forficulella, sp. n.

Antennæ dark brownish fuscous. *Palpi* whitish grey. *Head* whitish grey, face paler. *Thorax* pale fawn brownish. *Fore wings* pale fawn brownish, a pale whitish-cinereous space along the cell blending with the darker ground-colour towards the tornus, and a similar pale space along the costa nearly to the apex; cilia very pale fawn-brown. Underside pale fawn-brownish, with a large subovate blackish patch extending along the outer half of the cell at its upper edge nearly to the costa, and including the basal two-thirds of veins 8 and 9 as well as the greater portion of vein 10 and the outer part of vein 11. *Expl. al.* 24 mm. *Hind wings* transparent, iridescent, bluish grey, margined with a pale shade of fawn-brown; cilia pale fawn-brown. *Abdomen* clothed with pale

fawn-brown hairs; *anal claspers* somewhat peculiar, long, curved inwards and upwards in the form of two chitinous processes resembling the analogous organs in the *Forficulidæ*. Legs pale fawn-brown.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Jamaica (*Coll. Ragonot*).

The dark patch on the underside of the fore wings is probably a sexual character confined to the ♂.

50. Hyponomeuta, Ltr.

[†*Yponomeuta*, Ltr. (1796); ‡Hyponomeuta, Sdf. (1837).]

151. Hyponomeuta mahalebellus, Gn.

Yponomeuta mahalebella, Gn. Ind. Méth. 105–6 (1845)[1]. *Hyponomeuta mahalebellus*, Stgr. & Wk. Cat. Lp. Eur. 277. No. 1555 (1871)[2]. *Yponomeuta mahalebella*, Gn. Ann. Soc. Ent. Fr. (5 s.) IX. 282 (1879)[3]. *Hyponomeuta mahalebellus*, Wlsm. Pr. Z. Soc. Lond. 1891, 532, 547 (1892)[4].

Hab. Europe [1–4], Larva, *Cerasus mahaleb* [1, 2]. **West Indies**—Cuba [3, 4].

152. Hyponomeuta triangularis, Mschl.

Hyponomeuta triangularis, Mschl. Ab. Senck. Nat. Ges. XV. 339–40, 354 (1890)[1]; Wlsm. Pr. Z. Soc. Lond. 1891, 532, 547 (1892)[2]; Hdm. Stett. Ent. Ztg. LVII. 10 (1896)[3].

Hab. **West Indies**—Portorico [1, 2]; St. Thomas, 17 III.[3]

II. *PLUTELLINÆ*.

51. Plutella, Schrk.

153. Plutella cruciferarum, Z.

Plutella cruciferarum, Z. Stett. Ent. Ztg. IV. 281–3 (1843). *Plutella xylostella*, Stgr. & Wk. Cat. Lp. Eur. 281. No. 1626 (1871). *Plutella cruciferarum*, Stgr. & Wk. Cat. 425. No. 1626 (1871), &c. &c. *Plutella xylostella*, Mschl. Ab. Senck. Nat. Ges. XV. 341, 354 (1890)[1]. *Plutella cruciferarum*, Wlsm. Pr. Z. Soc. Lond. 1891, 518–9, 545 (1892)[2].

Hab. All regions. **West Indies**—Portorico [1, 2].

It is certainly remarkable that I should not have received specimens of this cosmopolitan species from some of my correspondents!

III. *GLYPHIPTERYGINÆ*.

52. Ditrigonophora.

(δίς = doubly; τρίγωνον = a triangle; φορεῖν = to carry.)

Type *Ditrigonophora marmoreipennis*, Wlsm.

Antennæ (broken).

Labial palpi somewhat longer than the head, slender at the

base, diverging outwards; apical joint shorter than second, both triangularly clothed with appressed scales, giving a truncate appearance.

Head densely clothed above and in front.

Fore wings with the costa slightly arched, apex rounded, termen oblique, dorsum straight. *Neuration*: 12 veins all separate, 7 to apex.

Hind wings as broad as the fore wings, somewhat trapezoidal. *Neuration*: 7 veins all separate.

Abdomen somewhat flattened and laterally dilated.

Hind tibiæ somewhat hairy above and beneath.

This genus is founded upon the peculiar shape of the palpi, which differ in form from those of all the genera of Micro-Lepidoptera with which I am acquainted.

154. Ditrigonophora marmoreipennis, sp. n.

Antennæ cinereous. *Palpi* silvery grey above, the second joint shaded and the apical joint doubly barred beneath with brownish fuscous. *Head* ochreous, mixed with brownish fuscous. *Thorax* brownish fuscous, transversely banded with whitish. *Fore wings* pale ochreous, thickly mottled with brownish fuscous, which is separated into ill-defined spots and shades by slender silvery whitish undulating lines; a series of five or six slender silvery white oblique costal streaks, the outer one of the series being in the middle of an elongate brownish-fuscous patch, scarcely more than two-thirds of the wing-length from the base; a slender blackish line, slightly angulated at the apex, runs along the base of the greyish-ochreous cilia. Underside uniformly reddish grey. *Expl. al.* 5–7 mm. *Hind wings* and cilia reddish grey. Underside uniformly reddish grey. *Abdomen* reddish grey. *Legs* grey with white spurs, the tarsi spotted with white.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Grenada (Balthazar, 250 ft., windward side, 15 III.—*H. H. Smith*). Two specimens.

These specimens were unfortunately almost destroyed by an accident.

53. Trapeziophora, Wlsm.

155. Trapeziophora gemmula, Wlsm.

Trapeziophora gemmula, Wlsm. Pr. Z. Soc. Lond. 1891, 530–1, 547, Pl. XLI. 7 (1892)[1].

Hab. **West Indies**—St. Vincent[1].

54. Glyphipteryx, Hb.

= *Æchmia*, Tr. (*nec* auct.); = *Ussara*, Wkr.

Curtis, Br. Ent. IV. Pl. 152 (1827), figured and specified *Phalæna linneella*, Cl., as the type of *Glyphipteryx*. If he were quoting *Glyphipteryx* from Hübner's 'Verzeichniss,' he must have been

acquainted with that work very soon after its completion. If "*Glyphipteryx*, nob." of Curtis were an independent creation, the name could not stand, as it was already preoccupied by Hübner; and if he were restricting Hübner's genus *Glyphipteryx*, his action was inadmissible, for *Glyphipteryx linneella*, Hb. Verz. bek. Schm. 4101 (Hb. Tin. 436, Tort. 84), is *bergstræsserella*, F. (Stgr. Cat. 2306), a totally different insect from *linneella*, L. and Crt. **Glyphipteryx*, Crt. (*nec* Hb.), must sink as a synonym of *Chrysoclista*, Stn.

156. GLYPHIPTERYX CAUDATELLA, sp. n.

Antennæ brownish grey. *Palpi* slender; whitish. *Head* and *thorax* shining olive-brown. *Fore wings* shining olive-brown, with five short white costal streaklets; the first two beyond the middle oblique, tending to converge, emitting a steel-blue line running to the tornus; the third small and straight; the fourth and fifth, before the apex, tending to converge at their extremities, the outer one of the two nearly meeting a short subapical white streak below the dark ocellated apex, which contains a white spot within the circular line running through the cilia and emitting a long uncate dark apical streaklet; on the middle of the dorsum is a conspicuous white outwardly oblique cuneiform dash, its extremity slightly curved over, and before the tornus is a much shorter one, straighter and less conspicuous; cilia pale greyish. *Exp. al.* 8 mm. *Hind wings* and cilia greyish brown. *Abdomen* shining olive-brown. *Legs* olive-brownish, tarsi spotted and tipped with whitish.

Type, ♂ ♀ Mus. Wlsm.

Hab. **West Indies**—GRENADA (Chantilly Estate, 350 ft.; and Balthazar, 250 ft., windward side, 13–20 IV.—*H. H. Smith*). Three specimens.

157. GLYPHIPTERYX PARADISEA, sp. n.

Antennæ brownish fuscous. *Palpi* smooth, slender, the second joint about as long as the apical; dirty whitish. *Head* and *thorax* brownish fuscous. *Fore wings* brownish fuscous at the base, richly ornamented beyond; with a broad triangular dorsal patch at one-third, its apex reaching to the upper edge of the cell; a short scarcely oblique steel-blue costal streak a little beyond it terminates on the cell in a space shaded with orange ochreous, which colour also intervenes between it and a second slightly inverted steel-blue costal streak slightly beyond the middle—the upper extremities of these streaks form white spots on the costa; from the middle of the dorsum arises a longer steel-blue streak with lilac reflections, its extremity equidistant between the ends of the costal streaks above it; thence the ground-colour becomes dark greyish fuscous, but is almost entirely superseded by a large brightly decorated patch of black occupying the whole tornal angle—its upper portion consisting of a steel-lilac spot, from which radiating lines of pale ochreous dots traverse the black space, its lower portion with three upright equidistant steel-lilac spots, the first larger than the other two; crossing the apical portion is a strong steel-blue streak

reaching the subapical incision on the termen, its costal extremity forming a white spot; beyond it, just before the extreme apex, is an outwardly oblique cuneiform white spot; cilia æneous, with a white spot at the incision. *Exp. al.* 9–10 mm. *Hind wings* dark brown, inclining to fuscous; cilia pale grey. *Abdomen* brownish grey. *Legs* greyish, with pale tarsal spots.

Type, ♂ ♀ Mus. Wlsm.

Hab. **West Indies**—Grenada (La Force Estate, 350 ft.; and Balthazar, 250 ft., windward side, 15 IV.–5 V.—*H. H. Smith*). Four specimens.

55. Brenthia, Clem.

158. Brenthia pavonacella, Clem.

Brenthia pavonacella, Clem. Pr. Ac. Nat. Sc. Phil. XII. 172 (1860)[1]; Stn. Pr. Ac. Nat. Sc. Phil. XII. 434 (1860)[2]; Wkr. Cat. Lp. Ins. B. M. XXX. 844 (1864)[3]; Stn. Tin. N. Am. pp. vii, 37, 41, 134–5 (1872)[4]; Z. Verh. z.-b. Ges. Wien, XXV. 323–4 (1875)[5]: Hor. Soc. Ent. Ross. XIII. 174 (1877)[6]. *Brenthia pavonicella*, Chamb. Bull. U.S. G.G. Surv. IV. 132 (1878)[7]. *Brenthia pavonacella*, Chamb. Can. Ent X. 76–7 (1878)[8]; Mschl. Ab. Senck. Nat. Ges. XV. 335, 354 (1890)[9]; Wlsm. Pr. Z. Soc. Lond. 1891, 529, 547 (1892)[10].

Hab. United States (Pennsylvania, Texas, Kentucky)[1–5,7,8–10], VI.–VIII[1,4,5,8]. Larva, *Amphicarpæa monoica*, VI.–VII., IX.[8] Panama—Chiriqui[6,9,10]. **West Indies**—(Antilles?[6]), Porto-rico[9,10]. Brazil[5,9,10].

56. Gauris, Hb.

159. Gauris biferana, Wkr.

n. syn. = *tristis*, F. & R.; n. syn. = *contubernalis*, Z.

Gauris biferana, Wkr. Cat. Lp. Ins. B.M. XXVIII. 418 (1863)[1]. *Gauris tristis*, F. & R. Reise Nov., Lep. Pl. 138. 15 (1875)[2]. *Simaethis contubernalis*, Z. Hor. Soc. Ent. Ross. XIII. 175–6, Pl. II. 63 (1877)[3]. *Gauris biferana*, Wlsm. Pr. Z. Soc. Lond. 1891, 529, 546 (1892)[4].

Hab. **West Indies**[3]—San Domingo[1,4]. Brazil (Amazons)[2].

160. Gauris rimulalis, Z.

Simaethis rimulalis, Z. Verh. z.-b. Ges. Wien, XXV. 321 (1875)[1]: Hor. Soc. Ent. Ross. XIII. 174–5, Pl. II. 62 (1877)[2]. *Gauris rimulalis*, Wlsm. Pr. Z. Soc. Lond. 1891, 529, 546 (1892)[3]. *Simaethis rimulalis*, Hdm. Stett. Ent. Ztg. LVII. 10 (1896)[4].

Hab. **West Indies**—Cuba[2,3]; St. Thomas[1,2,4], 10 IV.[4]

57. Tortyra, Wkr.

Tortyra, Wkr. Cat. Lp. Ins. B.M. XXVIII. 510 (1863).

= *Choregia* (Z.), F. & R. Reise Nov., Lp. expl. Pl. 140 (1875); Z. Hor. Soc. Ent. Ross. XIII. 191–2 (1877).

161. Tortyra auriferalis, Wkr.

= *aurofasciana*, Snell.[7]; = *ignita*, Z.[7]

Tortyra auriferalis, Wkr. Cat. Lp. Ins. B. M. XXVIII. 510–11 (1863)[1]. *Simaethis aurofasciana*, Snell. Tijd. v. Ent. XVIII. 73, 74–6, Pl. VI. 7 (1875)[2]. *Simaethis* (*Chordates*) *aurofasciana*, Snell. Tijd. v. Ent. XX. 48–9 (1876)[3]. *Choregia ignita*, Z. Hor. Soc. Ent. Ross. XIII. 195–6 (1877)[4]. *Choregia* (*Simaethis*) *aurofasciana*, Snell. Tijd. v. Ent. XXVIII. 15 (1885)[5]. *Choregia aurofasciana*, Mschl. Ab. Senck. Nat. Ges. XV. 335, 354 (1890)[6]. *Tortyra auriferalis*, Wlsm. Pr. Z. Soc. Lond. 1891, 528–9, 546 (1892)[7]; Hdm. Stett. Ent. Ztg. LVII. 10 (1896)[8].

Hab. **West Indies**—Cuba[4,7]; San Domingo[1,7]; Portorico[6,7]; St. Croix[8], 22 XI. (*Pontoppidan*); St. Martin[2,6,7]; St. Vincent[7].

[In my last paper (*l. c.* No. 7, 529) I suggested that *Choregia fulgens*, F. & R., was probably a variety. It may therefore be advisable to put on record an account of the life-history of that species. In the Oxford Museum are two specimens of *fulgens* with the following label attached:—

"Arica, Peru, Kenderdine. Flying in sun about low fig-trees. Larva in the young shoots of the fig tree, where it changes, spinning a strong white silken cocoon. It is of a dull brownish-red colour with the feet [*black*?] and a row of small black dots on each segment, from each of which issues a fine hair."

This note ought to enable collectors in the West Indies to breed *auriferalis*, Wkr., and to prove whether it is distinct or a variety of *fulgens*.

VIII. TORTRICIDÆ.

I. *OLETHREUTINÆ*, Hb.

= *Olethreutæ*, Hb.; = *Grapholithinæ*, Fern.; = *Epiblemidæ*, Meyr.; = *Olethreutinæ*, Wlsm. (*emend.*).

58. Bactra, Stph.

= §*Aphelia*, Stph.; = *Leptia*, Gn.

162. Bactra lanceolana.

Tortrix lanceolana, Hb. Samml. Eur. Schm. VII. (Tort.) Pl. XIII. 80 (1800)[1]. *Ancylis lanceolana*, Hb. Verz. bek. Schm. 376. No. 3614 (1826)[2]. *Aphelia lanceolana*, Stgr. & Wk. Cat. Lp. Eur. 251. No. 1006 (1871)[3], &c. *Bactra lanceolana*, Fern. Tr. Am. Ent. Soc. X. 28–9. No. 163 (1882)[4]; Wlsm. Pr. Z. Soc. Lond. 1891, 501, 543 (1892)[5].

Hab. Europe[3,5], Africa[5], Asia[5], Australia[5], New Zealand[5], United States[4,5]. **West Indies**—St. Thomas, 22–30 III (*Hedemann*); St. Vincent[5]; Grenada (windward side—Balthazar, 250 ft., La Force Estate, 350 ft., and Grand Etang, 1900 ft.,

1 IV.–30 V.; leeward side—Mount Gay Estate, 300 ft., 25–30 VIII.—*H. H. Smith*). S. AMERICA.

I have not thought it necessary to give the full synonymy of this widely distributed species.

59. ENARMONIA, Hb.

Type, *Tortrix wœberiana*, Schiff. (Steph. 1839).

163. ENARMONIA JAMAICANA, sp. n.

Antennæ shortly biciliate, and serrate towards the apex; cinereous. *Palpi* porrect, extending nearly the length of the head beyond it; pale cinereous, with a darker shade beneath the second and third joints. *Head* dirty fawn whitish. *Thorax* dull cinereous, speckled and blotched with hoary whitish. *Fore wings* dull cinereous, speckled and blotched with hoary whitish; a basal patch, extending a little beyond one-third, throws out an acutely angulated projection above the fold, almost bisecting an outwardly angulated dirty-whitish median fascia, which is separated from the terminal portion of the wing by an angulated band of the same darker ground-colour as the basal patch; this band commences about the middle of the costa in one of a series of about twelve outwardly oblique costal streaks, it is produced and dilated outwards to the end of the cell, whence it is abruptly bent back to the dorsum, becoming wider in its descent; this is bounded outwardly by a shining silvery whitish line, especially marked before the ocelloid patch, which contains six or seven black transverse lines, and is also terminated on its outer edge by a narrow, shining, silvery band; on the apical portion of the costa a series of pale lines between the dark costal streaks assume a silvery hue, and one of them is produced to the termen below the apex, and at the extreme apex is a dark spot, corresponding in colour with the costal streaklets; cilia mottled greyish cinereous. *Exp. al.* 14 mm. *Hind wings* pale greyish brown; cilia whitish cinereous. *Abdomen* and *legs* pale cinereous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—JAMAICA (Kingston, VI.—*Cockerell*). Unique.

This species appears to be nearly allied to *Grapholitha duodecemstriata*, Wlsm., but is somewhat smaller and has a more pronounced basal patch and fewer dark lines in the ocelloid patch.

60. EPISIMUS, Wlsm.

EPISIMUS, Wlsm. Pr. Z. Soc. Lond. 1891, 501–2, Pl. XLI. 3 *a–b* (1892).

The following addition should be made to my description of this genus :—

Thorax smooth; ♂ and ♀ with an expansible hair-pencil (arising from a point near the head) below the base of the fore wing. When not expanded this hair-pencil is appressed to the

side of the thorax beneath the wing and may easily be overlooked, but when spread out it is very noticeable, appearing like thistle-down at the base of the costa. The occurrence of this character in *both* sexes may suggest a different train of thought to those who have enunciated various theories to account for the functional utility of such structures hitherto observed in the male sex only.

This observation is founded on the examination of many specimens belonging to several described and undescribed Transatlantic species.

164. Episimus transferranus, Wkr.

[transferranus, Wkr. + transferranus, Wkr.

Carpocapsa transferrana, Wkr. Cat. Lp. Ins. B.M. XXVIII. 398 (1863)[1].
Episimus transferrana, Wlsm. Pr. Z. Soc. Lond. 1891, 502, 543 (1892)[2].
Hab. Brazil (*Ega*)[1, 2].]

transferranus, Wkr. + vincentanus, Wlsm.

Episimus transferrana, Wkr. + *vincentana*, Wlsm. Pr. Z. S. Lond. 1891, 502, 543, Pl. XLI. 3 (1892)[1].
Hab. **West Indies**—St. Vincent[1].

165. Episimus augmentanus, Z.

Grapholitha (*Hedya*) *augmentana*, Z. Hor. Soc. Ent. Ross. XIII. 160–1 (1877)[1]. *Episimus augmentana*, Wlsm. Pr. Z. Soc. Lond. 1891, 502, 543 (1892)[2].
Hab. **West Indies**—Cuba[1, 2]; Grenada (Balthazar, 250 ft., windward side, 20 IV.—*H. H. Smith*).

166. Episimus nesiotes, sp. n.

Antennæ: ♂, stout, slightly pubescent; bone-colour, with a rufous tinge towards the base. *Palpi* somewhat club-shaped, the apical joint scarcely visible; bone-white on their inner sides, rufous externally. *Head* reddish ochreous; face rufous, a transverse whitish band between the eyes. *Thorax* whitish, anteriorly margined with reddish brown. *Fore wings* mottled with reddish brown and bone-white with some admixture of bluish grey; the bone-white is especially noticeable in a large elongate dorsal patch extending to the fold, transversely barred and thus almost obliterated on the basal half; it is also noticeable in a series of short outwardly oblique costal streaks, and at the outer end of the cell in an inwardly curved line of which the lower extremity reaches the upper angle of the somewhat indistinct ocelloid patch (containing two black dots set in rosy-white preceded by a steel-grey shade); some oblique slender steel-grey lines extend outwards from the lower extremities of the pale costal streaks: cilia reddish brown mixed with bone-grey. *Exp. al.* ♂ 14 mm., ♀ 17 mm. *Hind wings* shining brownish grey, with somewhat paler cilia. *Abdomen* brownish grey. *Legs* bone-whitish.
Type, ♂ ♀ Mus. Wlsm.

Hab. **West Indies**—St. Croix, 4 V.–15 VI. (*Gudmann, Hedemann, Pontoppidan*).

"Die 16-füssige Raupe lebt auf *Euphorbia huperifolia* zwischen zusammengesponnenen Blättern; sie ist cylindrisch, zwischen den Leibsegmenten stark eingeschnürt, die Grundfarbe gelbgrün, auf dem ersten Segment mit vier kleinen rothen Punkten, auf allen übrigen Segmenten je ein rother Gürtel ringsum das Segment in welchem die rothen Punkte etwas dunkler erscheinen und mit feinen Haaren besetzt; Kopf herzförmig, gelbbraun, die Mundtheile etwas dunkler; Füsse und Aftersegment unbezeichnet." (*Gudmann.*)

Closely allied to *argutanus*, Clem., but differing in the distinctly apparent dorsal patch and in its paler hind wings.

167. Episimus argutanus, Clem.

= *allutana*, Z.[4]

Bactra? argutana, Clem. Pr. Ac. Nat. Sc. Phil. XII. 358 (1860)[1]. *Grapholitha* (*Hedya*) *allutana*, Z. Verh. z.-b. Ges. Wien, XXV. 295–6, Pl. IX. 27 (1875)[2]. *Bactra? argutana*, Pack. U.S. Dept. Intr. (Ent. Com.), Bull. VII. 69 (1881)[3]. *Semasia argutana*, Fern. Tr. Am. Ent. Soc. X. 45. No. 319 (1882)[4]. *Bactra? argutana*, Pack. U.S. Dept. Agr., Rp. V. 282 (1890)[5]. *Semasia argutana*, Pack. U.S. Dept. Agr., Rp. V. 668 (1890)[6]; Mft. Can. Ent. XXIII. 168 (1891)[7].

Hab. Canada[7]; United States[1–6], 9–26 VII.[2] Larva, *Hamamelis virginica*[1,3–6]; *Rhus glabra*[1,3–5]; *Crataegus tomentosa*[1,3–5]; *Ulmus*[1,3–5]. **West Indies**—St. Croix, 4 V.–15 VI. (*Hedemann, Pontoppidan*); St. Thomas, 18 III. (larva *Euphorbia* sp.?, *Gudmann*); St. Lucia (Point Michell, 25 V.); Grenada (Balthazar, 250 ft., windward side, 15–27 IV.—*H. H. Smith*).

Mr. Gudmann's specimen is labelled as bred, but the name of the food-plant is not indicated. Baron von Hedemann informs me that it was bred from a species of *Euphorbia*, but his note may possibly have referred to *nesiotes*.

168. Episimus submicans, sp. n.

Antennæ fawn-brown. *Palpi* rough, apical joint depressed, short, partly concealed; greyish-fawn. *Head* fawn-ochreous. *Thorax* fawn-brown; underside shining silvery white. *Fore wings* whitish cinereous, mottled and blotched with umber-brown mixed with fuscous; basal patch scarcely indicated, but traceable by two dark costal spots with smaller ones between them, by a small dark umber-brown patch resting on the fold, and by another nearer to the base beneath the fold; a broad triangular costal patch commencing before and extending beyond the middle is composed of dark umber-brown with fuscous lines running through it, a band of rather shining steel-grey dividing it into two parts obliquely, this patch is diffused and produced irregularly to the fold, above

which it is somewhat dilated; the apical portion of the wing contains two umber-brown costal streaks, the first of which sends out a narrow chestnut-brown line to the termen beneath the apex, the apex itself being dark umber-brown mixed with fuscous scales; an obliquely ascending patch of the same colour, also narrowly dark-margined, rests at its base on the lower half of the termen; an umber-brown patch within the tornus is preceded and followed by a silvery-grey space; cilia rich chestnut-brown along their base, their extremities being dark fuscous. *Exp. al.* 14–16 mm. *Hind wings* greyish brown; cilia paler, shaded along their base. *Abdomen* greyish brown. *Legs* whitish cinereous; hind tibiæ with a tuft of hairs beneath (on their inner sides, along their anterior half); middle femora shining white.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Grenada (Balthazar, 250 ft., windward side, 15 III.–20 IV.: nine specimens.—*H. H. Smith*).

This species varies considerably in the colour of the fore wings, in some specimens assuming a rich reddish brown (almost ferruginous) tint, the thorax matching the colour of the basal half of the wing.

61. Cacocharis, Wlsm.

169. Cacocharis albimacula, Wlsm.

Cacocharis albimacula, Wlsm. Pr. Z. Soc. Lond, 1891, 503–4, 543, Pl. XLI. 4 (1892)[1].

Hab. Brazil[1] (Ceara, VIII.—*Leech*, Mus. Wlsm.). **West Indies**—St. Vincent[1].

62. Ancylis, Hb.

= *Phoxopteris*, Tr.; = *Phoxopteryx*, Sdf.

170. Ancylis virididorsana, Mschl.

Phoxopteryx virididorsana, Mschl. Ab. Senck. Nat. Ges. XV. 334, 354 (1890)[1]. *Phoxopteris virididorsana*, Wlsm. Pr. Z. Soc. Lond. 1891, 504, 543 (1892)[2].

Hab. **West Indies**—Portorico[1, 2].

63. Thiodia, Hb.

Type, *Tortrix citrana*, Hb. (Stph.).

Thiodia, Hb. Verz. bek. Schm. 391 (1826); Stph. List Br. An. B.M. X. Lp. 63 (1852).

= **Cydia* (Hb. *partim*), Meyr. HB. Br. Lp. 482–3 (1895) (*nec* Stph.).

= *Semasia*, Stgr. & Wk. Cat. (*partim*); Fern.

Hübner proposed *Thiodia* for his two species *citrana* and *sulphurana* (= *rhododendronalis*, Dp.); and Stephens in 1852 constituted *citrana* the type. The name *Cydia* cannot be employed for this genus, as its type is *Tinea pomonella*, L. (*vide* p. 130).

171. Thiodia autochthones, sp. n.

Antennæ and *palpi* mouse-grey, the latter slightly paler. *Head* and *thorax* mouse-grey. *Fore wings* mouse-grey, with a series of oblique geminated white-grey costal streaks terminating in an inverted spot of the same colour before the apex; on the outer half these streaks are produced outwards in leaden-grey lines extending to the margin of the ochreous ocellated patch, which is bounded by a leaden-grey patch on its inner side, and on its outer by a less wide white-grey subovate spot lying between it and the termen, which is also ochreous throughout bounded by a slender dark line at the base of the cilia, which are slightly indented below the apex; the ocelloid patch contains two black dots; about the middle of the dorsum arises an inconspicuous leaden-grey patch, and the surface of the wing between the markings above described is minutely speckled with ochreous and fuscous scales; cilia shining leaden grey. *Exp. al.* 8 mm. *Hind wings* brownish grey, with a slight greenish iridescence in certain lights; cilia whitish grey, divided by a slight shade-line near their base. *Abdomen* leaden grey, with two darker cross-bands near the base; anal tuft paler. *Legs* shining leaden grey.

Type, ♂ Mus. Hedemann; ♀ Mus. Wlsm.

Hab. **West Indies**—St. Croix, 30 IV.–27 V. (*Gudmann, Hedemann, Pontoppidan*); St. Thomas, 10–18 IV. (*Gudmann, Hedemann*). Six specimens.

64. Eucosma, Hb.

Type, *Eucosma circulana*, Hb.

Eucosma, Hb. Zutr. II. 28. figs. 363–4 (1823): Verz. bek. Schm. 374 (1826): Wkr. Cat. Lp. Ins. B.M. XXVIII. 423 (1863) [*nec* Meyr. HB. Br. Lp. 457–8 (1895)]; = *Callimosema*, Clem. Pr. Ent. Soc. Phil. V. 140–1. fig. 9 (1865).

= *Epiblema*, Hb. Verz. bek. Schm. 375–6 (1826); Stph. Ill. Br. Ent., Haust. IV. 92–3 (1834), 418 (1835): List Br. An. B.M., X. Lp. 46–7 (1852); Meyr. HB. Br. Lp. 490 (1895). Type, *Tinea fœnella*, L. (Stph.).

= *Pædisca*, Tr. Schm. Eur. VIII. 188 (1830); Dp. Hist. Nat. Lp. Fr. IX. 22–3 (1834); Hein.; Stgr. & Wk.; Fern. &c. Type, *Tortrix solandriana*, L. (Dp.).

172. Eucosma longipalpana, Mschl.

Grapholitha (*Pædisca*) *longipalpana*, Mschl. Ab. Senck. Nat. Ges. XV. 333, 354 (1890)[1]. *Pædisca longipalpana*, Wlsm. Pr. Z. Soc. Lond. 1891, 506, 544 (1892)[2].

Hab. **West Indies**—Portorico[1, 2].

173. Eucosma strenuana, Wkr.

= *exvagana*, Wkr.[3]; = *flavocellana*, Clem.[4]; = *subversana*, Z.[5]

Grapholita strenuana, Wkr. Cat. Lp. Ins. B.M. XXVIII. 383

(1863)[1]. *Grapholita exvagana*, Wkr. Cat. Lp. Ins. B.M. XXVIII. 383–4 (1863)[2]. *Steganoptycha flavocellana*, Clem. Pr. Ent. Soc. Phil. V. 138 (1865)[3]. *Grapholitha subversana*, Z. Verh. z.-b. Ges. Wien, XXV. 318–9 (1875)[4]. *Pædisca strenuana*, Wlsm. Ill. Lp. Het. B.M. IV. 52, Pl. LXXII. 4 (1879)[5]; Fern. Tr. Am. Ent. Soc. X. 40. No. 278 (1882)[6].

Hab. North America[1, 2, 5]—United States[3, 4, 6], 27 VI.–3 VII.[4] [larva, *Ambrosia*[6]]. **West Indies**—San Domingo (Puerto Plata, 16 V.—*Gudmann*).

65. Crocidosema, Z.

174. Crocidosema plebeiana, Z.

=*altheana*, Mn.[15]; (=*lavaterana*, Mill.[8]; =*peregrinana*, Mschl.[8]).

Crocidosema plebejana, Z. Is. 1847, 721–2[1]. *Penthina altheana*, Mn. Verh. z.-b. Ges. Wien, V. 555–6 (1855)[2]. *Grapholitha altheana*, Ld. Wien. Ent. Mts. III. 343 (1859)[3]. *Crocidosema plebejana*, Ld. Wien. Ent. Mts. III. 367 (1859)[4]. *Pædisca lavaterana*, Mill. Ic. I. 290–3, Pl. XXXIV. 9–13 (1863)[5]. *Steganoptycha altheana*, Hein. Schm. Deutsch. Tort. 241 (1863)[6]. *Grapholitha peregrinana*, Mschl. Berl. Ent. Zts. X. 139–40 (1866)[7]. *Steganoptycha altheana*, Stgr. & Wk. Cat. 260. No. 1221 (1871)[8]. *Crocidosema plebejana*, Stgr. & Wk. Cat. 263. No. 1269 (1871)[9]. *Steganoptycha altheana*, Mill. Cat. Lp. Alp. Mar. 290 (1875)[10]. Hrtm. MT. Münch. Ent. Ver. III. 191. No. 1221 (1879)[11]. *Crocidosema plebeiana*, Meyr. Pr. Lin. Soc. N.S.W. VI. 659–60 (1881)[12]. *Steganoptycha altheana*, M.-P. & F.-T. Nat. Sic. VIII. 158 (1889)[13]. *Crocidosema plebeiana*, Wlsm. Pr. Z. Soc. Lond. 1891, 506, 544 (1892)[14]; Rag. Ann. Soc. Ent. Fr. LXIII. 221. No. 1221 (1894)[15].

Hab. Europe[1–15] [larva, *Althea rosea*[2, 6, 11, 12]; *Lavatera arborea*[3, 11, 12], IX.–II.[11]; *Imago*, II.–V.[11], IX.[2, 6]]. Australia, XII.–III., VII.[12, 14]. **West Indies**—St. Croix, 5–31 V. (*Hedemann*, *Pontoppidan*); St. Thomas, 18–23 III. (*Gudmann*); St. Vincent[14]; Grenada (windward side—Balthazar, 250 ft., La Force Estate, 350 ft., and Chantilly Estate, 350 ft., 30 III.–4 V.; leeward side—Mount Gay Estate, 300 ft., 1–5 X., *H. H. Smith*). Bred by Mr. Gudmann, but the plant not identified. Brazil[14]; Peru[14]; Argentine Republic[14].

66. Strepsicrates, Meyr.

§ *Strepsiceros*, Meyr. Pr. Linn. Soc. N.S.W. VI. 678–9 (1882). Strepsicrates, Meyr. Tr. N. Z. Inst. XX. 73 (1887).

175. Strepsicrates smithiana, Wlsm.

Strepsicrates smithiana, Wlsm. Pr. Z. Soc. Lond. 1891, 506–7, 544 (1892)[1].

Hab. **West Indies**—St. Croix, 9 V. (*Hedemann*); Dominica[1];

St. Lucia (Point Michell, Castle Bruce, 15 II., 30 IX.); St. Vincent[1]; Grenada (Balthazar, 250 ft., windward side, 5–20 IV.—*H. H. Smith*).

Baron von Hedemann observes that this species was bred by Mr. Gudmann, but does not mention the name of the plant. No specimen was included in the collection sent to me by Mr. Gudmann.

67. Balbis, g. n.

(*βαλβίς*=a starting point.)

Type, *Carpocapsa assumptana*, Wkr.

Antennæ less than $\frac{2}{3}$, stout, simple.

Palpi porrect; second joint slightly curved, moderately clothed; apical joint blunt, exposed, projecting forward.

Haustellum short.

Head roughly clothed above.

Thorax smooth, with hair-pencil arising beneath base of costa (appressed to side, but probably expansible, as in *Episimus*).

Fore wings, ♂ without a costal fold; costa slightly arched at base, somewhat straight beyond, thence rounded to the depressed apex, termen not sinuate, tornus rounded. *Neuration*: 12 veins, all separate; 2 from before three-fourths, 7 to termen.

Hind wings evenly rounded, not sinuate beneath apex. *Neuration*: 8 veins; 6 and 7 remote at origin, parallel; 8 approximated to radius; 3 and 4 connate; 5 almost straight, but somewhat approximated to 4.

Legs, hind tibiæ smooth.

Agreeing with *Dichrorampha* and *Lipoptycha* in having 6 and 7 of the hind wings parallel, but differing in the palpi and in the unsinuate termen, and probably intermediate between these genera and *Laspeyresia*, Hb. (=*Grapholitha*, HS.).

176. Balbis assumptana, Wkr.

Carpocapsa assumptana, Wkr. Cat. Lp. Ins. B.M. XXVIII. 406 (1863)[1].

Hab. Brazil (Ega)[1]. **West Indies**—Grenada (Grand Etang, 1900 ft., windward side, 30 V.—*H. H. Smith*).

177. Balbis albicapitana, Wlsm.

Coptoloma? albicapitana, Wlsm. Pr. Z. Soc. Lond. 1891, 505–6, 544 (1892)[1].

Hab. **West Indies**—St. Vincent[1].

178. Balbis? livens, Wlsm.

Grapholitha livens, Wlsm. Pr. Z. Soc. Lond. 1891, 504–5, 543 (1892)[1].

Hab. **West Indies**—St. Vincent[1].

This species is probably rightly referred to this genus, but the type was headless when received.

179. Balbis figurana, Z.

Grapholitha (*Coptoloma*?) *figurana*, Z. Hor. Soc. Ent. Ross. XIII. 163–5, Pl. II. 55 (1877)[1]. *Coptoloma*? *figurana*, Wlsm. Pr. Z. Soc. Lond. 1891, 505, 544 (1892)[2].

Hab. **West Indies**—St. Thomas[1,2], 17 XII.[1], 18 IV. (one specimen, *Gudmann*).

180. Balbis? excitana, Mschl.

Grapholitha excitana, Mschl. Ab. Senck. Nat. Ges. XV. 333–4, 354 (1891)[1]. *Grapholitha*? *excitana*, Wlsm. Pr. Z. Soc. Lond. 1891, 505, 543 (1892)[2].

Hab. **West Indies**—Portorico[1,2].

I am unacquainted with this species, but it probably belongs here, as the genus to which Möschler referred it does not appear to occur in the West Indies.

68. Eucelis, Hb.

Type, *Pyralis aurana*, F. (Hb.).

Eucelis, Hb. Verz. bek. Schm. 394 (1826); = *Trycheris*, Gn. Ind. Méth. 56 (1845), *vide* Wlsm. Tr. Ent. Soc. Lond. 1895, 516–7.

= **Epinotia*, Meyr. (*nec* Hb.) HB. Br. Lp. 516 (1895).

In 1834 Stephens constituted *Pædisca simulana*, Hb., the type of *Epinotia*, and Meyrick's genus does not contain any of Hübner's types.

181. Eucelis? lustromarginata, sp. n.

Antennæ stone-grey. *Head* and *palpi* stone-ochreous. *Fore wings* stone-colour, transversely striated with brownish fuscous, giving the whole wing a speckled and streaked appearance; among many more slender lines two may be especially distinguished, although both broken and ill-defined, the first commencing on the costa at one-third from the base, angulated outwards above the middle and reverting to the dorsum almost at a right angle; the second commencing on the middle of the costa, also outwardly rectangular above the middle, nearly parallel with the first, but slightly diverging toward the dorsum, which it reaches before the commencement of the cilia; between these lines is a lustrous steel-grey sheen above the middle; a series of geminated white streaklets along the costa, with some lustrous lines and a row of 4 or 5 black spots along the termen, the upper one being at the apex; cilia shining steel-grey. *Exp. al.* 9 mm. *Hind wings* greyish fuscous, strongly iridescent in certain lights; cilia shining steel-grey. (Underside of both wings brilliantly iridescent.) *Abdomen* grey. *Legs* greyish.

Type, ♀ Mus. Gudmann.

Hab. **West Indies**—St. Croix, 4 V. (*Hedemann*). Unique.

In the absence of the male this species cannot be referred with certainty to the genus *Eucelis*, and it differs from the type in having veins 3 and 4 of the hind wings coincident.

69. CYDIA, Hb.

Type, *Tinea pomonella*, L. (Stph.).

CYDIA, Hb. Verz. bek. Schm. 375 (1826); Stph. Ill. Br. Ent., Haust. IV. 119 (1834), 418 (1835).

= *CARPOCAPSA*, Tr. Schm. Eur. VII. 231 (1829); Hein.; Stgr. & Wk. Cat.; Meyr. &c.

Hübner proposed the genus *Cydia* for the three species—*pomonella*, L. (=*pomonana*, Hb.), *aspidiscana*, Hb., and *hohenwartiana* (Schiff.), Tr. (=*monetulana*, Hb.). Treitschke (Schm. Eur. VII. 231 [1829]) placed *pomonella* in his genus *Carpocapsa*, and (*l. c.* 232) *aspidiscana* and *hohenwartiana* in *Grapholitha*, Tr. One of these two genera must fall as a synonym of *Cydia*. Stephens (Ill. Br. Ent., Haust. IV. 119 [1834]), writing under the heading *Carpocapsa*, said:—"The three first species" (i.e. *pomonella*, *splendana*, and *grossana*) "form the true *Carpocapsæ* of Treitschke—*Cydia* of Hübner." The only species common to Hübner and Stephens, and which consequently was regarded as Hübner's type, is *pomonella*, L. Stephens [*l. c.* 119–20 (1834), 418 (1835)] under *Cydia* includes both *pomonella* and *aspidiscana*; but he had already indicated that he did not regard *aspidiscana* as the type, and in List Br. An. B.M. X. Lp. 54 (1852), *pomonella* appears as the sole type of *Cydia*, the subsequent reference of *aspidiscana* to *Cydia* (*l. c.* 93) is ruled out, *pomonella* having already been constituted the type.

182. CYDIA? FLAVICOLLIS, sp. n.

Antennæ stone-grey. *Palpi* projecting slightly beyond the head, of uniform thickness throughout, the second joint not brush-like; canary-yellow. *Head* and face canary-yellow. *Thorax* stone-grey, anteriorly with a lilac iridescence extending over the tegulæ. *Fore wings* stone-grey, with a slight lilac tinge along the costa nearly to its middle, beyond the middle obliquely banded with tawny fuscous and white, the latter appearing in about six wedge-shaped streaks of which the outer one is curved to the termen, reaching a slight indentation below the apex; an elongate tawny fuscous patch stands erect a little beyond the middle of the dorsum, its inner edge pale-margined; it is terminated at its upper extremity by two short ochreous lines, which separate it at the upper edge of the cell from the first oblique costal shade; beyond this erect patch the lower two-thirds of the wing-surface are transversely streaked with silvery metallic, preceding a triangular patch of reddish ferruginous, extending upwards from the tornus along the termen, and slightly tinging the extreme apex; cilia shining silvery-grey. Underside strongly iridescent, with five white costal streaks showing through. *Exp. al.* 15 mm. *Hind wings* brownish fuscous; cilia pale bluish grey. Underside strongly iridescent. *Abdomen* dark leaden grey. *Legs* bone-whitish, tarsal joints banded with fuscous.

Type, ♀ Mus. Hedemann.

Hab. **West Indies**—St. Thomas, 9 III. (*Hedemann*). Unique.

Though I have little doubt that this species belongs to the genus *Cydia*, it cannot be referred there with certainty in the absence of the male.

70. Heligmocera, Wlsm.

183. Heligmocera calvifrons, Wlsm.

Heligmocera calvifrons, Wlsm. Pr. Z. Soc. Lond. 1891, 508, 544, Pl. XLI. 5 *a–d* (1892)[1].

Hab. **West Indies**—St. Vincent[1]; Grenada (Balthazar, 250 ft., windward side, 15 III.–8 V.—*H. H. Smith*).

II. *TORTRICINÆ*.

71. Oxygrapha, Hb.

§*Peronea*, Crt. Br. Ent. I. expl. Pl. XVI. (1825). Type, *Pyralis cristana*, F. (Crt.).

†*Oxigrapha*, Hb. Verz. bek. Schm. 386 (1826). Type, *Tortrix literana*, L. (Hb.).

‡Oxygrapha, Wilk. Br. Tortr. 160 (1859).

Teras, Hein.; Stgr. & Wk. Cat.; Fern. &c. (*nec* Tr.+Dp.).

Acalla, Meyr. HB. Br. Lp. 519–20 (1895) (*nec* Hb.+Stph.).

Peronea, Crt., is the oldest name for the genus, but it is too close to *Peronæa*, Poli, 1795. *Oxigrapha*, Hb. (corrected to *Oxygrapha* by Wilkinson), was monotypical from its publication, and should therefore be chosen in preference to any other name proposed for species of this genus by Hübner. *Teras*, Tr., is synonymous with *Rhacodia*, Hb., its type being *caudana*, F., following Curtis (1831) and Duponchel (1834), the latter citing the type. The type of *Acalla*, Hb., was fixed as *Tortrix ophthalmicana*, Hb. (a *Pædisca*), by Stephens in 1834 (*vide* Ill. IV. 141).

The three following species differ from the type in having 3 and 4 of the fore wings stalked and 3 and 4 of the hind wings coincident; at present I am unwilling to separate them generically from *Oxygrapha*.

184. Oxygrapha negans, sp. n.

Antennæ brownish. *Palpi* short, suberect, apical joint exposed, second joint loosely clothed; rusty brownish. *Head* rust-brown. *Thorax* olive-grey with a greenish tinge. *Fore wings* olive-grey with a greenish tinge, the costa shining pale bronzy-brown throughout, the termen and cilia the same; an oblique series of raised fuscous scales extends from the costa before the middle in a slightly outwardly bowed line towards the middle of the dorsum; this is followed beyond the middle by ill-defined, scarcely visible, parallel lines of pale brown (not iridescent, but appearing only in certain lights). *Exp. al.* 16 mm. *Hind wings* trapezoidal; umber-brown, with a pale line along the base of the umber-brown cilia,

which are grey on their outer half. *Abdomen* umber-brown. *Legs* cinereous.

Type, ♀ Mus. Gudmann.

Hab. **West Indies**—Hayti (Port-au-Prince, 22 V.—*Gudmann*). One specimen.

185. Oxygrapha monochroma, sp. n.

Antennæ fuscous. *Palpi* suberect, apical joint exposed; reddish brown, slightly paler than the colour of the head. *Head* reddish brown. *Thorax* brownish fuscous: underside pale cinereous. *Fore wings* reddish brown, with slightly paler mottlings on the outer half, and a slight shining greyish shade preceded by a slender ferruginous line before the termen; cilia reddish brown. *Exp. al.* 12 mm. *Hind wings* dark fuscous. *Abdomen* dark fuscous: underside pale cinereous. *Legs* cinereous shaded with fuscous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Hayti (Port-au-Prince, 22–24 V.—*Gudmann*). Two specimens.

186. Oxygrapha rotundipennis, sp. n.

Antennæ cinereous. *Palpi* projecting less than the length of the head beyond it; dusky cinereous. *Head* cinereous. *Thorax* tawny cinereous. *Fore wings* abruptly arched near the base, of approximately even width throughout, the apex and termen evenly rounded, the costa roughened from base to apex; tawny reddish, with a faintly indicated oblique greyish-fuscous shade from before the middle of the costa, extending to the lower edge of the cell; a similar curved shade before the apex; waved lines of sublustrous scales are visible on the outer half of the wing in certain lights; a small black dot at the end of the cell; cilia shining reddish grey. *Exp. al.* ♂ 10, ♀ 11 mm. *Hind wings* trapezoidal; greyish fuscous; cilia very long and slightly paler. *Abdomen* greyish fuscous. *Legs* whitish ochreous.

Type, ♂ Mus. Wlsm.; ♀ Mus. Hedemann.

Hab. **West Indies**—St. Thomas, 8–22 III. (*Gudmann*, *Hedemann*). Three specimens.

"The larva feeds on *Acacia arabica*, joining two leaves together, between which it lives as in a sort of case" (*Hedemann*).

In the male the colour of the fore wings is dull fawn ochreous, the tawny gloss almost entirely confined to the two darker markings, which are much more conspicuous than in the female. The antennæ are slightly serrate and pubescent beneath.

72. Apinoglossa, Mschl. & Saalm.

187. Apinoglossa comburana, Mschl.

Apinoglossa comburana, Mschl. Ab. Senck. Nat. Ges. XV. 331, 354 (1894)[1]; Wlsm. Pr. Z. Soc. Lond. 1891, 496, 543 (1892)[2].

Hab. **West Indies**—Portorico[1,2].

73. Tortrix, L.

188. Tortrix? effœtana, Mschl.

Tortrix effœtana, Mschl. Ab. Senck. Nat. Ges. XV. 330, 354 (1890)[1]. *Tortrix? effœtana*, Wlsm. Pr. Z. Soc. Lond. 1891, 497, 543 (1892)[2].

Hab. **West Indies**—Portorico[1,2].

189. Tortrix? insignitana, Mschl.

Tortrix insignitana, Mschl. Ab. Senck. Nat. Ges. XV. 330–1, 354 (1890)[1]. *Tortrix? insignitana*, Wlsm. Pr. Z. Soc. Lond. 1891, 497, 543 (1892)[2].

Hab. **West Indies**—Portorico[1,2].

74. Archips, Hb.

Type, *Tortrix piceana*, L. (Hb.).

Archips, Hb. Tent. (1806).

= *Cacœcia*, Hb. Verz. bek. Schm. 388 (1826): Hein., Stgr. & Wk., Fern., Meyr., &c.

190. Archips jamaicana, Wkr.

Teras jamaicana, Wkr. Cat. Lp. Ins. B.M. XXVIII. 291 (1863)[1]. *Cacœcia jamaicana*, Wlsm. Pr. Z. Soc. Lond. 1891, 497, 543 (1892)[2].

Hab. **West Indies**—Jamaica[1,2].

75. Ptychamorbia, Wlsm.

191. Ptychamorbia catenana, Wlsm.

Ptychamorbia catenana, Wlsm. Pr. Z. Soc. Lond. 1891, 498–9, 543 (1892)[1].

Hab. **West Indies**—St. Vincent[1]; Grenada (La Force Estate, 350 ft., windward side, 5 V.—*H. H. Smith*). Brazil—Espiritu Santo[1], Santa Catherina (*Mus. Wlsm.*).

The specimen from Grenada is a male, and confirms my conjecture that it would only possess eleven veins in the fore wings. It differs, however, from *exustana* in not having a mat of scales on the basal portion of the antennæ. I have also received both sexes from Santa Catherina.

76. Ceratorrhineta, Z.

(†*Cerorrhineta*, Z.; ‡Ceratorrhineta, Wlsm.)

192. Ceratorrhineta calidana, Z.

Cerorrhineta calidana, Z. Hor. Soc. Ent. Ross. XIII. 116–7 (1877)[1]. *Ceratorrhineta calidana*, Wlsm. Pr. Z. Soc. Lond. 1891, 500, 543, Pl. XLI. 2 *a–e* (1892)[2].

Hab. **West Indies**—Cuba[1–2].

77. Platynota, Clem.

193. Platynota flavedana, Clem.

=*concursana*, Wkr.[6]; =*laterana*, Rbs.[5]

Platynota flavedana, Clem. Pr. Ac. Nat. Sc. Phil. XII. 348 (1860)[1]. *Tortrix concursana*, Wkr. Cat. Lp. Ins. B.M. XXVIII. 324–5 (1863)[2]. *Tortrix flavedana*, Rbs. Tr. Am. Ent. Soc. II. 278, Pl. VI. 55, ♂ (1869)[3]. *Tortrix laterana*, Rbs. Tr. Am. Ent. Soc. II. 278, Pl. VI. 56, ♀ (1869)[4]. *Tortrix* (*Platynota*) *flavedana*, Z. Verh. z.-b. Ges. Wien, XXV. 236–7 (1875)[5]. *Platynota flavedana*, Wlsm. Ill. Typ. Lep. Het. B.M. IV. 11 (1879)[6]; Fern. Tr. Am. Ent. Soc. X. 22. No. 113 (1882)[7]; Pack. U.S. Dept. Agr., Rp. V. 425, 651 (1890)[8].

Hab. United States[1–8], 15–18 VII.[5] [Larva, Clover[7], *Rosa*[7], *Sassafras officinale*[7,8], *Acer*[7,8]]. **West Indies**—Hayti (Port-au-Prince, 25 V.—*Gudmann*); St. Thomas, 10 IV. (*Gudmann*).

This species has a long costal fold.

194. Platynota repandana, Wkr.

Teras repandana, Wkr. Cat. Lp. Ins. B.M. XXVIII. 292 (1863)[1]. *Platynota repandana*, Wlsm. Pr. Z. Soc. Lond. 1891, 499, 543 (1892)[2].

Hab. **West Indies**—San Domingo[1,2].

This species has a long, straight, costal fold.

195. Platynota rostrana, Wkr.

=*restitutana*, Wkr.[4]; =*connexana*, Wkr.[4]

Teras rostrana, Wkr. Cat. Lp. Ins. B.M. XXVIII. 290 (1863)[1]. *Teras restitutana*, Wkr. Cat. Lp. Ins. B.M. XXVIII. 292 (1863)[2]. *Teras connexana*, Wkr. Cat. Lp. Ins. B.M. XXVIII. 293 (1863)[3]. *Platynota rostrana*, Wlsm. Ill. Typ. Lp. Het. B.M. IV. 5–6, Pl. LXII. 1 (1879)[4]. *Tortrix rostrana*, Cmstk. U.S. Dept. Agr., Rp. Ent. 1880, 253 (1881)[5]. *Platynota rostrana*, Fern. Tr. Am. Ent. Soc. X. 22. No. 114 (1882)[6]; Wlsm. Pr. Z. Soc. Lond. 1891, 499, 543 (1892)[7].

Hab. United States[1–4]—Florida[5,6,7] [Larva, Orange[5,6,7]. 31 I.–II.[5]; 17 V.[5]] **West Indies**—San Domingo[1,2,4,6,7]; St. Vincent[7]; Grenada (Balthazar, 250 ft., and La Force Estate, 350 ft., windward side, 15 III.–5 V.—*H. H. Smith*). Venezuela[3,6,7]; Brazil (Ega)[1,4,7].

Walker's three species are represented by females indistinguishable from each other, and until male topotypes have been obtained it will be impossible to determine whether they represent one or more species—probably each matches a male of the *flavedana* group occurring with it. I referred the St. Vincent specimens (both females) to *rostrana* with some diffidence, and the reception of both sexes from Grenada *only* does not enable me to clear up the synonymy as confidently as I should desire. The males from

Grenada have a short fold and much resemble *labiosana*, Z., but are smaller.

196. PLATYNOTA BREVIPLICANA, sp. n.

Antennæ dark brown. *Palpi* brownish ochreous. *Head* and *thorax* brownish ochreous. *Fore wings* with a short brownish-ochreous basal patch, somewhat indented on the fold; the costal fold in the male not extending beyond this pale patch, which reaches only to one-fourth the wing-length (in the more northern species *flavedana*, Clem., it extends to half the wing-length); the whole of the middle portion of the wing is overclouded by a broad dark umber-brown band, beyond which the terminal portion is shining whitish ochreous with two sinuate lines of slightly raised scales; there are also some raised scales on the dark central band, notably in an oblique line from its upper and inner angle ending in a strong patch near the outer end of the fold and in a small patch at the outer end of the cell; cilia pale cinnamon-brown on their basal, brownish ochreous on their outer half. *Exp. al.* 15 mm. *Hind wings* cinnamon-brown, blending to ochreous towards the base; cilia shining pale cinnamon-brown. *Abdomen* cinnamon-brown. *Legs* brownish ochreous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—GRENADA (Balthazar, 250 ft., windward side, 15–20 IV.—*H. H. Smith*). Two specimens.

197. PLATYNOTA DIMINUTANA, sp. n.

Antennæ dark greyish brown. *Palpi* somewhat curved downwards; apical joint less than half the length of the second; grey-brown. *Head* and *thorax* rust-brown. *Fore wings*: male with a short costal fold extending to one-fourth; rust-brown, with a broad central band, thickly mottled with purplish fuscous in which is an oblique line of raised scales ending on the fold, and a second line, shorter and more oblique, from beyond the middle of the costa where it is accompanied by a dark patch; a small patch of dark fuscous scales lies near the base of the dorsum; cilia ferruginous brown on their basal half, pale ochreous on their outer half. *Exp. al.* 14 mm. *Hind wings* cinnamon-brown, tending to ochreous towards the base; cilia shining pale cinnamon-brown. *Abdomen* brownish ochreous. *Legs* pale ochreous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—GRENADA (Balthazar, 250 ft., windward side, 15 IV.—*H. H. Smith*). Two specimens.

This species differs from *breviplicana* in the more broken or mottled appearance of the central band, which almost assumes the form of an oblique fascia followed by a costal patch, and in the darker ferruginous terminal portion of the wing. It is quite conceivable that it may be a variety of *breviplicana*, but I am strongly inclined to regard it as distinct in the absence of intermediate forms. Except in the colour of the hind wings it approaches somewhat closely the Mexican species *stultana*, Wlsm.

78. Cœlostathma, Clem.

Type, *Cœlostathma discopunctata*, Clem. (Clem.).

Cœlostathma, Clem. Pr. Ac. Nat. Sc. Phil. XII. 355 (1860).
=**Amphisa*, Fern. Tr. Am. Ent. Soc. X. 22 (1882), nec Crt.

I cannot agree with Professor Fernald in sinking *Cœlostathma* as a synonym of *Amphisa*, Crt., which has veins 7 and 8 of the fore wings stalked and 9 separate, whereas *Cœlostathma* has 7 and 8 stalked out of 9.

198. Cœlostathma parallelana, sp. n.

Antennæ biciliate, 2½; cream-colour. *Palpi* projecting rather more than the length of the head beyond it; cream-coloured; second joint shaded with fawn-brown externally. *Head* and *thorax* cream-colour. *Fore wings* and cilia cream-coloured, with a dark fawn-brown band from before the middle of the costa to the middle of the dorsum, variable in breadth and distinctness, sometimes diffused or dilated outwards below the middle; this is followed by a second narrower band, commencing on the costa at one-fourth from the apex and reaching to the tornus; a single black dot lies at the end of the cell between veins 5 and 6. *Exp. al.* 12 mm. *Hind wings* pale fawn-grey with a slight reddish tinge. *Abdomen* cream-coloured, shaded with grey across the middle. *Legs* creamy whitish.

Type, ♂ Mus. Hdm.; ♀ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 4 IV.–14 IV. (*Gudmann*, *Hedemann*). "The larva feeds on *Mimosa*" (*Hedemann*).

This species differs from *Cœlostathma discopunctana*, Clem., in the form of the outer band, which is almost parallel with the first instead of being conspicuously curved inward at its upper extremity. Along the costa the intensity of the bands is variable, and in one female they are almost entirely obliterated, the wing-colour becoming pale fawn-ochreous instead of creamy. I cannot, however, doubt that it belongs to the same species.

III. *PHALONIANÆ*.

79. Phalonia, Hb.

=†*Cochylis*, Tr., Stgr. Cat.; ‡*Conchylis*, Sdf., Fern., &c.

199. Phalonia ichthyochroa, sp. n.

Antennæ whitish cinereous. *Palpi* projecting nearly the length of the head beyond it; whitish, shaded with brown externally. *Head* hoary. *Thorax* shining silvery whitish. *Fore wings* shining silvery whitish; a rust-brown shade along the base of the costa not extending to the dorsum; a broken fascia commencing on the costa beyond the middle consists of a dark-margined rust-brown spot at its upper extremity and a larger rust-brown shade on its lower half, extending somewhat inwards and containing one or two patches of blackish scales; the apical

portion of the wing is mottled with rust-brown mixed with blackish scales, forming a subapical transverse streak and a spot opposite to the middle of the termen; minute blackish speckling is visible in the whitish cilia and along the dorsum as well as in a series of costal reticulations. *Exp. al.* 8–10 mm. *Hind wings* pale brownish grey, with a slight pinkish reflection; cilia paler. *Abdomen* pale brownish grey. *Hind legs* pale cinereous.

Type, ♂ Mus. Wlsm.; ♀ Mus. Hedemann.

Hab. **West Indies**—St. Croix, 26 IV. (*Gudmann*); St. Thomas, 15 III. (*Hedemann*); Grenada (Balthazar, 250 ft., windward side, 5–10 IV.—*H. H. Smith*). Four specimens.

200. Phalonia subolivacea, sp. n.

Antennæ whitish. *Palpi* whitish, shaded with olivaceous on their outer sides. *Head* whitish. *Thorax* creamy whitish. *Fore wings* shining creamy white, shaded with olivaceous along the basal half of the costa; an olivaceous band, descending straight from the middle of the costa, is angulated on the cell, reverting to the dorsum before the middle, at its angle is a small dot of black scales; a small, oblique, olivaceous streak commences on the costa halfway between this and the apex, not quite attaining the middle of the termen, along which is a slight olivaceous shade, with a rounded patch of the same colour lying above the tornus and a small brownish dot below and before it at the commencement of the dorsal cilia; cilia shining creamy whitish. *Exp. al.* 10 mm. *Hind wings* pale smoky grey; cilia whitish, shaded along their middle. *Abdomen* greyish; anal tuft inclining to ochreous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Croix, 26 IV.–7 V. (*Gudmann*); St. Thomas, 7 III.–4 IV. (*Gudmann*, *Hedemann*). Nine specimens.

201. Phalonia distigmatana, sp. n.

= *Conchylis* sp. (near *angulatana*, Rbs.), Wlsm. Pr. Z. Soc. Lond. 1891, 501, 543 (1892)[1].

Antennæ ochreous. *Palpi* whitish ochreous, slightly shaded externally. *Head* and *thorax* whitish ochreous. *Fore wings* whitish ochreous, with three dark fawn-brown costal spots and the extreme base of the costa also fawn-brown; the first spot occurs at one-fourth from the base and almost meets an oblique streak of a slightly paler shade running outwards from the base of the dorsum; the second is large and triangular, a little beyond the middle, its apex pointing outwards and scarcely separated from the apex of a similar dorsal triangle almost exactly opposite to it, but very slightly nearer to the base; the third costal spot is very minute and less well-defined; from this runs a paler fawn-brown band, outwardly to the termen below the apex and downwards along the terminal margin to the tornus; a small brown spot at the end of the cell, almost between the apices of the costal and dorsal triangles, completes the wing-markings, with the exception

of some scarcely noticeable silvery lines in the apical half of the wing along the edges of the darker markings; cilia pale ochreous. *Exp. al.* 9 mm. *Hind wings* and cilia greyish. *Abdomen* greyish. *Legs* whitish ochreous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Croix, 25 VI. (*Hedemann*); St. Vincent (*H. H. Smith*)[1]; Grenada (Balthazar, 250 ft., windward side, 13 IV.–4 V. (*H. H. Smith*). Five specimens.

I am unacquainted with the following three species, and therefore am unable to refer them to this genus with certainty.

202. Phalonia? prolectana, Mschl.

Cochylis prolectana, Mschl. Ab. Senck. Nat. Ges. XV. 332, 354 (1890)[1]. *Conchylis prolectana*, Wlsm. Pr. Z. Soc. Lond. 1891, 500, 543 (1892)[2].

Hab. **West Indies**—Portorico[1,2].

203. Phalonia? tectonica, Mschl.

Cochylis tectonica, Mschl. Ab. Senck. Nat. Ges. XV. 332–3, 354 (1890)[1]. *Conchylis tectonica*, Wlsm. Pr. Z. Soc. Lond. 1891, 501, 543 (1892)[2].

Hab. **West Indies**—Portorico[1,2].

204. Phalonia? vicinitana, Mschl.

Cochylis vicinitana, Mschl. Ab. Senck. Nat. Ges. XV. 333, 354 (1890)[1]. *Conchylis vicinitana*, Wlsm. Pr. Z. Soc. Lond. 1891, 501, 543 (1892)[2].

Hab. **West Indies**—Portorico[1,2].

80. Thyraylia, g. n.

(θύραυλία = living out of doors.)

Type, *Conchylis bunteana*, Rbs.

Antennæ ♂ shortly biciliate.

Palpi moderate, porrect; second joint roughly clothed; apical joint short, blunt.

Head roughly clothed.

Thorax smooth.

Fore wings: ♂ without a costal fold; costa somewhat straight, rounded to the slightly depressed apex; termen rather oblique, not sinuate beneath apex; tornus rounded. *Neuration*: 12 veins all separate; 2 from outer fourth of cell, 7 to costa above apex.

Hind wings slightly broader than the fore wings, trapezoidal; apex and tornus rounded; termen and dorsum subsinuate. *Neuration*: 8 veins; 3 and 4 connate (or stalked), 5 almost straight but inclining to 4 towards base, 6 and 7 stalked.

Hind legs smooth.

Allied to *Phtheochroa*, Stph. (*Commophila*, Meyr.), from which it

differs in the much shorter palpi, in vein 7 of the fore wings attaining the costa before the apex, and in the absence of raised scales. It is possible that specimens in better condition might exhibit a slight thoracic tuft.

205. THYRAYLIA BUNTEANA, Rbs.

Conchylis bunteana, Rbs. Tr. Am. Ent. Soc. II. 288, Pl. VIII. 86 (1869)[1]; Z. Verh. z.-b. Ges. Wien, XXV. 245–6 (1875)[2]; Fern. Tr. Am. Ent. Soc. X. 26. No. 144 (1882)[3]; Wlsm. Pr. Z. Soc. Lond. 1891, 501, 543 (1892)[4].

Hab. UNITED STATES[1–4]. **West Indies**—ST. VINCENT[4].

206. THYRAYLIA LEPIDANA, Clem.

Argyrolepia? lepidana, Clem. Pr. Ac. Nat. Sc. Phil. XII. 355 (1860)[1]. *Conchylis lepidana*, Rbs. Tr. Am. Ent. Soc. II. 287, Pl. VIII. 84 (1869)[2]; Fern. Tr. Am. Ent. Soc. X. 25. No. 142 (1882)[3].

Hab. UNITED STATES[1–3]. **West Indies**—JAMAICA (Kingston, 17 VII.—*Cockerell*); ST. CROIX, 6–18 V. (*Gudmann, Hedemann, Pontoppidan*).

207. THYRAYLIA LACTEIPALPIS, Wlsm.

Conchylis lacteipalpis, Wlsm. Pr. Z. Soc. Lond. 1891, 500, 543 (1892)[1].

Hab. **West Indies**—ST. VINCENT[1].

IX. TINEIDÆ.

I. *OPOSTEGINÆ.*

81. OPOSTEGA, Z.

208. OPOSTEGA ABRUPTA, sp. n.

(*Head* missing.) *Thorax* shining white. *Fore wings* shining white, with pale bluish reflections; before the apex a pale fawn-brown costal streaklet, tending obliquely outwards, is dark-margined on both sides, this runs nearly parallel with the upper half of a slender dark line in the apical cilia which is continued around the termen, with a slight inclusion opposite the apex of the wing, below which is a small reduplicated black dot; the cilia beyond the dark line which runs through them are fawn-brown, their basal half white along the termen and gradually shading to fawn-brown on the dorsum. On the underside the brown outer ends of the apical cilia are plainly visible. *Exp. al.* 5·5 mm. *Hind wings* and cilia shining pale fawn-brown. *Abdomen* shining fawn-brown. *Hind legs* pale fawn-brownish, the bristles strongly developed.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—ST. THOMAS, 19 III. (*Hedemann*). Unique.

Although the head is missing, it is easy to decide that this is an undescribed species of the genus to which I refer it.

209. Opostega adusta, sp. n.

Antennæ with a broad shining white eyecap on the basal joint; beyond pale fawn-brownish. *Palpi* pale fawn-brownish. *Head* and *thorax* shining white. *Fore wings* shining white, with blue and lilac reflections: a conspicuous umber-brown dorsal spot at about one-third from the base; a narrow dark umber-brown shade along the costa a little beyond the middle is continued to the commencement of the costal cilia; a slender fuscous line beginning in these runs obliquely outwards through the cilia forming an angle at the apex of the wing, thence deflected along the termen; this is reduplicated by a slight shade in the middle of the fawn-brown cilia beyond it, its upper half preceded by a slight ferruginous tinge running parallel with it from costa to apex; cilia shining pale fawn-brownish along the dorsum and tornus. Underside spotless. *Exp. al.* 5 mm. *Hind wings* and cilia pale fawn-brownish. *Abdomen* (somewhat denuded) shining pale brownish. *Hind legs* shining pale brownish ochreous, the bristles continued to the tarsal joint.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—St. Thomas, 20 III. (*Hedemann*). Unique.

210. Opostega venticola, sp. n.

Antennæ golden yellow; eyecaps shining white. *Palpi* white. *Head* and *thorax* shining white. *Fore wings* shining white, with two minute oblique fuscous costal streaklets followed by a short straight one before the apex, all tending to converge in the direction of a single black point in the apical cilia; the space between the first and second streak is golden yellow, which extends also to the black point but not to the dorsum or tornus; a very narrow faint golden spot rests on the middle of the dorsum; beyond the black point a slight shade is visible in the cilia, which are otherwise white with a golden tinge. *Exp. al.* 6 mm. *Hind wings* whitish grey; cilia golden white. *Abdomen* white with a golden tinge. *Legs*: hind tibiæ and basal joints of the tarsi with stiff hairs; whitish ochreous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Hayti (Port-au-Prince, 23 V., *Gudmann*); Grenada (Balthazar, 250–300 ft., windward side, 5 IV.–8 V.—*H. H. Smith*). Four specimens.

211. Opostega saltatrix, sp. n.

Antennæ with a conspicuous shining white eyecap; remaining joints pale straw. *Palpi* small, slender, dependent; yellowish. *Head* and *thorax* shining white. *Fore wings* shining white, with a dark olive-grey fascia before the middle, diffused outwards at its upper end to the middle of the costa; this is followed by a streak of the same colour, along the apical portion of the costa, reaching to the apex; a slender streak above it running through the cilia and meeting it beyond the apex, this streak is sometimes very inconspicuous; cilia pale olive-grey. *Exp. al.* 5 mm. *Hind wings* very

narrow; pale olive-grey; cilia the same. *Abdomen* greyish. *Legs*: hind tibiæ with profuse spiny hairs above; pale greyish.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 18 III.–2 IV. (*Gudmann, Hedemann*). Three specimens.

"In repose the moth resembles a Cicada and springs forwards" (*Hedemann*).

II. *DENDRONEURINÆ.*

82. Dendroneura, Wlsm.

212. Dendroneura præstans, Wlsm.

Dendroneura præstans, Wlsm. Pr. Z. Soc. Lond. 1891, 510, 544, Pl. XLI. 6, *a–c* (1892)[1].

Hab. **West Indies**—St. Vincent[1]; Grenada (windward side, Chantilly Estate, 350 ft., Balthazar, 250 ft., 13–20 IV.—*H. H. Smith*).

213. Dendroneura simplex, sp. n.

Antennæ rather shorter than the fore wings; pale yellowish fawn. *Palpi* short, flattened; apical joint subovate, broader than the second; pale yellowish fawn. *Head* and *thorax* pale fawn. *Fore wings* shining, pale yellowish fawn, with a bright yellowish ferruginous spot before the apex, preceded by two oblique fuscous streaks, one from a little beyond the middle of the dorsum, the other commencing a little beyond it on the costa, the two nearly meeting outwardly at their extremities (these appear to be composed of very fugitive scales and are easily obliterated); beyond the ferruginous spot a dark fuscous (almost black) slender curved line passes from the apex through the silvery-yellowish cilia giving a slight uncate appearance, tornal cilia yellowish grey. *Exp. al.* 8 mm. *Hind wings* and cilia yellowish grey. *Abdomen* pale greyish. *Legs* shining straw-whitish.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—San Domingo (Puerto Plata, 16 V., *Gudmann*). Two specimens.

This differs from *præstans*, Wlsm., the only other known species of the genus, in the apparent absence of the tuft of long hair-scales arising beneath the eyes, which, so far as I am able to determine, does not exist in this species; but such structures are often only displayed in individual specimens, and in others are completely hidden away.

III. *LYONETIANÆ.*

83. Leucoptera, Hb.

Leucoptera, Hb. Verz. bek. Schm. 426 (1826).
= *Cemiostoma*, Z. Lin. Ent. III. 272–3 (1848).

214. Leucoptera coffeella, Guér.-Mén. & Prrott.

= *noctuella*, Mdnr.

Elachista coffeella, Guér.-Mén. & Prrott. Mém. Ins. Cafiers Antill. 1–32, Pl. 1.–II. (1842)[1]; Rev. Zool. 1842, 126–7[2]; Ann.

Soc. Ent. Fr. XI. Bull. ii. (1842)[3]. *Bucculatrix* sp., Stn. Ent. Wk. Int. IV. 70 (1858)[4]. *Cemiostoma coffeella*, Stn. Ent. Wk. Int. X. 110-11 (1861)[5]. *Elachista coffeella*, Nietn. Obs. Enemies Coffee-tree Ceylon, 24 (1861)[6]: (2 edn.) 18 (1872)[6]. ..... *noctuella*, Madinier, Rev. Agr. Imp. Fluminense Agr. No. 3, p. 29 *et seq.* (18..)[7]. *Cemiostoma coffeellum*, P. Mann, Am. Nat. VI. 332-41, 596-607, Pl. V. (1872)[8]. *Elachista coffeella*, Nietn. (Green's edn.) Obs. Enemies Coffee-tree Ceylon, 16 (1880)[9].

Larva SUP. *Coffea arabica*[1,9]. *Pupa* in hammock (teste fig.)[1].

Hab. **West Indies**—GUADELOUPE, larva and imago, I.–XII.[1,5,8]; MARTINIQUE[7,9]. BRAZIL—Vassouras (Prov. Rio Janeiro, introduced from Antilles), larva and imago, III.–VI.[8]

No. 7 is quoted from Mann (No. 8), as I have not been able to find a copy of the work in London, where indeed the title appears to be unknown, and I should be grateful to anyone who could tell me where it was published. The second edition of Nietner cited above appears to have been overlooked; there is a copy in the British Museum.

84. COMPSOSCHEMA, g. n.

(κομψός = elegant; σχῆμα = form.)

Type, *Compsoschema bimarginellum*, Wlsm.

Antennæ slightly longer than the fore wings, somewhat stout, simple; basal joint with a rather large eyecap. *Labial palpi* slender, dependent; apical joint as long as second. *Maxillary palpi* obsolete. *Haustellum* almost obsolete. *Head* and face smooth. *Thorax* smooth. *Fore wings* somewhat dilated from the base outwards, apex depressed, rounded, termen slightly sinuate beneath the apex. *Neuration*: 9 veins; 7 and 8 stalked, 7 to costa slightly above apex; 3, 4, and 6 absent. *Hind wings* (½) elongate-acuminate, evenly attenuated from base; cilia 4. *Neuration*: 5 veins, without a cell (radial and cubital veins coincident); 3 absent, 4 absent, 6 and 7 coincident. *Legs*: hind tibiæ with somewhat long hairs.

Allied to *Lyonetia*, Hb.

215. COMPSOSCHEMA BIMARGINELLUM, sp. n.

Antennæ yellowish white, eyecaps snow-white. *Palpi* white. *Head* and *thorax* snow-white. *Fore wings* shining white, a slender outwardly oblique dorsal streaklet from one-half reaches nearly across the wing; this is dark brown, with a golden sheen along its inner margin; some very faint golden-yellow mottling is visible on the apical half of the wing, and there is a minute black spot at the extreme apex; the long whitish cilia, which give the end of the wing a much widened appearance, are marked by two dark brown lines running through them, the first at the base, the other beyond their middle—these both pass around the apex to the costal cilia and reach well through the tornal cilia. *Exp. al.* 6 mm. *Hind wings* and cilia pale greyish. *Abdomen* brownish above.

Legs: hind tibiæ clothed with somewhat long whitish hairs; tarsi white, basal joint distinctly marked with fuscous.

Type, ♂ Mus. Gudmann.

Hab. **West Indies**—St. Thomas, 12–16 III. (*Gudmann, Hedemann*). Three specimens.

85. Coptodisca, Wlsm.

§ *Aspidisca*, Clem. Pr. Ac. Nat. Sc. Phil. XII. 11–12, 209 (1860); Stn. Tin. N. Am. 104-5 (fig.), 143 (1872).

Coptodisca, Wlsm. Ent. Mo. Mag. XXXI. 41 (1895).

216. Coptodisca rhizophoræ, sp. n.

Antennæ and *palpi* silvery. *Head*: face silvery, the head above with a golden sheen. *Fore wings* golden yellow, with a pair of silvery-whitish costal and dorsal streaks beyond the middle (the dorsal somewhat preceding the costal), both dark-margined before and behind; a very oblique silvery costal streak, also dark-margined, occurs at one-third from the base, and before the apex is a small silvery costal spot, also dark-margined, its outer marginal streak extending downward through the terminal cilia beyond a rounded velvety-black subterminal dot; cilia silvery whitish, with a curved line along their base from the tornus to the subterminal dot; the dorsum slightly silvery. *Exp. al.* 3·5–4 mm. *Hind wings* and cilia pale greyish. *Abdomen* greyish. *Legs* silvery.

Co-types, (1–2) Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 15 III.–30 IV. (*Gudmann, Hedemann*). Four specimens.

"The young larva mines in leaves of *Rhizophora mangle*; later on it cuts a case out of the leaves" (*Hedemann*). Bred by Baron von Hedemann and Mr. Gudmann. Mr. Gudmann found a leaf containing twenty-four mines.

Nearly allied to *splendoriferella*, Clem.

86. Cycloplasis, Clem.

[Clem. Pr. Ent. Soc. Phil. II. 423–4 (1864); Stn. Tin. N. Am. 246–8 (1872).]

217. Cycloplasis basiplagata, sp. n.

Antennæ shining greyish. *Palpi* and *head* silvery. *Thorax* pale fawn; shining pale creamy-metallic beneath. *Fore wings* and costal cilia shining pale fawn, a short basal patch darker fawn-grey; dorsal cilia greyish. *Exp. al.* 4 mm. *Hind wings* and cilia tawny greyish. *Abdomen* tawny grey: underside shining pale creamy metallic. *Legs* pale fawn; the spines on the tibiæ and tarsi very distinct.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 10 III.–10 IV. (*Gudmann, Hedemann*). Two specimens.

Larva in a case similar to that of a *Coleophora* (*Hedemann*); on

Sida sp. (*Gudmann*). The moth holds the second pair of legs outstretched as in *Stathmopoda* (*Hedemann*).

It is interesting to find a second species of this genus, originally described by Clemens from Pennsylvania. I have not had sufficient material to enable me to critically examine the structure of this genus, which is perhaps allied to *Heliozela*, HS.

IV. *BEDELLIANÆ*.

87. Bucculatrix, Z.

218. Bucculatrix flexuosa, sp. n.

Antennæ with a strong shining white eyecap on the basal joint; pale fawn, with minute darker annulations towards the apex. (*Palpi* obsolete.) *Head* whitish, with a line of fawn-coloured hairs down the middle; face shining white. *Thorax* fawn, the tegulæ with white longitudinal streaks. *Fore wings* fawn, with white lines—one from the base scarcely below the costa reaches to the end of the cell; another following the extreme costa from the base is deflected to the end of the cell from about the middle of the wing-length, nearly reaching to a short longitudinal black streak beyond the outer end of the cell; another white line from the base of the dorsum reaches along the fold to one-third, nearly joining a sinuous white line which, arising from before the middle of the dorsum, is waved upwards and outwards, reverting to the tornus and thence overspreading the termen and cilia to below the apex; there are two slender fawn-coloured dark lines running through the white cilia at and above the apex. *Exp. al.* 5 mm. *Hind wings* pale greyish, cilia brownish grey. *Abdomen* greyish ochreous. *Legs* fawn-white, the tarsi minutely speckled with fuscous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 8 III.–2 IV. (*Gudmann, Hedemann*). Six specimens.

Bred by chance in a glass containing some twigs of *Acacia arabica*, but the larva was not observed (*Gudmann*).

219. Bucculatrix unipuncta, sp. n.

Antennæ whitish. (*Palpi* obsolete.) *Head* and *thorax* creamy white. *Fore wings* creamy whitish, suffused and shaded with pale fawn-ochreous, especially along the base of the fold and along the outer two-thirds of the costa; with a single strong black dot before the termination of the fold; a short slender line runs through the apical cilia, and there are a few black scales at the extreme apex and at the base of the whitish cilia. *Exp. al.* 6 mm. *Hind wings* and cilia very pale yellowish grey. *Abdomen* shining, pale whitish ochreous. *Legs* whitish, tarsal joints minutely spotted with fuscous.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—St. Thomas, 12 III.–3 IV. (*Hedemann*). Two specimens.

88. TISCHERIA, Z.

220. TISCHERIA HELIOPSIELLA, Chamb.

†*HELIOPSISELLA*, Chamb. (‡HELIOPSIELLA, Wlsm.[2])=*NOLCKENII*, F. & B.[3]

Tischeria heliopsisella, Chamb. Cin. Qr. Jr. Sc. II. 113–4 (1875)[1]. *Tischeria nolckenii*, F. & B. Stett. Ent. Ztg. XXXVII. 220 (1876)[2]. *Tischeria heliopsisella*, Chamb. Bull. U.S. G.G. Surv. IV. 115[3], 116[4], 165[5] (1878). *Tischeria nolckenii*, F. & B. Stett. Ent. Ztg. XXXIX. 257 (1878)[6]. *Tischeria heliopsisella*, Hgn. (& Frey) Pap. IV. 153 (1884)[7]. *Tischeria heliopsiella*, Wlsm. Ins. Life, II. 325 (1890)[8]: III. 389 (1891)[9]; Riley, Smith's List Lep. Bor. Am. 110. No. 5917 (1891)[10].

Hab. UNITED STATES[1–10]—Kentucky[1, 7, 9]; Texas[2, 6, 8]; California[5]. Larva, *Ambrosia trifida* and spp.[1–3, 6, 9]; *Heliopsis lævis* and spp.[1, 4, 8], VII.[6], VIII.[6, 8], IX.[6]; imago, VIII.[8], summer and fall[1]. **West Indies**—ST. THOMAS, 2 IV. (*Gudmann*).

Bred by Mr. Gudmann, but the plant not identified.

221. TISCHERIA UNICOLOR, sp. n.

Antennæ greyish fuscous. *Palpi* ochreous. *Head* pale ochreous. *Thorax* brownish ochreous. *Fore wings* ochreous, with a very slight darkened shade at the extreme base of the costa and a faint reddish gloss (in some lights) towards the apex; cilia concolorous with the wings. *Exp. al.* 6 mm. *Hind wings* pale grey; cilia reddish grey. *Abdomen* whitish ochreous. *Legs* whitish ochreous.

Type, ♂ Mus. Gudmann.

Hab. **West Indies**—ST. CROIX, 5 V. (*Gudmann*). Unique.

Bred by Mr. Gudmann from larvæ mining leaves of a tree which was not identified.

222. TISCHERIA PULVEREA, sp. n.

Antennæ, ♂ with very long biciliations; pale fuscous. *Palpi* short, straight, drooping; whitish. *Head* and *thorax* fawn-yellowish. *Fore wings* pale fawn-yellowish, profusely sprinkled around all the margins (but especially along the costa) with smoky-fuscous scales; a slight indication of a dark dorsal mark before the tornus; cilia greyish. *Exp. al.* 5 mm. *Hind wings* pale grey; cilia yellowish grey. *Abdomen* greyish. *Legs* unspotted, yellowish white.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—ST. THOMAS, 15–30 III. (*Gudmann, Hedemann*). Two specimens.

Bred by Mr. Gudmann, but the plant not identified.

V. *GRACILARIANÆ*.

89. LITHOCOLLETIS, Hb.

223. LITHOCOLLETIS? ALBIMACULA, sp. n.

Antennæ cinereous, with a broad white band before the apex. (*Palpi* apparently broken in setting.) *Head* orange-ochreous, the

face silvery. *Thorax* dark bronzy brown. *Fore wings* dark bronzy brown, with two narrow transverse fasciæ, the one before, the other scarcely beyond the middle, and a short dorsal streak from the anal angle shining silvery metallic, a strong snow-white spot running through the costal cilia; cilia bronzy brown. *Exp. al.* 7·5 mm. *Hind wings* and cilia slightly paler bronzy brown. *Abdomen* purplish fuscous. *Legs* brownish: the tarsal joints broadly banded with whitish; two small white spots at the end of the tibiæ.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—St. Thomas, 10 IV. (*Hedemann*). Unique.

This species cannot be referred with certainty to *Lithocolletis* as the underside of the head is injured in pinning.

224. Lithocolletis desmodiella, Clem.

= *gregariella*, Mrt.[10]

Lithocolletis desmodiella, Clem. Pr. Ac. Nat. Sc. Phil. XI. 318, 319, 320 (1859)[1]; Stn. Tin. N. Am. pp. xiii, 37, 63, 65, 68 (1872)[2]; Chamb. Can. Ent. III. 127, 162 (1871)[3]: V. 47 (1873)[4]; F. & B. Stett. Ent. Ztg. XXXVII. 227 (1876)[5]; Chamb. Bull. U.S. G.G. Surv. IV. 110[6], 154 (1878)[7]: Jr. Cin. Soc. N. H. II. 189–90 (1880)[8]. *Lithocolletis gregariella*, Mrt. Can. Ent. XIII. 245–6 (1881)[9]. *Lithocolletis desmodiella*, Wlsm. Tr. Am. Ent. Soc. X. 202 (1882)[10]: Ins. Life, II. 119 (1889)[11]: III. 328. No. 52 (1891)[12]; Riley, Smith's List Lep. Bor. Am. 108. No. 5850 (1891)[13].

Hab. United States[1–13]. Larva, inf. *Desmodium viridiflorum*[1,5,11], spp.[2,6,8]; *Phaseolus pauciflorus*[9,11], sp.[8], VII.–IX.[1–3,5]. Imago, spring[9]; midsummer[3]. **West Indies**—St. Thomas, 11 III.–10 IV. (*Gudmann*, *Hedemann*); Larva, *Centrosema virginianum* (*Gudmann*).

Bred by Mr. Gudmann and Baron von Hedemann from larvæ feeding on *Centrosema virginianum*.

225. Lithocolletis argentifrontella, sp. n.

Antennæ brownish, faintly annulated. *Palpi* pale saffron. *Head* and face shining silvery white, the head with a saffron spot behind the white tuft. *Thorax* pale saffron. *Fore wings* pale saffron, with four transverse white fasciæ, slenderly dark-margined internally: the first before the middle, slightly curved outwards, the second at the middle, straight, the third at the commencement of the costal cilia tending inwards to the dorsum, the fourth a little before the apex running through the cilia, which are saffron beyond it at the apex but greyish before it on the dorsum. *Exp. al.* 5 mm. *Hind wings* and cilia pale greyish. *Abdomen* greyish. *Legs* white, with pale saffron annulations.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—St. Thomas, 11 III.–2 IV. (*Hedemann*). Two specimens.

226. LITHOCOLLETIS TENUICAUDELLA, Wlsm.

Antennæ saffron. *Palpi* whitish. *Head* pale saffron; face silvery white. *Thorax* pale saffron. *Fore wings* pale saffron, with four costal and dorsal streaks shining white, slightly dark-margined before and behind: the first two costal streaks are conspicuous and oblique (the first a little before the middle, the second a little beyond it), the third and fourth costal are very small immediately before the apex, their points turned slightly inwards; the first dorsal arises on the middle, its apex reaching as far as that of the second costal, but it is much less clearly defined; the second and third dorsal are opposite to the outer costal streaks, but are also indistinct; a round black spot lies at the extreme apex, a slender smoky line running through the cilia in a half circle beyond it, to which is attached a slender smoky line running straight outward to the end of the cilia, which are slightly marked with white above and below it; dorsal cilia greyish. *Exp. al.* 5 mm. *Hind wings* and cilia greyish. *Abdomen* grey. *Legs* whitish, with faint tarsal spots.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—ST. CROIX, 1 V. (*Hedemann*). Unique.

90. ORNIX, Tr.

227. ORNIX ERRANTELLA, sp. n.

Antennæ slightly longer than the fore wings; yellowish grey. *Palpi* drooping, slender; whitish cinereous. *Head* with projecting scales above; pale cinereous. *Thorax* pale stone-grey. *Fore wings* pale stone-grey, with brownish-fuscous longitudinal streaks: the first commencing at the base leaves the costa at one-fourth, extending to the outer end of the cell where it almost joins a sharply-angulated costal streak of the same colour; the second commencing at the base of the dorsum extends to two-thirds the wing-length, its lower edge obtusely biangulated and more sharply defined than its upper edge, which is somewhat diffused; a slender streak from before the tornus points towards the apex, but is terminated by a reduplicated oblique transverse bar extending outward to the termen, above the tornus, from the commencement of the costal cilia; the central space between the dark margins of this band is somewhat silvery, and beyond the band the triangular apical space left by it contains a dark fuscous spot margined before and beneath by silvery scales, with a short streak of the same from the apex; cilia brownish grey, becoming whiter towards the apex. *Exp. al.* 8·5 mm. *Hind wings* and cilia brownish grey. *Abdomen* brownish grey. *Legs* bone-whitish, with faintly mottled tarsal joints.

Type, ♂ Mus. Gudmann.

Hab. **West Indies**—ST. THOMAS, 18 III. (*Gudmann*). Unique.

91. Spanioptila, g. n.

(σπάνιος=slender; πτίλον=wing.)

Type, *Spanioptila spinosum*, Wlsm.

Antennæ longer than the fore wings, simple; basal joint with a pecten.

Labial palpi long, slender, drooping, curved, divergent, naked; terminal joint shorter than second.

Maxillary palpi moderate, filiform, drooping.

Haustellum moderate.

Head and face smooth.

Thorax smooth.

Fore wings narrow, elongate, lanceolate, dorsum ciliate almost to base. *Neuration*: 8 veins; 11 absent, 10 absent, 7 to apex, 3 absent.

Hind wings linear, acute, cilia 5. *Neuration*: 6 veins; cell open, 3 and 4 coincident, 5 and 6 coincident.

Abdomen long and slender.

Legs: front tibiæ slightly thickened with scales at their end; middle and hind tibiæ and tarsi clothed with spiny hairs, tending to arrange themselves in tufts.

Allied to *Gracilaria*, but distinguishable by the narrower wings and consequently more degraded neuration, by the pecten on the basal joint of the antennæ, and by the bristly middle and hind legs.

228. Spanioptila spinosum, sp. n.

Antennæ white, the basal joint with a pecten beneath. *Palpi* white. *Head* snow-white. *Thorax* white, with a yellowish tinge. *Fore wings* white, with a yellowish tinge and some dark brownish transverse speckling which becomes agglomerated in two elongate dorsal marks, one before and one beyond the middle, also in a faint costal spot above each of them; a slender ochreous shade runs from the end of the cell to the apex where a smoky line crosses the cilia, giving a falcate appearance not due to the form of the wing which is acute; the cilia, which extend along the dorsum nearly to the base, are tawny greyish. *Exp. al.* 10 mm. *Hind wings* pale grey, with tawny-grey cilia. *Abdomen* shining whitish. *Legs* white; bristly above on the hind tibiæ and tarsi, the latter flecked with umber-brown at the feet and spurs.

Type, ♂ ♀ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 22 III.–12 IV. (*Gudmann, Hedemann*). Five specimens.

92. Eucosmophora, g. n.

(εὖ=beautiful; κόσμος=an ornament; φορεῖν=to carry.)

Type, *Eucosmophora dives*, Wlsm.

Antennæ more than $1\frac{1}{4}$, simple; basal joint without a pecten.

Labial palpi strongly recurved laterally, smooth; apical joint longer than second.

Maxillary palpi well-developed, not folded, slightly recurved, dependent or porrect, smooth.

Haustellum moderate.

Head and face smooth.

Thorax smooth.

Fore wings narrow, elongate, lanceolate, dorsum ciliate almost to base. *Neuration*: 8 veins; 7 to costa, 8 absent, 3 and 4 absent, 6 absent.

Hind wings narrow, lanceolate, acute, cilia 4. *Neuration*: 6 veins, cell open, 5 and 6 coincident, 3 and 4 coincident.

Abdomen long, slender.

Legs: hind tibiæ pectinate above with moderately long stiff bristles, middle tibiæ unclothed.

Allied to *Spanioptila*, from which it differs essentially in the smooth middle tibiæ, and in the hind tibiæ being merely pectinate.

229. EUCOSMOPHORA DIVES, sp. n.

Antennæ pale greyish, with an æneous sheen at the base. *Palpi* strongly recurved laterally, of even width throughout; whitish. *Head* and *thorax* smooth, shining metallic æneous. *Fore wings* bright metallic æneous, merging into cupreous before the apex; nearly at the base of the costa is an elongate subovate black spot extending to about one-fourth; beyond it an elongate bright orange costal patch, before the middle of which is a shining silvery white oblong costal spot, slenderly black-margined except at its upper edge; the orange patch is also margined beneath by a narrow black shade; a small blackish spot below the costa at the commencement of the costal cilia separates the orange patch from the cupreous apical portion of the wing, but the extreme apex becomes again shining æneous; cilia bronzy grey. *Exp. al.* 8 mm. *Hind wings* and cilia grey. *Abdomen* beneath shining pale æneous, above shaded with grey. *Legs*: hind tibiæ with a comb of short bristles above throughout their length: pale straw-colour, tarsi unspotted.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—GRENADA (Balthazar, 250 ft., and Chantilly Estate, 350 ft., windward side, 13 IV.–15 V.—*H. H. Smith*). Six specimens.

230. EUCOSMOPHORA ORNATA, sp. n.

Antennæ brownish. *Labial* and *maxillary palpi* white. *Head* and *thorax* white, both laterally tinged with pale olive-brown. *Fore wings* pale olive-brown from the base to nearly two-thirds, thence blending to rich reddish orange; a silver-white dorsal streak throughout, interrupted by a small orange spot at two-thirds the wing-length; in the orange portion of the wing is a very oblique silvery metallic streak before the costal cilia, followed by two minute opposite silvery metallic marginal spots beyond which the costa and costal cilia are shining white, a fuscous streaklet running through them at the apex (accompanied by some

orange) in an uncate form; cilia below the apex white, an orange line descending through them near their tips, and a dark fuscous line marking their base along the termen; cilia behind the tornus grey. *Exp. al.* 8 mm. *Hind wings* and cilia brownish grey. *Abdomen* pale brownish ochreous. *Legs* whitish ochreous, tarsal joints faintly dark-spotted; hind tibiæ distinctly clothed with a stiff pecten of ochreous hairs above.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Grenada (Balthazar, 300 ft., windward side, 8 V.—*H. H. Smith*). Unique.

231. Eucosmophora insulella, Wlsm.

Zarathra insulella, Wlsm. Pr. Z. Soc. Lond. 1891, 538–9 (1892)[1]. *Zarathra insulsella*, Wlsm. Pr. Z. Soc. Lond. 1891, 548 (1892)[2].

Hab. **West Indies**—San Domingo (Puerto Plata, 16 V.—*Gudmann*); St. Vincent[1].

232. Eucosmophora cupreella, sp. n.

Antennæ fuscous, longer than the fore wings. *Palpi* somewhat slender, slightly recurved, the apical joint as long as the second; whitish. *Head* ochreous. *Thorax* cupreous. *Fore wings* coppery brown with a slight gloss; a slender ochreous line along the dorsum from the base; a narrow outwardly oblique costal streak a little beyond the middle, white blending into steel-grey at its lower extremity; a transverse outwardly curved steel-grey band crosses the wing before the apex terminating in an ochreous spot on the costa, the space before it rich chestnut blending into the ground-colour, the space beyond it bright ochreous, separated from the whitish ochreous cilia by a steel-grey line with a small chestnut spot at the apex. *Exp. al.* 9 mm. *Hind wings* and cilia brownish grey. *Abdomen* dark fuscous. *Legs* brownish grey; hind tibiæ with the apex and spurs white, hind tarsi whitish barred with greyish.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Jamaica (Monteague, 1100 ft., XI.—*Rendall*). Unique.

93. Dialectica, g. n.

(διαλεκτικός = provocative of discussion.)

Type, *Gracilaria scalariella*, Z.

Antennæ not exceeding the length of the fore wings, simple.

Labial palpi smooth, drooping; the apical joint as long as the second, slightly recurved.

Maxillary palpi slender, smooth, acute, porrect.

Head and *thorax* smooth.

Fore wings narrow, elongate, attenuated at the apex, with long cilia, ornamented with recurved lines. *Neuration*: 11 veins, all separate, 7 to costa.

Hind wings very narrow, elongate, attenuate; cilia 5. *Neuration*: 7 veins; 3 and 4 coincident, cell open, 5 and 6 stalked.

Legs: hind tibiæ pectinate above throughout, inner spurs much longer than the outer.

The pectinate hind tibiæ separate this genus from *Gracilaria* and *Ornix*, to which it is allied.

233. DIALECTICA SANCTÆ-CRUCIS, sp. n.

Antennæ smoky-whitish. *Palpi* white, unspotted. *Head* and face white. *Thorax* white, tegulæ and sides pale copper-brown. *Fore wings* pale copper-brown, with two large shining white triangular patches on the dorsum, their apices reaching the costa; the first, at the base, covering nearly one-third of the dorsum, the second on the middle, both delicately margined with black scales externally, the second also internally; beyond these at the tornus is an elongate subovate shining silvery-white dorsal patch, above which a short oblique slender white costal streaklet, black-margined on either side, crosses to the termen before the apex; cilia at the apex greyish, with two short dividing streaklets, below the apex coppery brown, at the tornus shining white and behind it greyish. *Exp. al.* 7 mm. *Hind wings* and cilia grey. *Abdomen* shining greyish. *Legs*: posterior pair white with a black dot between the spurs.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—ST. CROIX, 17 V. (*Gudmann*); ST. THOMAS, 2 IV. (*Hedemann*); ST. JAN, 4 IV. (*Gudmann*). Three specimens.

This species belongs to the group of *scalariella*, Z., and is most nearly allied to *nolckenii*, Z. Bred by Mr. Gudmann, but the plant not identified.

234. DIALECTICA RENDALLI, sp. n.

Antennæ brownish. *Palpi* white. *Head* and *thorax* white, the latter shaded across the front with brown. *Fore wings* brown with two broad snow-white transverse fasciæ followed by a slender oblique costal streak and a semicircular subapical costal spot, with some white scales around the apex and about the tornus; the first fascia is broader on the dorsal than on its costal extremity, the second is slightly oblique, tending outwards from the costa, and is somewhat widened towards the dorsum; cilia brownish grey. *Exp. al.* 7 mm. *Hind wings* and cilia dark brownish grey. *Abdomen* greyish brown. *Legs*: hind tibiæ with a comb of bristly scales above; white, shaded along the tibiæ and banded on the tarsi with brown.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—JAMAICA (Monteague, 1100 ft., XI.—*Rendall*). Unique.

Nearly allied to *fasciella*, Chamb., but distinguished by the absence of a third fascia.

235. Dialectica permixtella, sp. n.

Antennæ yellowish. *Palpi* white, with a grey spot before the apex of the terminal joint, which is especially conspicuous on the underside. *Head* stramineous. *Thorax* dirty whitish. *Fore wings* dirty whitish on the basal half, straw-ochreous beyond, with greyish-fuscous streaks and reticulations, on the basal half these are placed transversely; a reduplicated patch from the base of the costa, not quite reaching the dorsum, is more conspicuous than some more slender similar markings beyond it; beyond the middle of the wing the markings assume a longitudinal direction, but are curved and interlaced so as to form enclosed patches of the ochreous ground-colour, of which the most conspicuous is an obliquely placed patch at three-fourths the wing-length, its lower extremity directed inwards between two greyish fuscous lines, the lower of which is reduplicated, the upper one being preceded by similar curved lines running between ochreous patches; near the apex is a slightly curved narrow shining whitish fascia, dark-margined on each side, and at the extreme apex is a dark spot followed by a curved line around the termen at the base of the whitish cilia, through which runs a dark uncate streaklet. *Exp. al.* 6–9 mm. *Hind wings* and cilia brownish fuscous. *Abdomen* brownish ochreous. *Hind legs* white, spotted with dark brownish fuscous on the posterior end of the tibiæ and at the commencement and middle of the tarsi, the spurs also are dark brownish fuscous.

Type, ♀ Mus. Wlsm.

Hab. **West Indies**—S. Domingo (Sanches, 14 V.—*Gudmann*); Grenada (Balthazar, 250 ft., windward side, 1 IV.–4 V.—*H. H. Smith*). Three specimens.

236. Dialectica apicepunctella, Wlsm.

Gracilaria apicepunctella, Wlsm. Pr. Z. Soc. Lond. 1891, 540, 548 (1892)[1].

Hab. **West Indies**—St. Vincent[1].

94. Gracilaria, Hw.

237. Gracilaria æneocapitella, Wlsm.

Gracilaria æneocapitella, Wlsm. Pr. Z. Soc. Lond. 1891, 539–40, 548 (1892).

Hab. **West Indies**—St. Vincent[1].

238. Gracilaria similatella, Z.

Gracilaria similatella, Z. Hor. Soc. Ent. Ross. XIII. 411–2, Pl. VI. 144 (1877)[1].

Hab. **West Indies**—St. Croix, 30 IV. (*Gudmann*); St. Thomas, 14 IV. (*Hedemann*). Colombia—Chipo, 8 VI.[1]

Bred by Mr. Gudmann, but the plant not identified.

239. Gracilaria pulverella, sp. n.

Antennæ cinereous, faintly annulated. *Palpi* cinereous. *Head* pale cinereous. *Thorax* dull pale greyish fuscous. *Fore wings* dull pale greyish fuscous, somewhat mottled on their outer half with shining steel-grey (visible only in a strong light); a pale line along the base of the costal cilia continuing round the apex is dilated to the tornus, covering one half the cilia on the terminal margin, thus leaving a small dark hook beyond it at the apex, two slender dark fuscous lines run along the base and along the middle of the cilia respectively. *Exp. al.* 6·5 mm. *Hind wings* and cilia pale brownish grey. *Abdomen* with a slight reddish tinge. *Legs* cinereous.

Type, ♀ Mus. Hedemann.

Hab. **West Indies**—San Domingo (Puerto Plata, 16 V.—*Gudmann*); St. Thomas, 2 IV. (*Hedemann*). Two specimens.

240. Gracilaria undosa, sp. n.

Antennæ very pale fawn, faintly annulated. *Palpi* white. *Head* very pale fawn. *Thorax* white. *Fore wings* very pale fawn, with a slender sinuate white line from the base of the dorsum to the termen below the apex, touching the dorsum at its two downward bends; three oblique white costal streaks, the first scarcely before the middle, the third coalescing with an inverted white spot before the apex, a few dark brown scales around the margins of the streaks; cilia pale fawn with a white streak through them below the apex. *Exp. al.* 5·5 mm. *Hind wings* very pale greyish; cilia pale fawn. *Abdomen* pale fawn-ochreous. *Legs* white, spotted with pale fawn.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Hayti (Port-au-Prince, 23 V.—*Gudmann*); St. Thomas, 20 III. (*Hedemann*). Two specimens.

The smooth crown separates this species from *Lithocolletis*, to which genus it might be referred at first sight.

241. Gracilaria nesitis, sp. n.

Antennæ as long as the fore wings; yellowish white, faintly barred above with brown. *Palpi* slightly recurved; white, the end of the second joint and a band above the middle of the third joint brown. *Head* yellowish white. *Thorax* white, mixed with brown. *Fore wings* umber-brown, with a nearly straight yellowish-white central fascia, before which are two slightly oblique ill-defined transverse streaks, and beyond it a well-defined costal spot and a few scales of the same colour along the dorsum; cilia pale brownish, at the apex white. *Exp. al.* 6 mm. *Hind wings* brownish grey, with tawny-grey cilia. *Abdomen* pale cinereous. *Legs* white, with brown tarsal annulations.

Type, ♀ Mus. Gudmann.

Hab. **West Indies**—St. Thomas, 18–21 III. (*Gudmann, Hedemann*). Two specimens.

95. Coriscium, Z.

242. Coriscium albomarginatum, sp. n.

Antennæ mouse-grey. *Palpi* white, with a smoky-white brush beneath the second joint and two minute black annulations on the apical joint. *Head* and *thorax* smoky-white, the latter margined with mouse-grey. *Fore wings* dark mouse-grey, with a series of oblique white costal streaklets beginning at one-third from the base, the fifth continued across the wing and meeting a white inverted tornal streaklet, beyond it a sixth costal is inverted before the apex; the dorsum is white throughout; with two dark spots connected with the dark ground-colour in the fold, one before the other behind the middle; a short elongate very oblique white dorsal streaklet ascends before the tornus pointing in the direction of the apex; cilia white, tipped with mouse-grey, with a line of blackish scales along their base sending a short black point through them at the apex; tornal cilia greyish. *Exp. al.* 6 mm. *Hind wings* and cilia grey. *Abdomen* greyish. *Legs* white, speckled with mouse-grey on the hind tibiæ and tarsi.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 12 III.–14 V. (*Gudmann, Hedemann*). Five specimens.

Bred by Mr. Gudmann and Baron von Hedemann, but the plant not identified.

243. Coriscium attenuatum, sp. n.

Antennæ yellowish white, delicately annulated. *Palpi* recurved, the second joint slightly tufted beneath; white, tinged externally with pale fawn. *Head* white. *Thorax* whitish. *Fore wings* delicate pale fawn-ochreous, with some whitish mottling on the basal half; a slender whitish line along the dorsal margin bending upwards and meeting at a right angle the second of three white costal streaks (which is somewhat more oblique than the other two), the margins of these streaks are peppered with minute black scales; a white dorsal spot lies before the apex of the outer costal streak, and a white apical spot contains a rounded black dot; a slender fawn line running around the apex at the base of the paler cilia, which are also tipped with fawn at the extreme apex. *Exp. al.* 7 mm. *Hind wings* pale greyish, with pale fawn-grey cilia. *Abdomen* fawn-grey. *Legs* whitish.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 7–28 III. (*Gudmann, Hedemann*). Three specimens.

Bred by Mr. Gudmann from larvæ feeding on *Croton flavens*.

VI. *ARGYRESTHIANÆ*.

96. Leucophasma, g. n.

(λευκός = bright; φάσμα = phantom.)

Type, ♂ *Leucophasma phantasmella*, Wlsm.

Antennæ nearly as long as the fore wings, somewhat flattened towards the base, simple.

Labial palpi slender, short, projecting; second joint sparsely hairy beneath, apical joint as long as the second.

Maxillary palpi and *haustellum* obsolete.

Head rough above, face smooth.

Thorax smooth.

Fore wings lanceolate, somewhat widened in the middle, apex depressed, slightly uncate, subacute. *Neuration*: 9 veins; 7 and 8 stalked, enclosing the apex, 3, 5, and 10 absent.

Hind wings (under 1) lanceolate, acute, costal margin suddenly depressed from the middle, cilia 1½. *Neuration*: 7 veins; 4 absent (coincident with 5); 6 and 7 parallel.

Legs: posterior tibiæ clothed with long fine hairs.

Allied to *Cedestis*, Z., but differing in the absence of the haustellum.

244. LEUCOPHASMA PHANTASMELLA, sp. n.

Antennæ shining white. *Palpi*, *head*, and face white. *Thorax* white with a golden-yellow tinge. *Fore wings* white with a golden-yellow suffusion, more apparent on the middle and towards the apical portion of the wing; a small fuscous dot lies at the extreme apex surrounded by golden yellow; cilia white with a golden-yellow sheen. *Exp. al.* 11 mm. *Hind wings* greyish white, cilia with a yellowish tinge. *Abdomen* shining whitish ochreous. *Legs* white; hind tibiæ clothed with long white hairs above.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—GRENADA (Chantilly Estate, 350 ft., windward side, 13 IV.—*H. H. Smith*). Unique.

97. ARGYRESTHIA, Hb.

245. ARGYRESTHIA PERCUSSELLA, Z. (?).

Argyresthia percussella, Z. Hor. Soc. Ent. Ross. XIII. 246–7 (1877)[1].

Hab. COLOMBIA—Bogota, *m.* III.[1] [? **West Indies**—ST. THOMAS, 6–10 III. (*Gudmann*, *Hedemann*).]

Two specimens from St. Thomas are probably small varieties of this species, but they are not in sufficiently good condition to determine with certainty.

VII. *ERECHTHIANÆ*.

98. EREUNETIS, Meyr.

246. EREUNETIS MINUSCULA, sp. n.

(=*Nolckenia minuscula*, Z. MS.)

Antennæ rather stout, enlarged at the base, simple in the ♂; creamy-white. *Palpi* projecting more than the length of the head beyond it, brush-like beneath; creamy-white. *Head* rough; cream-coloured. *Thorax* cream-coloured. *Fore wings* cream-coloured, more or less shaded and speckled with umber-brown, this shading being concentrated (and therefore more conspicuous) from the

base along the first half of the fold, from beyond the middle of the costa to the lower angle of the cell, and in a subapical oblique costal streak; a dark fuscous streaklet immediately before the extreme apex is preceded by a narrow whitish costal patch; the termen deeply incised below and opposite to it, causing the apex of the wing to turn up sometimes almost at right angles to its surface; cilia creamy whitish, with a slender reduplicated umber-brown line close to their tips. *Exp. al.* 9 mm. *Hind wings*, ♂ with a hyaline patch at the base; pale golden yellowish, sometimes with a cupreous tinge; cilia whitish with a slight golden or cupreous tinge, a slender reduplicated curved line of umber-brown running through them around the extreme apex. *Abdomen* whitish ochreous. *Legs* creamy-white.

Type, ♂ ♀ Mus. Wlsm.

Hab. **West Indies**—Jamaica (Kingston, 26 VII.—*Cockerell*); St. Croix, 22–28 IV. (*Gudmann, Hedemann*); St. Thomas, 7 III.–22 IV. (*Gudmann, Hedemann*); Grenada (Balthazar, 250 ft., windward side, 30 IV.—*H. H. Smith*). Nine specimens.

[Colombia? (*Nolcken*). Twelve specimens.]

"In repose the moth holds the end of the fore wings curved upwards" (*Hedemann*).

This species varies in the intensity of its colouring, the post-median oblique streak or shade being sometimes continued backward at a right angle to the dorsum, while in other specimens the markings are almost obliterated. I have a series in the Zeller Collection named "*Nolckenia minuscula*, Mus. Z.," received from Baron von Nolcken, but unfortunately they are only labelled "*N.*" It is possible they may have been taken in St. Thomas or Jamaica, as the Baron visited these islands in December 1870; but he appears to have found Micros scarce in the West Indies, and the specimens were more probably captured in Colombia.

Very closely allied to *Ereunetis iuloptera*, Meyr., an Australian species which also possesses the hyaline patch in the hind wings—it appears to be distinct, but my specimens of *iuloptera* are in poor condition.

247. Ereunetis maculicornis, sp. n.

Antennæ: basal joint with a brush of hair-like scales above and beneath, somewhat serrate on the outer half in the ♂; white with three brownish spots, the first at one-third, the second at two-thirds, the third at the apex. *Palpi* slender, second joint scarcely clothed beneath; white. *Head* and *thorax* white. *Fore wings* shining white, with a pale fawn-ochreous shade from the base along the fold, some similar shading on the outer half of the wing tending to fawn, and two slightly oblique fasciæ; cilia pale fawn-ochreous. *Exp. al.* 6 mm. *Hind wings* shining yellowish grey; cilia pale grey. *Abdomen* and *legs* very pale ochreous.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—St. Thomas, 7 III.–12 IV. (*Hedemann*). Three specimens.

"In repose the moth holds the end of the fore wings curved upwards" (*Hedemann*).

This obscure species, which is allied to *minuscula*, can be at once separated by the brownish blotches on the antennæ.

248. Ereunetis aeolella, sp. n.

Antennæ longer than the fore wings, slender; pale cinereous. *Palpi* slender, somewhat dependent; second joint longer than the apical, slightly clothed beneath; dirty whitish. *Head* rough-haired; whitish cinereous. *Thorax* whitish cinereous. *Fore wings* with the costa slightly arched, apex moderately acute; pale brownish fawn-colour, longitudinally streaked throughout with whitish-cinereous lines running from the base to the termen—one above the cell, two along it, and one along the fold; the costa also whitish cinereous; a few black scale-points around the termen at the base of the cilia and one a little beyond the middle of the fold; cilia brownish cinereous. *Exp. al.* 8 mm. *Hind wings* and cilia dull greyish. *Abdomen* brownish grey. *Legs* whitish cinereous; hind tibiæ with slender greyish hairs above.

Type, ♂ ♀ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 7 III.–12 IV. (*Hedemann*). Three specimens.

249. Ereunetis frontella, sp. n.

Antennæ white, faintly annulated with fawn-brown. *Head* with a long pointed frontal tuft reaching more than the length of the head beyond it; white. *Labial palpi* slender, the second joint sparsely clothed at its apex; white. *Thorax* whitish, shaded with fawn-brown. *Fore wings* whitish, with a broad longitudinal streak of fawn-brown, sprinkled with black scales, extending from the base to the apex, its width encroaching on the dorsal, but not on the costal, half of the wing; a narrower and slightly paler line follows the dorsum throughout; a slender black streak or spot on the pale interspace at one-third from the base; the costal half of the wing is very obliquely striated with pale fawn-brown—the first streak arising at the base, the second before the middle, a third somewhat darker beyond the middle, and a fourth following the margin to the apex, where there is an elongate black spot; cilia whitish, with a slender fawn-brown line running through their base, defining very clearly the acuminate apex, a rather broader shade of the same colour around their outer extremities (the longer cilia on the dorsal margin are not thus marked). *Exp. al.* 9–10 mm. *Hind wings* very pale greyish, with pale brownish-ochreous cilia. *Abdomen* shining brownish ochreous. *Legs* with long slender hairs above and beneath the tibiæ; yellowish white, the tarsi faintly annulated.

Type, ♂ ♀ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 13 III.–7 IV. (*Gudmann*, *Hedemann*). Eight specimens.

"In repose the moth holds the end of the wings curved upwards" (*Hedemann*).

This species, which belongs to the group of *symmacha*, Meyr., most resembles *Comodica acontistes*, Meyr., but is not so strongly marked, and does not possess the notch in the antennæ.

250. EREUNETIS LANCEOLATA, sp. n.

Antennæ cinereous. *Palpi* moderately long, drooping; greyish fuscous. *Head* above whitish cinereous, face greyish fuscous. *Thorax* pale cinereous. *Fore wings* dirty whitish, with a slight yellowish tinge, strongly marked with brownish cupreous in three costal blotches—the first at the base extending to about one-fourth, the second about the middle diffused obliquely outwards to the end of the cell, the third beyond the middle, containing an oblique line and an anteapical triangle of the pale ground-colour, extends very obliquely to a cupreous spot in the apical cilia; the acuminate apex of the wing is defined by a cupreous line along the base of the costal and dorsal cilia, which are of the pale ground-colour. *Exp. al.* 8–10 mm. *Hind wings* as broad as the fore wings, lanceolate acuminate; shining pale grey; cilia the same. *Abdomen* greyish. *Legs*: hind tibiæ hairy; yellowish white, tibiæ banded with fuscous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—JAMAICA (Mandeville, 1950 ft., X.—*Cockerell*); ST. THOMAS, 7–30 IV. (*Gudmann*, *Hedemann*): four specimens. BRAZIL—Pará (Amazons), IV., 20 VII., 1 IX.–15 XII. (*Schulz*): several specimens.

This species belongs to the group of *symmacha*, Meyr.

251. EREUNETIS ÆNEOALBIDA, sp. n.

Antennæ pale yellowish. *Palpi* dependent; white. *Head* and face rough; white, the crest brassy-yellow. *Thorax* shining white, touched with brassy-yellow behind. *Fore wings* shining, snow-white, with two transverse fasciæ, three costal streaks, and one dorsal streak, all brassy-yellow—the first fascia close to the base, the second at ⅓, the three costal streaks all very oblique from the middle to the apex, divided from an oblique medio-dorsal streak by a slender black longitudinal line; the second costal streak, which is more slender than the other two, has a fine black line along its inner edge; the dorsal streak is also dark-margined internally; cilia snow-white, with a cuneiform brassy dash along their base from the anal angle, the outer costal streak also running through them at the apex. *Exp. al.* 7–9 mm. *Hind wings* pale greyish, with a slight brassy sheen; cilia very pale grey. *Abdomen* shining pale brownish ochreous. *Legs*: hind tibiæ hairy above; whitish.

Type, ♂ ♀ Mus. Wlsm.

Hab. **West Indies**—ST. THOMAS, 6 III.–12 IV. (*Gudmann*, *Hedemann*). Four specimens.

VIII. *TINEINÆ*.

99. Tinea, L.

252. Tinea brevistrigata.

Antennæ dirty whitish. *Palpi* whitish, with a fuscous band around the base of the apical joint; second joint with some long separate whitish hairs beneath. *Head* and *thorax* hoary greyish. *Fore wings* hoary whitish, the costa faintly mottled with greyish ochreous, the dorsal half of the wing shaded and speckled with grey: four short dark brownish-fuscous streaks accompanied by a few pale ochreous scales—the first very short, lying on the fold at one-fourth from the base; the second also short, on the cell a little before the middle of the wing; the third larger and more conspicuous, at the end of the fold, reaching the base of the dorsal cilia; the fourth more diffused, running from the end of the cell to the middle of the termen; a slight fuscous shade runs along the base of the hoary-grey cilia. *Exp. al.* 9–12 mm. *Hind wings* shining pale greyish; cilia the same. *Abdomen* cinereous. *Legs* hoary whitish.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Croix, 5–6 V. (*Gudmann*, *Hedemann*); St. Thomas, 2 III.–15 IV. (*Gudmann*, *Hedemann*). Six specimens.

253. Tinea reduplicata, sp. n.

Antennæ bone-white. *Palpi* externally black nearly to the end of the second joint; apical joint short, also banded with black externally. *Head* hoary. *Thorax* bone-white. *Fore wings* slightly shining, bone-white, speckled with small groups of black and purplish-fuscous scales; a short greyish-fuscous streak along the base of the costa is followed by an irregular series of marginal spots of different sizes to the commencement of the costal cilia: along the fold, before and beyond its middle, are three minute spots of black scales, similar spots extending in a series of three or four along the outer half of the cell, the outer one being opposite to the termen of the cell, others lying on the extreme margins below and above, but a little beyond it; a line of greyish-fuscous scales along the base of the bone-white cilia. *Exp. al.* 12–14 mm. *Hind wings* shining greyish, with a slight æneous tinge; cilia corresponding to this colour along their base, but shining whitish on their outer half. *Abdomen* pale brassy-brown, with silvery transverse lines. *Legs* bone-white, shaded with brownish grey.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 17–31 III. (*Gudmann*). Two specimens.

254. Tinea diluticornis, sp. n.

Antennæ yellowish white. *Palpi* porrect, second joint slightly hairy beneath, apical joint somewhat obtuse, not reaching beyond the head; white, with a fuscous streak on the outer side of the second joint. *Head* hoary whitish. *Thorax* whitish, shaded with

brownish grey. *Fore wings* hoary whitish, suffused and speckled with brownish grey, some dots of the same around the base of the long whitish cilia. *Exp. al.* 12 mm. *Hind wings* pale brassy-yellow; cilia whitish, with an æneous tinge along their base. *Abdomen* yellowish grey. *Legs* whitish.

Type, ♀ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 16 IV. (*Hedemann*). Unique.

255. Tinea scythropiella, sp. n.

Antennæ bone-white. *Palpi*, second joint recurved, somewhat roughened beneath, apical joint short, projected; white. *Head* and *thorax* white. *Fore wings* rather shining, white, sparsely sprinkled with greyish brown; a slender curved greyish-brown line, leaving the costa near the base, reaches obliquely outwards to the fold; a second, from before the middle of the costa, angulated outwards on the cell, descends obliquely to the middle of the dorsum; a small ill-defined blotch of the same colour rests at the end of the cell, with a spot below it about the tornus, followed by others less conspicuous towards the apex; cilia whitish. *Exp. al.* 14 mm. *Hind wings* yellowish grey; cilia becoming whitish on their outer half. *Abdomen* greyish. *Legs* whitish.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 8–11 III. (*Gudmann*). Two specimens.

256. Tinea cretella, sp. n.

Antennæ slender, simple (⅔); greyish ochreous. *Palpi* small, slender, drooping, slightly recurved, obtuse, naked; dark fuscous. *Head* rough; white, face fuscous. *Thorax* smooth, white; tegulæ white. *Fore wings* chalky white, with a series of chestnut-brown costal spots and streaks; the first commencing at the base and extending to one-third the length of the wing; after this two smaller length-spots lie on each side of the middle and are followed by a larger, rather triangular, spot of the same colour at the commencement of the costal cilia, beneath this is a minute black dot at the end of the cell; cilia white, with a series of black specks near the base following the termen; tornal cilia greyish. *Exp. al.* 11 mm. *Hind wings* grey, with a lustrous brassy tinge; cilia grey, with a slight rosy tinge. *Abdomen* greyish. *Legs* pale cinereous; hind tibiæ loosely clothed above.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Hayti (Port-au-Prince, 24 V.—*Gudmann*). Two specimens.

257. Tinea umbraticostella, sp. n.

Antennæ smoky brownish, the basal joint fringed with white beneath. *Palpi* short, drooping; white. *Head* very rough; white. *Thorax* white, with a median brown streak. *Fore wings* lanceolate; white, the costa smoky-brown throughout, broader beyond than before the middle; a pale chestnut-brown shade along the fold and

at the end of the cell, with three or four minute black dots along the outer half of the dorsum, and one near the upper angle of the cell; cilia pale brownish grey, with a smoky-brown line running through them and continued around the apex. *Exp. al.* 8–10 mm. *Hind wings* pale grey; cilia with a slight brownish tinge. *Abdomen* pale yellowish brown. *Legs* hairy; yellowish white, the tarsi faintly annulated.

Type, ♂ ♀ Mus. Wlsm.

Hab. **West Indies**—St. Croix, 5 V. (*Hedemann*); St. Thomas, 8 III.–13 IV. (*Gudmann, Hedemann*); St. Vincent (windward side, *H. H. Smith*). Nine specimens.

258. Tinea tischeriella, sp. n.

Antennæ yellowish, annulated with olive-brown. *Palpi* drooping; yellowish. *Head* and *thorax* pale yellow. *Fore wings* and *cilia* shining pale yellow, with a broad olive-brown band (occupying more than the costal half of the wing) extending from the base nearly to the apex, with two very slight projections, one before and one beyond the middle, encroaching upon the pale dorsal space. *Exp. al.* 6 mm. *Hind wings* very pale grey; cilia with a faint æneous gloss. *Abdomen* pale shining ochreous. *Legs* hairy above; whitish. *Exp. al.* 6 mm.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—Hayti (Port-au-Prince, 22 V.—*Gudmann*); St. Thomas, 11 IV. (*Hedemann*). Two specimens.

259. Tinea solenobiella, sp. n.

Antennæ bone-whitish. *Palpi* very short, slender, drooping; bone-white. *Head* and face rough; bone-whitish. *Thorax* bone-whitish, with a slight brownish tinge. *Fore wings* whitish, sparsely suffused with pale greyish brown, which colour also forms some costal speckling as far as the middle and some ill-defined small costal spots beyond the middle; a spot lies on the disc a little before the middle and there is more speckling of the same colour towards the apex and on the outer half of the dorsum; a waved line of brownish-fuscous atoms runs through the bone-white cilia. *Exp. al.* 9 mm. *Hind wings* shining whitish grey; cilia bone-grey. *Abdomen* greyish. *Legs* whitish; hind tibiæ with long slender hairs above.

Type, ♀ Mus. Wlsm.

Hab. **West Indies**—St. Croix, 21 IV. (*Gudmann*); St. Thomas, 7–17 III. (*Gudmann*). Four specimens.

A very inconspicuous and faintly-marked species of the group allied to *cloacella*, Hw.

260. Tinea fragilella, sp. n.

Antennæ yellowish white. *Palpi* very slender, drooping, naked; white. *Head* and *thorax* white. *Fore wings* white, neatly speckled throughout with fuscous, tending to black around the extreme

apex, where it forms a semicircular shade, and on a spot before the margin, preceding the semicircle; a pair of costal spots lie before and beyond the middle, the second equidistant between the first and the apex; cilia above the apex white, at the apex shaded with greyish ochreous, a slender shade-line running through them towards the tornus, where also they become whitish. *Exp. al.* 8 mm. *Hind wings* very pale grey; cilia whitish grey. *Abdomen* white. *Legs* white, hind tarsal joints delicately spotted with fuscous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Hayti (Port-au-Prince, 24 V.—*Gudmann*). Three specimens.

261. Tinea minutella, F.

Alucita minutella, F. Ent. Syst. III. (2) 344, No. 51 (1794)[1]. *Tinea minutella*, F. Sppl. Ent. Syst. 500. No. 110 (1798)[2]. *Phalæna (Alucita) minutella*, Turton, Syst. Nat. III. 383 (1806)[3].

"*minutella*, 51. *A.* alis albidis: fasciis tribus fuscis. Statura parva præcedentium. Alæ albidæ, fasciis tribus fuscis, prima baseos, tertia apicis.

"*Habitat* in Americæ Insulis, Dom. v. Rohr."[1]. = **West Indies**[1–3].

262. Tinea plumella, Wlsm.

Tinea plumella, Wlsm. Pr. Z. Soc. Lond. 1891, 508–9, 544 (1892)[1].

Hab. **West Indies**—St. Croix, 21 IV.–7 V. (*Hedemann*); St. Thomas, 10–26 IV. (*Gudmann*); St. Vincent[1].

Bred by Mr. Gudmann, who found the larvæ very common on walls and stone fences.

263. Tinea tetraonella, sp. n.

Antennæ minutely annulated with brownish fuscous and whitish ochreous; basal joint whitish ochreous. *Palpi* very short, drooping; whitish, a minute fuscous ring round the apical joint. *Head* brownish fuscous, mixed with whitish ochreous; face whitish ochreous. *Thorax* brownish fuscous, sprinkled and slightly mottled with whitish ochreous. *Fore wings* brownish fuscous, sprinkled and slightly mottled with whitish ochreous; the only noticeable spot of this colour being before the middle of the dorsum, this and other smaller ones beyond it are minutely speckled with fuscous scales; cilia pale whitish ochreous with a dark parting line running through them. *Exp. al.* 6 mm. *Hind wings* blue-grey; cilia tawny fuscous. *Abdomen* brownish fuscous. *Legs* brownish fuscous, hind tarsal joints banded with white.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—St. Croix, 28 IV. (*Hedemann*); St. Thomas, 12–28 IV. (*Gudmann*, *Hedemann*). Four specimens.

"Larvæ on walls and stone fences, not so common as *plumella*, Wlsm., and very difficult to breed" (*Gudmann*).

In paler specimens the whitish-ochreous mottling is increased, forming a series of spots along the costa and dorsum. Very near *Tinea plumella*, Wlsm., but apparently distinct; the colour of the fore wings is more suffused.

264. TINEA PUMILIELLA, sp. n.

Antennæ cinereous. *Palpi* very small, drooping, cylindrical; dirty whitish. *Head* and face rough; whitish cinereous above, face inclining to ochreous. *Thorax* whitish cinereous. *Fore wings* whitish cinereous, blotched with ferruginous, especially on the outer portion and on the inner margin of a slender, almost straight, transverse black fascia slightly before the middle; a blackish streak along the base of the costa and a blackish costal spot at two-thirds from the base; on the outer edge of the central fascia is a pale band, almost white, but ill-defined externally; the pale cilia are minutely speckled with black scales. *Exp. al.* 6 mm. *Hind wings* yellowish grey; cilia pale grey. *Abdomen* bronzy grey. *Legs* whitish.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—ST. CROIX, 8 V. (*Hedemann*); ST. THOMAS, 12–30 III. (*Gudmann, Hedemann*). Three specimens.

265. TINEA CUMULATELLA, Z.

Tinea cumulatella, Z. Hor. Soc. Ent. Ross. XIII. 211–2 (1877)[1].

Hab. **West Indies**—ST. THOMAS, 11 III.–14 IV. (*Gudmann, Hedemann*). COLOMBIA, Fusagasuga, 16 IV.[1]

There is one male and three females in the collection, which can be distinguished from *cumulatella*, Z., only by their paler hind wings. The type is unique, and I should not venture to separate them specifically on this ground alone, as I find in the present series some variation in this respect.

266. TINEA NIGROVITTA, sp. n.

Antennæ pale brownish. *Palpi* drooping, slender, second joint sparsely clothed; whitish cinereous. *Head* pale brownish. *Thorax* greyish brown. *Fore wings* greyish brown, indistinctly speckled and smudged with a darker shade of the same colour; cilia slightly paler, with a dark shade running through them near the base. *Exp. al.* 10 mm. *Hind wings* brownish grey, with a conspicuous patch of deep black scales below the costa near the base on the upper side; some short erect bristling hairs on the costal margin; cilia slightly paler than the wings. *Abdomen* pale brownish. *Legs* pale cinereous.

Type, ♂ Mus. Gudmann.

Hab. **West Indies**—ST. THOMAS, 8 IV. (*Gudmann*). Unique.

This species is separable from *Tinea cumulatella*, Z., only by the distinct black patch on the upper surface near the base of the hind wings in the male and in its yellower and paler hind wings; in all other respects it almost absolutely resembles it.

267. TINEA FAMILIARIS, Z.

Tinea familiaris, Z. Hor. Soc. Ent. Ross. XIII. 214–6 (1877)[1].

Hab. **West Indies**—HAYTI (Port-au-Prince, 23 V., *Gudmann*); ST. THOMAS, 13 III. ("in the house"—*Gudmann*). COLOMBIA—Fusagasuga[1].

Mr. Gudmann bred this species at St. Thomas.

268. TINEA PALLIDORSELLA, Z.

Tinea pallidorsella, Z. Hor. Soc. Ent. Ross. XIII. 212–4 (1877)[1].

Hab. **West Indies**—ST. THOMAS, 15 III. (*Gudmann*). COLOMBIA—Ubaque, 23 III.[1]

269. TINEA FRONTESTRIGATA, sp. n.

Antennæ ($\frac{2}{3}$); pale ochreous, distinctly annulate with dark fuscous. *Palpi* short, drooping, second joint with a rough brush beneath, apical joint as long as the second; pale ochreous, externally blotched with fuscous on each joint. *Head* whitish ochreous at the sides, banded and shaded above with fuscous; face ochreous. *Thorax* dark fuscous, obscurely speckled with ochreous. *Fore wings* bright ochreous, thickly sprinkled with dark purplish fuscous, which has a tendency to coalesce in a small transverse subcostal patch near the base, in a dorsal patch a little beyond the base, in a strong shade occupying the outer half of the cell and reaching to the costa, and on the apical portion of the wing, where it also sprinkles the pale ochreous cilia over two-thirds their length. *Exp. al.* 7 mm. *Hind wings* narrower than the fore wings; purplish grey, cilia the same. *Abdomen* purplish grey, anal tuft ochreous. *Legs* dark greyish, with pale ochreous tarsal spots and spurs.

Type, ♂ Mus. Gudmann.

Hab. **West Indies**—ST. CROIX, 2 V. (*Gudmann*). Unique.

270. TINEA AUROMACULATA, sp. n.

Antennæ yellow, faintly annulated with tawny brown. *Palpi* slender, drooping; yellowish, externally tawny. *Head* and *thorax* golden yellow. *Fore wings* tawny brown with a purplish gloss, marbled with golden yellow, of which there is a spot at the extreme base, a larger spot at the middle of the fold reaching to the dorsum, another spot at the outer end of the fold, a fourth on the disc above and between the last two, and one at the end of the cell reaching to the costa; apex and apical cilia golden yellow, dorsal cilia tawny grey. *Exp. al.* 6·5 mm. *Hind wings* and cilia bronzy grey. *Abdomen* bronzy greyish. *Legs* slightly paler.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—ST. THOMAS, 20 III. (*Hedemann*). Unique.

271. TINEA DIVISA, sp. n.

Antennæ of the male pubescent; creamy-white, delicately annu-

lated with brownish fuscous. *Palpi* slender, depressed, whitish; the second joint with some brownish hairs beneath its apex. *Head* rough; white. *Thorax* bronzy fuscous. *Fore wings* and cilia bronzy fuscous; a rather broad cream-white central fascia tinged with brownish ochreous is slightly attenuated toward the costa, from which it is separated by a narrow line of the dark ground-colour; beyond the fascia is a small patch of brownish-ochreous scales at the end of the cell, with a few others at the extreme apex. *Exp. al.* 6·5 mm. *Hind wings* and cilia brownish. *Abdomen* brownish. *Legs* whitish ochreous, with some brownish hairs on the tibiæ.

Type, ♂ Mus. Hedemann.

Hab. **West Indies**—St. Thomas, 12 IV. (*Hedemann*). Unique.

100. Tineola, HS.

272. Tineola uterella, sp. n.

Antennæ smoky fawn-colour. *Palpi*: maxillaries not folded: labials short, porrect; smoky fawn. *Head* smoky fawn-colour, face brownish ochreous. *Thorax* smoky fawn. *Fore wings* yellowish fawn, with minute fuscous speckling: a purplish fuscous blotch on the costa near the base is partly connected with a spot of the same colour lying obliquely beneath it on the fold; beyond this are two spots before the middle of the wing, the smaller on the fold, the larger on the disc slightly beyond and above the lower one; a larger spot of the same colour lies at the end of the cell, and there are a few dark scales at the base of the dorsum; (these markings although showing a purplish gloss in a strong light appear blackish under the lens); cilia fawn-grey. *Exp. al.* ♂ 10–♀ 15 mm. *Hind wings* pale grey, with a strong æneous tinge below the cell; cilia yellowish grey. *Abdomen* yellowish grey. *Legs* yellowish grey, tarsi with obscure darker blotches.

Type, ♂ ♀ Mus. Wlsm.

Hab. **West Indies**—St. Thomas, 14–24 III. (*Gudmann*, *Hedemann*): three specimens. Brazil—Pará (Amazons), 17 IX.–14 XII. (*Schulz*): a long series.

Bred by Messrs. Schulz, Gudmann, and Baron von Hedemann. Mr. Gudmann notes it as found "on trunks," while Mr. Schulz writes:—"The Amazonian clothes moth, their larva and pupa-cases called 'traças' in Portuguese. These traças are very frequent in the houses in Pará, keeping on the walls of the rooms and are very injurious to clothes." All three observers send with this species a flattened bladder-shaped case composed of silk and grains of sand, wide in the middle, narrowed towards each extremity and open at both ends. *Œcia maculata*, Wlsm., a species which although belonging to a different family is almost inseparable from *uterella* in colour and markings, is found likewise in St. Thomas and at Pará at the same time as *uterella*. Baron von Hedemann writes of *Œcia maculata*, "very common on the inner walls of nearly

every house in St. Thomas"; Mr. Schulz, who apparently did not distinguish the two insects, notes *uterella* as the domestic species; while Mr. Gudmann found it on the trunks of trees; and Baron von Hedemann, who found the cases very common on the inner walls of houses, only succeeded in breeding one specimen. The larva of *maculata* is unknown.

101. Myrmecozela, Z.

273. Myrmecozela ochraceella, Tgstr.

Tinea ochraceella, Tgstr. Not. Sällsk. Faun. et Flor. Fenn. För. II. 111 (1847)[1]. *Myrmecozela ochraceella*, Z. Lin. Ent. VI. 176–7 (1852)[2]; Stgr. & Wk. Cat. Lp. Eur. 271, 425. No. 1435 (1871)[3]; Mschl. Ab. Senck. Nat. Ges. XV. 339, 354 (1890)[4]; Wlsm. Pr. Z. Soc. Lond. 1891, 517, 545 (1892)[5].

Hab. Europe (Finland, Switzerland, Scotland, England)[1–5]. *Larva* in Ants' nests, VIII.–X. **West Indies**—Portorico[4, 5].

If this species is correctly determined by Möschler its occurrence in the West Indies is a remarkable contribution to the study of Geographical Distribution. It has not yet been detected in the United States, and a myrmecophilous species could hardly be imported from Europe to Portorico. Moreover, the localities in which it is found in Europe are not such as could warrant the suggestion of its having been introduced from the West Indies.

102. Xylesthia, Clem.

[Clem. Pr. Ac. Nat. Sc. Phil. XI. 259, 262 (1859); Stn. Tin. N. Am. 53–4, 59, 60, fig. 5 (1872).]

274. Xylesthia australis, sp. n.

Antennæ simple; dusky cinereous. *Palpi* with the second joint widely and roughly clothed beneath, apical joint almost concealed; cinereous speckled with fuscous. *Head* and *thorax* cinereous. *Fore wings* arched at the base, apex depressed, rounded, termen oblique; cinereous dusted with fuscous, an indication of an obscure cloud-like fuscous spot at the end of the cell is followed by four cloud-like spots above at the base of the costal cilia; cilia cinereous, with a fuscous shade-line running through them. *Exp. al.* 16–20 mm. *Hind wings* broader than the fore wings, rounded at the apex; brownish fuscous, cilia the same. *Abdomen* greyish fuscous. *Legs* very pale cinereous.

Type, ♀ Mus. Wlsm.; (*Paratype* ♂ Mus. Gudmann).

Hab. **West Indies**—Hayti (Port-au-Prince, 23–25 V., *Gudmann*); St. Thomas, 9 III. (*Gudmann*). Three specimens.

The male specimen from St. Thomas is more distinctly marked, having fuscous spots along the costal margin, a fuscous shade along the disc from the base, and the terminal cilia are mottled. It seems to be, however, only a well-marked variety.

103. AMYDRIA, Clem.

[Clem. Pr. Ac. Nat. Sc. Phil. XI. 260, 262 (1859); Stn. Tin. N. Am. 55, 59, 60, fig. 2 (1872).]

275. AMYDRIA ANAPHORELLA, Wlsm.

Amydria anaphorella, Wlsm. Pr. Z. Soc. Lond. 1891, 517, 545 (1892)[1].

Hab. **West Indies**—ST. VINCENT[1].

104. PEXICNEMIDIA, Mschl.

[Mschl. Ab. Senck. Nat. Ges. XV. 337–8 (1890).]

276. PEXICNEMIDIA MIRELLA, Mschl.

Pexicnemidia mirella, Mschl. Ab. Senck. Nat. Ges. XV. 338, 354 (1890)[1]; Wlsm. Pr. Z. Soc. Lond. 1891, 518, 545 (1892)[2].

Hab. **West Indies**—PORTORICO[1, 2].

105. TIQUADRA, Wkr.

TIQUADRA, Wkr. Cat. Lp. Ins. B.M. XXVIII. 519 (1863); = *OSCELLA*, Wkr. Cat. Lp. Ins. B.M. XXIX. 783–4 (1864); = *MANCHANA*, Wkr. Cat. Lp. Ins. B.M. XXXV. 1818 (1866); n. syn. = *VENTIA*, Wkr. Cat. Lp. Ins. B.M. XXXV. 1838–9 (1866); = *ACUREUTA*, Z. Hor. Soc. Ent. Ross. XIII. 198–9 (1877).

277. TIQUADRA ASPERA, Z.

Acureuta aspera, Z. Hor. Soc. Ent. Ross. XIII. 199–201 (1877)[1]. *Tiquadra aspera*, Mschl. Ab. Senck. Nat. Ges. XV. 339, 354 (1890)[2]; Wlsm. Pr. Z. Soc. Lond. 1891, 518, 545 (1892)[4].

Hab. **West Indies**—PORTORICO[2, 3]. COLOMBIA[1, 3].

278. TIQUADRA LENTIGINOSA, Z.

Acureuta lentiginosa, Z. Hor. Soc. Ent. Ross. XIII. 201–2 (1877)[1]. *Tiquadra lentiginosa*, Wlsm. Pr. Z. Soc. Lond. 1891, 518, 545 (1892)[2].

Hab. **West Indies**—TRINIDAD (Port-of-Spain)[2]. BRAZIL[1] (Rio Janeiro[1], Petropolis)[2]. PERU (Ropaybamba, 30 XII)[1, 2].

106. MOROPHAGA, HS.

279. MOROPHAGA HIRSUTEVESTITA, sp. n.

Antennæ ♂, slightly serrate, ciliate ($\frac{1}{3}$); umber-brown, finely annulate with ochreous, basal joint brownish ochreous. *Palpi* (broken, but decidedly rough); umber-brown mixed with pale ochreous (so far as they are visible). *Head* rough; *head* and *thorax* umber-brown mixed with some ochreous scales. *Fore wings*: costa somewhat arched, apex depressed, termen oblique, somewhat securiform, veins 8 and 9 stalked; dark umber-brown, with scattered spots of ochreous scales, especially noticeable along the costa,

where they form a somewhat regular series, and at the base of the cilia which correspond to the wing-colouring; the dark colouring is concentrated in a patch at the end of the cell, reaching to the costa, and is followed by a paler space and preceded by a paler spot. *Exp. al.* 25–27 mm. *Hind wings* and cilia pale brownish cinereous. *Abdomen* pale brownish cinereous. *Legs* brownish cinereous, tarsal joints shaded with umber-brown.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Jamaica (*Coll. Ragonot*). Two specimens received from the late Monsr. Ragonot.

280. Morophaga? angulatella, sp. n.

Antennæ stout, slightly serrate; shining whitish ochreous, a black spot beneath at the outer extremity of the elongate basal joint. *Palpi* whitish ochreous, the apical joint somewhat stout, as long as the second, the second joint with a large triangular tuft beneath (as in some species of the genus *Ypsolophus*, but the tuft is much less compact and more hirsute) shaded with brown externally almost to the outer edge of the tuft. *Head* brown. *Thorax* whitish, edged anteriorly with brown. *Fore wings* narrow elongate, sub-ovate; creamy whitish, a large brownish-fuscous patch extending from the base along the costal half to one-fourth from the apex, following the fold, its lower edge is angulated upward in the middle, its outer edge passing obliquely to the costa almost parallel with the termen, the costal and terminal margins are mottled with alternate smoky white and brownish fuscous, the cilia suffused with smoky brown. *Exp. al.* 16 mm. *Hind wings* brownish grey, a pale line running along the base of the cilia. *Abdomen* missing. *Legs* bone-whitish.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Dominica (Point Michell).

This species differs from *Amydria* and *Xylesthia* in having veins 8 and 9 of the fore wings stalked, and from *Morophaga*, with which it agrees in neuration, in the longer apical joint of the palpi and in the second joint being more triangularly clothed.

IX. *SETOMORPHINÆ*.

107. Setomorpha, Z.

281. Setomorpha rupicella, Z.

Setomorpha rupicella, Z. Handl. Kong. Svensk. Vet.-Ak. 1852, 95–6 [1]; Wlsm. Pr. Z. Soc. Lond. 1891, 511, 544 (1892) [2].

Hab. **West Indies**—Cuba (Havannah) [1, 2]; Hayti (Port-au-Prince, 25 V.—*Gudmann*). Brazil—Para, X.–XII. (*Schulz*).

282. Setomorpha grenadella, sp. n.

Antennæ greyish fuscous. *Palpi* porrect, second joint slightly hirsute; pale fawn. *Head* rough above; pale fawn. *Thorax* pale fawn. *Fore wings* pale fawn, shaded round the margins with

small broken patches of umbreous scales, these are somewhat aggregated at the base of the costa, in an elongate patch above the middle of the wing, in a second patch extending from the outer end of the cell to the termen, and near the base of the dorsum; cilia pale fawn mottled with umbreous along their base. *Exp. al.* 10 mm. *Hind wings* shining reddish grey; cilia fawn-grey. *Abdomen* fawn-grey shaded with umbreous. *Hind tibiæ* much tufted above and beneath; greyish ochreous, the spurs paler; hind tarsi mottled with greyish fuscous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—GRENADA (Balthazar, 250 ft., windward side, 5–10 IV.—*H. H. Smith*). Two specimens.

X. *ANAPHORINÆ.*

108. ATOPOCERA, g. n.

(ἄτοπος = strange; κέρας = a horn.)

Type, ♂ *Atopocera occultum*, Wlsm.

Antennæ ♂, stout, simple, tapering outwards.

Labial palpi ♂, strongly recurved to front of thorax; second joint thickened, somewhat closely clothed, apical joint as long as the second, smooth.

Maxillary palpi small, slender.

Head smooth.

Thorax not tufted.

Fore wings with the costa slightly arched, apex obtuse, termen oblique. *Neuration*: 12 veins, 7 and 8 stalked enclosing the apex, the rest separate.

Hind wings slightly broader than the fore wings. *Neuration*: 8 veins all separate.

Abdomen somewhat slender.

Legs, hind tibiæ sparsely hairy above.

This genus constitutes a new section of the *Anaphorinæ* characterized by having in the fore wing veins 7 and 8 stalked instead of 8 and 9.

283. ATOPOCERA OCCULTUM, sp. n.

Antennæ brownish grey. *Palpi* brownish grey, the second joint somewhat shaded with fuscous externally. *Head* and *thorax* brownish grey. *Fore wings* fawn-brown, with a few greyish-fuscous scales scattered about the outer third and a scarcely noticeable group of fuscous scales at the upper angle of the cell; cilia fawn-brown, sparsely speckled with greyish fuscous. *Exp. al.* 12 mm. *Hind wings* brownish fuscous; cilia paler, divided by a brownish-fuscous shade. *Abdomen* brownish fuscous; uncus single, lateral claspers scarcely spatulate. *Legs* cinereous.

Type, ♂ Mus. Gudmann.

Hab. **West Indies**—HAYTI (Cap Haiti, 18 V.—*Gudmann*). Unique.

109. Cænogenes, Wlsm.

284. Cænogenes? ochracea, Mschl.

Cænogenes? ochracea, Mschl. Ab. Senck. Nat. Ges. XV. 337, 354 (1890)[1]; Wlsm. Pr. Z. Soc. Lond. 1891, 515, 544 (1892)[2].

Hab. **West Indies**—Portorico[1, 2].

110. Hypoclopus, Wlsm.

285. Hypoclopus parvus, sp. n.

= *Cænogenes pusilla*, Wlsm. (*partim*) Pr. Z. Soc. Lond. 1891, 514, 544 (1892)[1].

Antennæ greyish ochreous. *Palpi*, ♂ recurved to back of thorax; greyish touched with fuscous at the sides, apical joint tipped with ochreous; ♀ porrect. *Head* and *thorax* greyish ochreous intermixed with fuscous. *Fore wings* pale greyish ochreous, much speckled and blotched with fuscous which is concentrated in three connected patches (one at the end of the cell, one below it, and one at the base), leaving the pale ground-colour more conspicuous in two ovate patches (the first on the middle of the wing, the second beyond it) and in a dorsal patch obtusely angulated upwards before the middle and slightly angulated beyond the middle, a few fuscous specklings along its lower edge; cilia agreeing in colour with the wing. *Exp. al.* ♂ 15·5–17 mm.; ♀ 21 mm. *Hind wings* and cilia dull greyish. *Abdomen* greyish. *Legs* greyish, tarsi with pale subochreous speckling.

Type, ♂ Mus. Wlsm.; ♀ Mus. Gudmann.

Hab. **West Indies**—St. Thomas, 18 III.–8 IV. (*Gudmann, Hedemann*); Dominica[1] (Point Michell, 29 V.). Eleven specimens.

This species varies considerably: in the intermediate form which I have described as the type the dark and pale markings are sharply defined; in the extreme forms either the dark or the paler colour predominates and tends to efface the pattern.

The specimen which I recorded (Pr. Z. Soc. Lond. 1891, 514) from Dominica as *Cænogenes pusilla*, Z., was not in good condition, and the reception of better specimens from the same island proves it to be *Hypoclopus parvus*. My notes on the structure of "*Anaphora pusilla*, Z." refer truly to that species, but the additional locality is erroneous, and *Cænogenes pusilla*, Z., must be removed from the West Indian list.

111. Eulepiste, Wlsm.

286. Eulepiste umbratipalpis, Wlsm.

Eulepiste umbratipalpis, Wlsm. Pr. Z. Soc. Lond. 1891, 511, 544, Pl. XLI. 10 (1892)[1].

Hab. **West Indies**—San Domingo[1].

112. Felderia, Wlsm.

287. Felderia dimidiella, Wlsm.

Felderia dimidiella, Wlsm. Pr. Z. Soc. Lond. 1891, 516, 545, Pl. XLI. 15 (1892)[1].

Hab. **West Indies**—Cuba[1].

113. Pilanaphora, g. n.

(πῖλος = felt; *Anaphora*, nom. gen.)

Type, ♂ ♀ *Pilanaphora hedemanni*, Wlsm.

Antennæ: ♂ somewhat flattened, serrate towards the apex.

Labial palpi: ♂ very strongly recurved, reaching to the back of the thorax, brush-like throughout; ♀ porrect, fully twice the length of the head beyond it.

Fore wings: ♂ scarcely more than twice as long as broad, with a long fringe along the basal third of the costa (bent back and lying flat on the wing); ♀ without the costal fringe. *Neuration*: 12 veins all separate, 8 to apex.

Hind wings: ♂ with a strong upstanding fringe extending from the base along the lower edge of the cell to vein 2, the abdominal margin densely hairy; ♀ without the upstanding fringe. *Neuration*: 8 veins all separate.

Abdomen densely hairy.

Legs: all the tibiæ densely clothed in the male, less strongly in the female.

Allied to *Acrolophus*, Poey, and *Anaphora*, Clem.; but readily separated by the erect fringe on the hind wings.

288. Pilanaphora hedemanni, sp. n.

Antennæ brownish ochreous. *Palpi*, *head*, and *thorax*: ♂ reddish fawn-grey; ♀ mouse-colour. *Fore wings*: ♂ tawny reddish, speckled along the costa with purplish fuscous, the margins of the cell also marked out with purplish fuscous, which is intensified at the end of the cell and in a triangular blotch on its lower edge before the angle; a whitish-ochreous streak follows the line of the fold, scarcely interrupted by a dark spot near its base, but incised at its upper edge by the triangular spot before mentioned; at the end of the cell a small reduplicated dot of white raised scales (probably very fugitive), which is connected by a pale whitish streak with a pair of purplish-fuscous spots nearer to the termen; cilia conforming to the wing-colour, somewhat speckled: ♀ mouse-colour, with the markings less distinct, and the whole wing-surface more evenly and distinctly speckled with darker spots; cilia slightly darker than the wings. *Exp. al.* ♂ 20–22 mm.; ♀ 24–26 mm. *Hind wings*, ♂ greyish fuscous, the raised tuft fawn-ochreous, and the hairs along the abdominal margin also inclining to ochreous; cilia shining, paler than the wings; ♀ shining, fuscous with a purplish gloss; cilia slightly paler than the wings. *Abdomen*: ♂ thickly clothed with hoary

grey, anal tuft inclining to ochreous; ♀ cinereous, with paler hairs towards the base. *Legs* subochreous, dusted with greyish fuscous.

Type, ♂ Mus. Wlsm.; ♀ Mus. Hedemann.

Hab. **West Indies**—St. Croix, 21 IV.–13 VI. (*Gudmann, Hedemann, Pontoppidan*). Ten specimens.

In the absence of evidence to the contrary, I must regard the ten specimens before me as belonging to one variable species; the general pattern of the markings is retained wherever these are traceable, but in some they are entirely obliterated; the ground-colour varies from tawny reddish to pale cinereous, with more or less suffusion. The females also exhibit pale and dark varieties.

114. Anaphora, Clem.

289. Anaphora popeanella, Clem.

=*agrotipennella*, Grt.[14]; =*scardina*, Z.[14]

Anaphora popeanella, Clem. Pr. Ac. Nat. Sc. Phil. XI. 261 (1859)[1]; Stn. Tin. N. Am. pp. vi, 57–8, 60. fig. 4 (1872)[2]. *Anaphora agrotipennella*, Grt. Can. Ent. IV. 137–8 ♂, 142–3 ♀ (1872)[3]. *Anaphora popeanella*, Grt. Can. Ent. IV. 137–8, 142–3 (1872)[4]. *Anaphora scardina*, Z. Verh. z.-b. Ges. Wien, XXIII. 215–6 (1873)[5]. *Anaphora agrotipennella*, Mrt. Can. Ent. VIII. 185–6 (1876)[6]; Chamb. Bull. U.S. G.G. Surv. IV. 110[7], 129 (1878)[8]. *Anaphora popeanella*, Chamb. Bull. U.S. G.G. Surv. IV. 129 (1878)[9]. *Anaphora scardina*, Chamb. Bull. U.S. G.G. Surv. IV. 129 (1878)[10]. *Anaphora agrotipennella*, Wlsm. Tr. Am. Ent. Soc. X. 167–8 (1882)[11]. *Acrolophus agrotipennella*, Grt. Can. Ent. XVIII. 199 (1886)[12]. *Anaphora popeanella*, Wlsm. Tr. Ent. Soc. Lond. 1887, 138[13], 161–3, Pl. VIII. 11, 11 *a–c*[14]; Mschl. Ab. Senck. Nat. Ges. XV. 337, 354 (1890)[15]; Riley, Smith's List Lep. Bor. Am. 95. No. 5061 (1891)[16]; Wlsm. Pr. Z. Soc. Lond. 1891, 515, 545 (1892)[17].

Hab. United States[1–14, 16–17], VI.–VII. Larva roots of *Trifolium pratense*, IV.–V.[6, 7, 13]. **West Indies**—Portorico[15, 17].

290. Anaphora triatomella, sp. n.

Antennæ: ♂ serrate towards the apex; whitish ochreous. *Palpi*: ♂ recurved to beyond the back of the thorax, apical joint roughly clothed; whitish ochreous in front, reddish brown on the apical joint; ♀ porrect, twice the length of the head beyond it; pale cinereous. *Head* and *thorax*: ♂ mouse-grey, mixed with reddish brown; ♀ pale cinereous. *Fore wings*: ♂ whitish ochreous along the costa and dorsum, transversely streaked and mottled with mouse-grey; suffused with reddish brown along and beyond the cell, much shaded and blotched with mouse-grey, which reaches the dorsum near the base and sends an angular projection downward across the fold opposite to the middle of the dorsum; at the end of the cell are three tooth-like dots of white scales in an even parallel transverse series; cilia mouse-grey, mottled with

reddish-brown: ♀ pale cinereous throughout, more or less speckled with greyish fuscous, the markings confined to three greyish-fuscous spots, one about the middle of the cell, another at the end of the cell, and the triangular one (as in the male) coming halfway between them on the lower edge of the cell, its apex crossing the fold. *Exp. al.* ♂ 20 mm.; ♀ 23 mm. *Hind wings* greyish fuscous; cilia scarcely paler. *Abdomen* greyish. *Legs* whitish ochreous.

Type, ♂ ♀ Mus. Hedemann.

Hab. **West Indies**—St. Thomas, 20 III.–10 IV. (*Gudmann, Hedemann*). Five specimens.

This species is very variable in colour in both sexes, and the markings in some varieties are obliterated; but the white spots appear to be constant in the male.

291. Anaphora arcasalis, Wkr.

Palthis? arcasalis, Wkr. Cat. Lp. Ins. B.M. XVI. 153–4 (1858)[1].
Anaphora arcasalis, Wlsm. Pr. Z. Soc. Lond. 1891, 515, 545 (1892)[2].

Hab. **West Indies**—San Domingo[1, 2].

292. Anaphora mimasalis, Wkr.

Palthis? mimasalis, Wkr. Cat. Lp. Ins. B.M. XVI. 154 (1858)[1].
Anaphora mimasalis, Wlsm. Pr. Z. Soc. Lond. 1891, 515, 545 (1892)[2].

Hab. **West Indies**—San Domingo[1, 2].

293. Anaphora noctuina, Wlsm.

Anaphora noctuina, Wlsm. Pr. Z. Soc. Lond. 1891, 515–6, 545, Pl. XLI. 14 (1892)[1].

Hab. **West Indies**—Cuba[1].

115. Acrolophus, Poey.

294. Acrolophus vitellus, Poey.

Acrolophus vitellus, Poey, Cent. Lp. Cuba, Pl. (XX.) (1833)[1]; Wlsm. Tr. Ent. Soc. Lond. 1887, 148[2]: Pr. Z. Soc. Lond. 1891, 512, 544, Pl. XLI. 11 (1892)[3].

Hab. **West Indies**—Cuba[1–3]; (? Portorico[3]).

295. Acrolophus? reflexus, F.

Bombyx reflexa, F. Ent. Syst. III. (1) 448. No. 128 (1793)[1].
Phalæna (Bombyx) reflexa, Turton, Syst. Nat. III. 212 (1806)[2].

"*reflexa*. 128. *B.* alis deflexis cinereo fuscoque variis, palpis reflexis longitudine thoracis.

"Minuta. Antennæ simplices, cinereæ. Palpi compressi, hirsuti, inter antennas reflexi, ferruginei usque ad alas pertingunt. Alæ anticæ cinereæ lunula magna, media liturisque fuscis. Posticæ cinereæ.

"*Habitat* in Americæ meridionalis, Dr. Pflug."[1]

= **West Indies**[1, 2] (probably St. Thomas or St. Croix).

296. Acrolophus poeyi, Wlsm.

Acrolophus poeyi, Wlsm. Pr. Z. Soc. Lond. 1891, 512–3, 544, Pl. XLI. 12 (1892)[1].

Hab. **West Indies**—St. Vincent[1].

297. Acrolophus niveipunctatus, Wlsm.

Acrolophus niveipunctata, Wlsm. Pr. Z. Soc. Lond. 1891, 513, 544 (1892)[1].

Hab. **West Indies**—Cuba[1].

298. Acrolophus plumifrontellus, Clem.

= *bombycina*, Z.[6]

Anaphora plumifrontella, Clem. Pr. Ac. Nat. Sc. Phil. XI. 261 (1859)[1]; Stn. Tin. N. Am. pp. vii, 39, 57, 59, 60 (1872)[2]. *Anaphora bombycina*, Z. Verh. z.-b. Ges. Wien, XXIII. 216–7 (1873)[3]; Chamb. Bull. U.S. G.G. Surv. IV. 129 (1878)[4]. *Anaphora plumifrontella*, Chamb. Bull. U.S. G.G. Surv. IV. 129 (1878)[5]. *Acrolophus plumifrontellus*, Wlsm. Tr. Ent. Soc. Lond. 1887, 149–50, Pl. VII. 5[6]; Mschl. Ab. Senck. Nat. Ges. XV. 336, 354 (1890)[7]; Riley, Smith's List Lep. Bor. Am. 94. No. 5048 (1891)[8]; Wlsm. Pr. Z. Soc. Lond. 1891, 513–4, 544 (1892)[9].

Hab. United States[1–9]. **West Indies**—Cuba[6]; Portorico[7–9].

299. Acrolophus walsinghami, Mschl.

Acrolophus walsinghami, Mschl. Ab. Senck. Nat. Ges. XV. 335, 336, 354 (1890)[1]; Wlsm. Pr. Z. Soc. Lond. 1891, 514, 544, Pl. XLI. 13 (1892)[2].

Hab. **West Indies**—Portorico[1,2].

300. Acrolophus leucodocis, Z.

Anaphora leucodocis, Z. Hor. Soc. Ent. Ross. XIII. 197–8 (1877)[1]; Wlsm. Tr. Ent. Soc. Lond. 1887, 159–60[2]. *Acrolophus leucodocis*, Wlsm. Pr. Z. Soc. Lond. 1891, 514, 544 (1892)[3].

Hab. **West Indies**—Cuba[1–3]. (? Brazil[1–3]).

116. Pseudanaphora, Wlsm.

301. Pseudanaphora noctivaga, sp. n.

Antennæ purplish fuscous above, ochreous beneath. *Palpi* pale ochreous, a dark fuscous patch externally at the base of the first joint. *Head* ochreous, with a purplish shade; face pale ochreous. *Thorax* purplish fuscous. *Fore wings* purplish fuscous, mottled with pale ochreous, the costa reticulated with dark tawny fuscous throughout; an oblique small tawny-fuscous patch extending on either side of the fold near the base; a larger patch of the same colour lying on the outer half of the fold, not reaching the dorsum but extending upwards at its inner extremity across the cell; this is followed by some pale ochreous mottling, which also

precedes and follows a third conspicuous quadrangular tawny fuscous patch at the end of the cell: cilia pale ochreous, heavily sprinkled with purplish fuscous. *Exp. al.* 16 mm. *Hind wings* greyish brown. *Abdomen* greyish brown; anal tuft slightly paler. *Legs* greyish cinereous, hind tarsal joints banded with purplish fuscous.

Type, ♂ Mus. Wlsm.

Hab. **West Indies**—Grenada (Balthazar, 250 ft., windward side, 10 V.—*H. H. Smith*). Unique.

117. Bazira, Wkr.

=§ *Eddara*, Wkr.

302. Bazira xylinella, Wkr.

Eddara xylinella, Wkr. Cat. Lp. Ins. B.M. XXVIII. 518 (1863)[1]. *Bazira xylinella*, Wkr. Cat. Lp. Ins. B.M. XXX. 1009 (1863)[2]; Wlsm. Pr. Z. Soc. Lond. 1891, 516, 545 (1892)[3].

Hab. **West Indies**—Jamaica[1-3].

INDEX.

Invalid names are printed in italics; = denotes that the name in italics is a synonym; § = a homonym; † = wrongly written either in inception or in adoption; ‡ signifies the correction of a name hitherto wrongly written; * = invalid as not containing the type of the conception. Names within square brackets are referred to in this paper, but are not connected with the West-Indian fauna.

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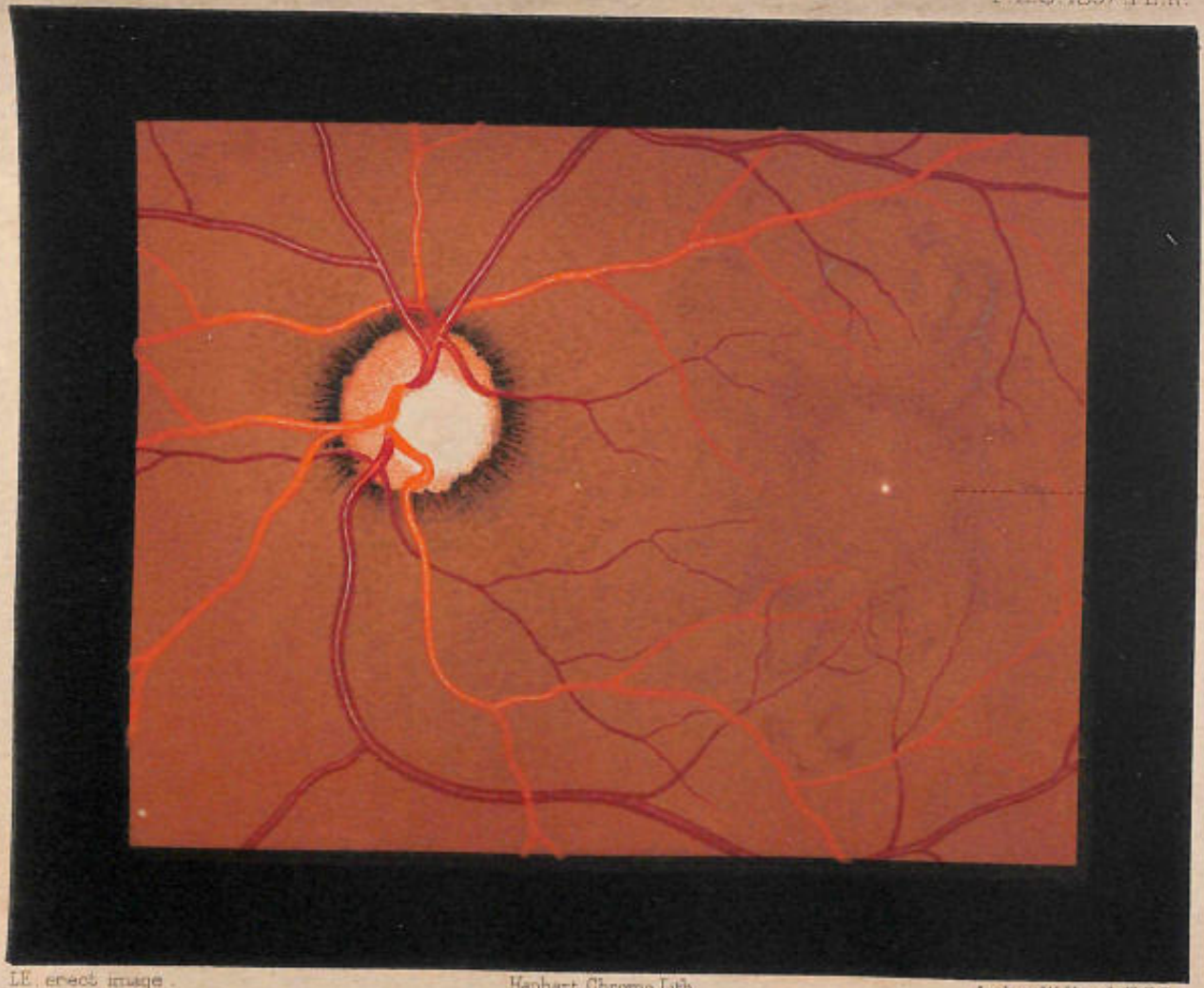
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subolivacea (Phalonia)	200
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subtilis, Hb. = punctella, *Cram. & Stoll*	139
subversana, Z. = strenuana, *Wkr.*	173
suffumigata	106
synophrys, Meyr. = caffer, *Z.*	2
tarsimaculata	122
tecnidion, Z. = pusillidactyla, *Wkr.*	3
tectonica, *Mschl.*	203
tegulella	69
tenera, Z. = albanus, *F.*	112
tenuicaudella	226
[tenuis, *F. & R.*	6]
tetraonella	263
thomæ, *Z.*	11
tibialis, *Z.*	107
tischeriella	258
transferrana, Wkr.	164
transferranus, *Wkr.*	164
translucida	41
triangularis, *Mschl.*	152

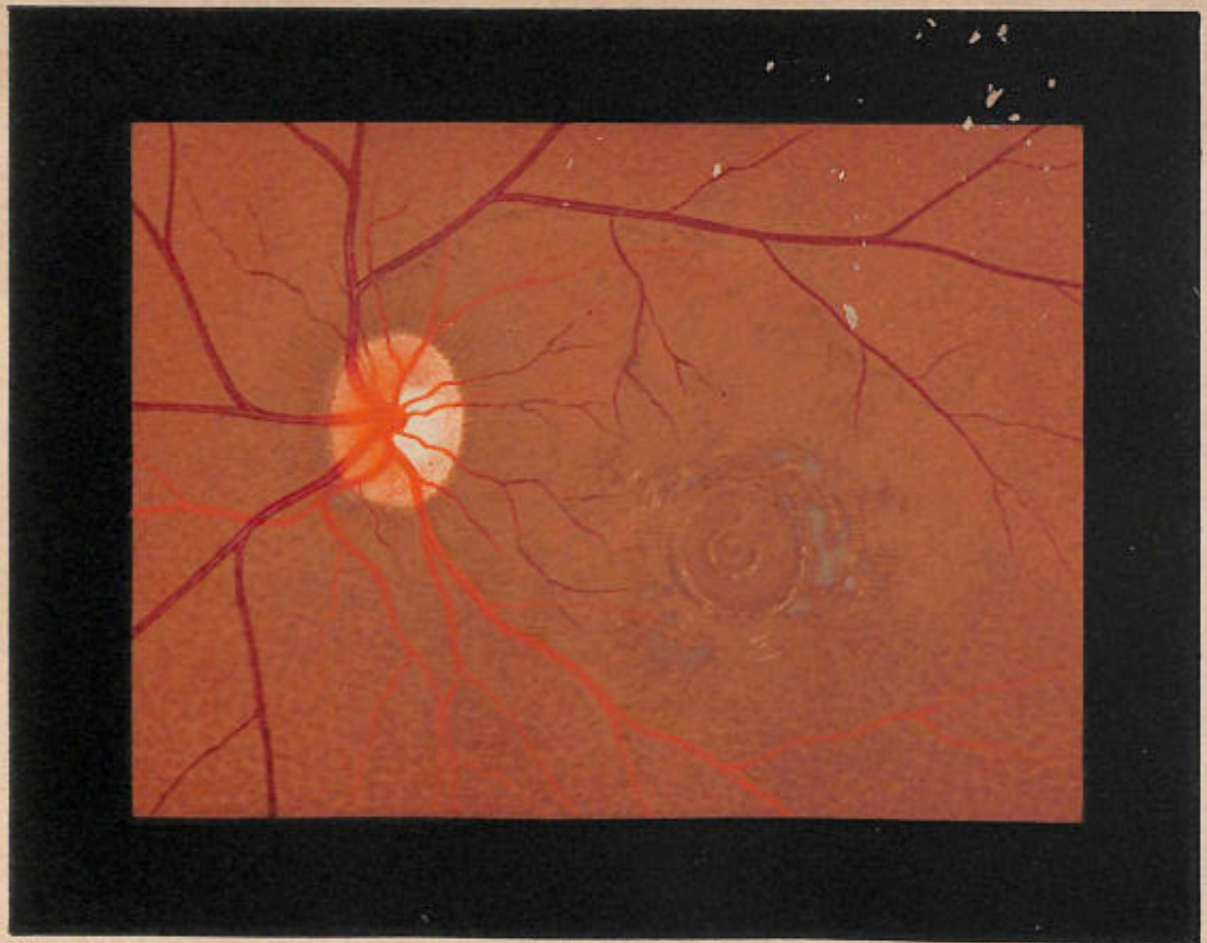


LE. erect image.

Hanhart Chromo, Lith.

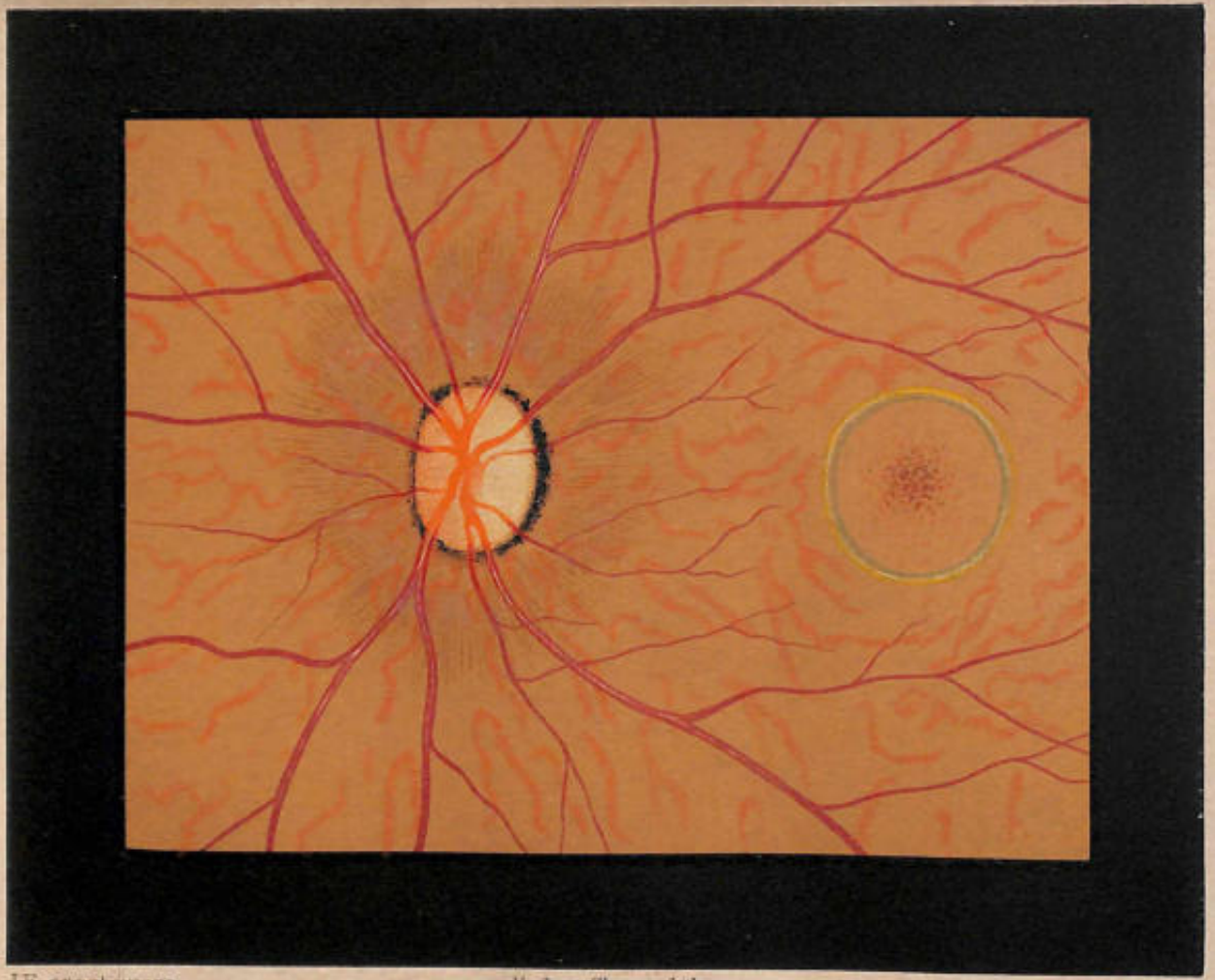
Arthur W. Head. F.Z.S.

FUNDUS OCULI OF A NUBIAN YOUTH.



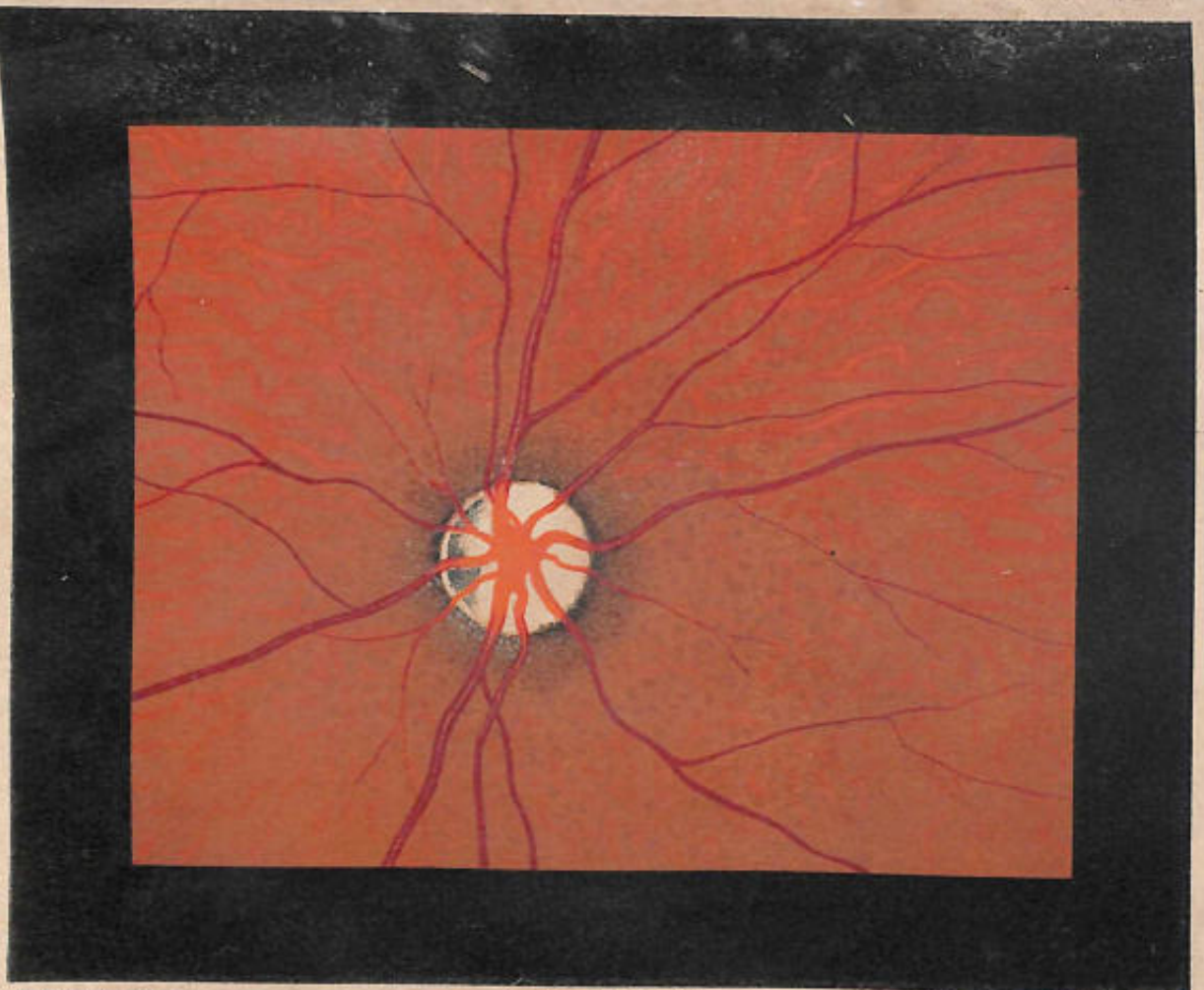
LE. erect image. Hanhart Chromo.Lith. Arthur W. Head. F.Z.S.

FUNDUS OCULI OF OURANG-OUTANG, *(Simia satyrus)*



LE. erect image. Hanhart Chromo, Lith. Arthur W. Head F.Z.S.

FUNDUS OCULI OF A MARMOSET, *(Hapale penicillata.)*

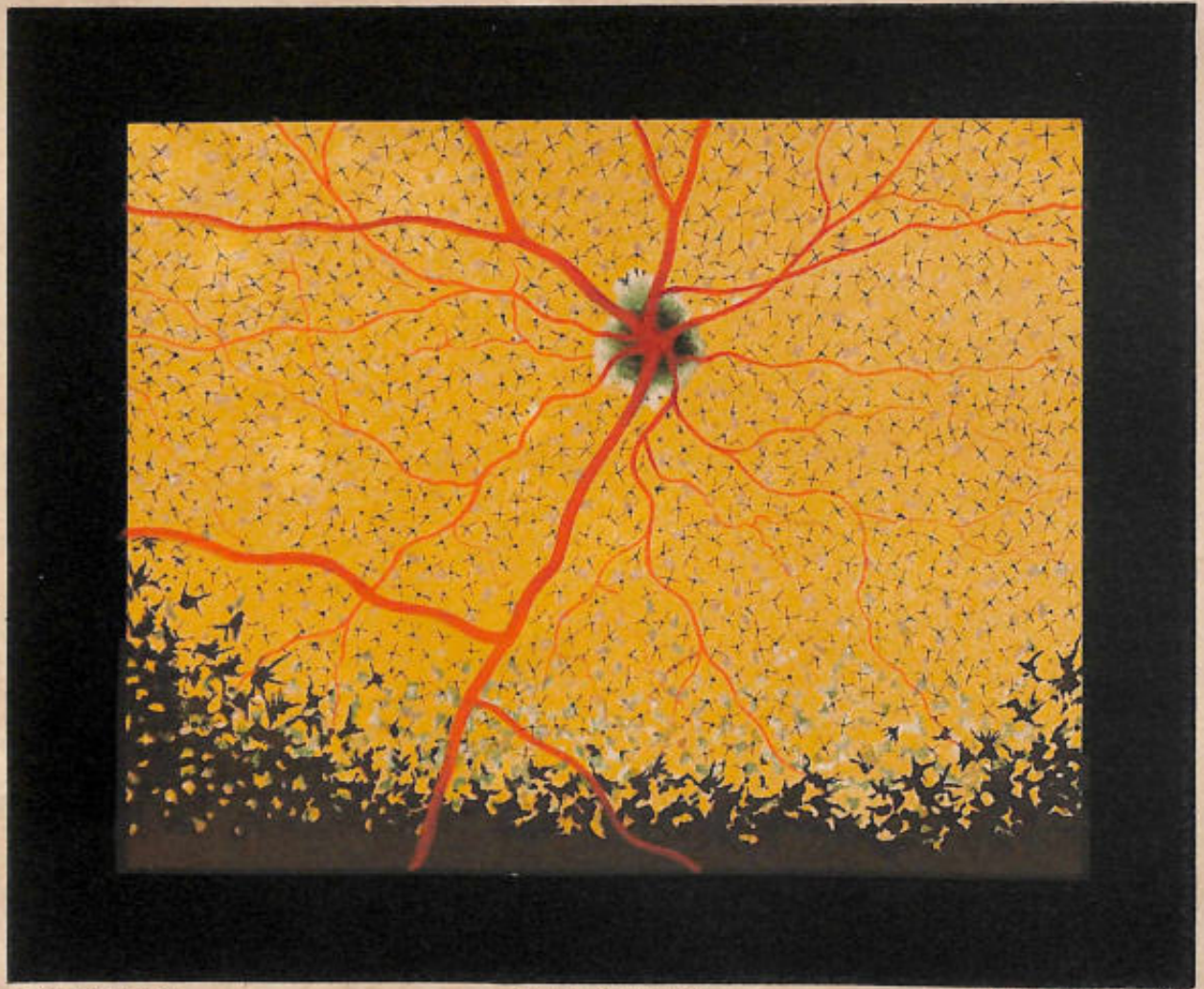


RE. A Brown Lemur,
Rt. erect image.

Hanhart Chromo, Lith.

Arthur W. Head F.Z.S.

FUNDUS OCULI OF A LEMUR, (*Lemur brunneus*.)



L.E. erect image. Hanhart Chromo, Lith. Arthur W. Head F.Z.S.

FUNDUS OCULI OF A LEMUR, *(Lemur coquereli.)*

	No.
triangularis, *Wlsm.*	92
triatomella	290
trigonella	68
tripunctata	130
tristis, F. & R. = biferana, *Wkr.*	159
trossulella	29
umbraticostella	257
umbratipalpis	286
undosa	240
unicolor	221
unipuncta	219
uterella	272
variolata	97
venticola	210
vicinitata, *Mschl.*	204
vincentana, Wlsm. = transferranus, *Wkr.*+	164
vincentanus, *Wlsm.* = transferranus, *Wkr.*+	164
virididorsana, *Mschl.*	170
vitellus, *Poey*	294
[walchiana, *Cram. & Stoll*	108]
**walchiana*, Z. = griseana, F.	108
walkeri, Wlsm. = caffer, *Z.*	2
walsinghami, *Mschl.*	299
[wœberiana, *Schiff.* (Enarmonia), p. 122.]	
xanthorrhoa, Z. = notatella, *Wkr.*	84
xylinella, *Wkr.*	302
**xylostella*, Mschl. = cruciferarum, *Z.*	153
[zelleri, *Wlsm. & Drnt.*	108]
zingarella	70

5. Observations on the Ophthalmoscopic Appearances of the Eyes of the Order Primates. By G. Lindsay Johnson, M.A., M.D., F.R.C.S., F.Z.S.

[Received January 8, 1897.]

(Plates II.–VI.)

Adopting the classification given in Sir W. Flower's classical work on the Mammals, I include in the order Primates: Man, Monkeys, Marmosets, and the suborder Lemuroidea. I have found that a comparison of the ophthalmoscopic appearances of the fundus oculi of the various members of this most important order enables us to arrive at certain definite conclusions, which I believe to be of interest to zoologists.

All the animals, including Man, were examined by me in a darkened room with the same amount and the same kind of illumination, and also with the same degree of magnification.

Only animals in perfect health were selected, and, so far as possible, several animals of the same species were examined in order to preclude the possibility of abnormal fundi. Moreover, in all cases both eyes were examined and ascertained to be similar in all respects before a drawing was made. As a further precaution, each detail of the drawing as it was being painted by my artist, Mr. Head, was confirmed by myself in the living eye, and altered (if necessary) until it represented the original in all respects.

As regards keeping the animals quiet, I found considerable difficulty at first, but as my experience increased the difficulties vanished. In no case was any drug or anæsthetic used, but in the case of a few of the wilder Monkeys a net was thrown over them. In all the other cases the animal was held gently by the keeper in his lap. The animal rarely struggled, and usually became

quite reconciled and contented. I found that extreme gentleness, together with petting the animals, overcame their fears, so that no force was needed; nor, indeed, would I have suffered it to be employed under any circumstances. A few of the Monkeys and Lemurs were observed in the Belle Vue Gardens, Manchester, some in Mr. Jamrach's and Mr. Hamlin's collections, and in various travelling menageries, since they were not to be found in the Society's Gardens. In all examples of 38 distinct species of Monkeys and Lemurs were examined, including forms of every genus which could be found in the Society's and other menageries.

All the observations were made by what is termed the direct method with the ophthalmoscope, the instrument being used within an inch of the animal's eye without an interposed magnifying lens, thus presenting to the observer an upright picture of 10 diameters' magnification. This method is preferable to the indirect in which a lens is used, as the image then obtained is inverted, and only of 3 to 4 diameters' magnification, which is also less distinct than the larger upright image. In most cases cocaine and homatropine were dropped into the eye to obtain a larger pupil and consequently more light.

The fundus of the fair European human eye appears, when viewed with the ophthalmoscope, of an orange-red colour, pretty uniformly distributed over the entire fundus; only when we get towards the confines of the visible field does the background become more intermixed with streaks of pigment. A little to the inner or nasal side of the centre of the field we observe the disc of the optic nerve, of a pinkish colour and slightly oval shape, with the major axis vertical. From the centre of this disc the scarlet arteries and lake-red veins of the retina proceed, passing in every direction, dividing into numerous branches. In the dark-coloured races the appearances are similar, save that the orange-red background is replaced by a reddish brown, owing to the great increase of dark pigment (see Plate II.).

Only one part of the fundus is wholly free from vessels, and that is at and around the macula lutea or yellow spot. The macula is a small pit or depression situated in the axis of vision, about $2\frac{1}{2}$ disc breadths from the disc to the outer or temporal side. It appears different in colour in the eyes of different individuals. Generally it appears as a dark-reddish circular patch, with a bright spot in the centre, and in some cases surrounded by a circular glistening halo or ring, well defined on its internal margin, but fading away into the general background towards its external border (marked *d*, Plate II.). Occasionally a second or even a third ring may be seen inside this large one, all having the fovea as a common centre.

The macula being in ourselves the seat of most acute vision, considerable attention has been given to this highly differentiated area, which has an actual diameter of about 1·5 mm. It is only in this region, the size of a pin's head, that we see perfectly, our acuteness of vision decreasing rapidly outside this region. In

most books which treat on the subject we find it stated that among mammals Man and the Anthropoid Apes (the Simiidæ) alone possess a macula; but I find, as I will presently explain, that the existence of the macula is not restricted to these only.

In addition to the scarlet and lake-red branches of the retinal vessels which proceed from the disc, a large number of interrupted orange-yellow and red vessels, uniformly coloured and much broader than the artery and the veins, can be observed, anastomosing so as to form a network (see *c c*, Plate V.). These vessels belong to the choroid, a vascular structure underlying the retina. As that portion of the retina which lies in contact with the choroid is pigmented, these choroidal vessels can only be distinctly observed in fair people and in albinos. I am, of course, speaking of the normal eye of the adult, and not taking into consideration defective senile or pathological conditions.

It is not only with regard to the degree of distinctness with which the choroidal vessels can be observed that the ophthalmoscopic appearance differs in fair and dark people. The colour of the fundus likewise varies in proportion to the pigmentation of the individual. In very fair people the colour is a bright vermilion, which gradually tends towards a reddish brown in people with very dark hair and skin, until we find it of a chocolate colour in the negro. Except in colour, the appearance of the fundus oculi does not differ in the various races of Man. I need hardly say that of course the colour of the macula varies with the general colour of the fundus, being always distinguishable as a darker patch than the rest, although occasionally, in very dark Europeans, I have seen it of a decidedly redder hue than the rest of the fundus.

The chocolate-coloured field, with a darker chocolate-coloured circular patch indicative of the macula region bordered by a bright scintillating ring, characteristic of the negro, is likewise what we find when we examine the eye of the Simiidæ, but we find the fundus varies greatly in colour once we descend below this group. Even in the Gibbons, the lowest of the Simiidæ, we already find a commencement of this departure.

Throughout the Anthropoidæ the arrangement of the retinal vessels is the same as in Man, the first indication of variation being found as soon as we reach the Lemuroidæ.

The disc is oval, with the long axis vertical, at times more or less circular, or practically the same as in Man. Here again we only find a difference in the Lemuroidæ, which all have a circular disc.

The Lemuroidæ have no macula, the existence of which ceases with the last of the true Monkeys. In other words, we find a striking resemblance between the appearance of the eye of Man and the entire order Anthropoidæ, although in many details we can trace as we descend the scale a tendency towards that lower form which reveals itself to us when we examine the Lemuroidæ; and here again we find a gradual departure from the higher type

as we wend our way from the Lemurs through the Galagos down to the Aye-Aye.

The eyes of all the Primates below Man are smaller than our own, but this is not so in proportion to the size of the body. I have found, for instance, that the transverse diameter of the globe of the eye of the half-grown Gorilla which lately died in the Society's Gardens measured 20·7 mm., which is the size of the eye of a child between the age of 9 and 11. Of course the eye of a small Marmoset is very much smaller, being in proportion to the size of the animal.

There are other distinctive differences between Man, the Monkeys, and Marmosets, in other words between the Anthropoidæ on the one hand and the Lemuroidæ on the other.

The pupil of Man and the Anthropoidæ is always circular, whilst we find a vertically oval pupil in all the Lemuroidæ. In addition to this I find from repeated observations that all the Anthropoidæ or true Monkeys are able to accommodate their eyes for near objects by converging both eyes on to a single point, and in so doing the pupil contracts as in Man, though to a less degree. The Lemuroidæ have not this power of convergence; and although I have noticed the power of convergence in all the Monkeys, I find it is only a transition stage—that is to say, they employ it with hesitation and difficulty, much in the same way as an infant uses its legs when learning to walk, since they cannot converge for more than one or two seconds at most. If you hold a small bright-coloured object near the nose of a Monkey, you will observe the eyes converge immediately in a horizontal plane, and the pupils contract slightly, but the next moment the eyes return to parallel vision, though not necessarily in a horizontal plane, being often accompanied by a slight elevation upwards.

We thus find that we must draw a broad distinction between Man and Monkeys as a group and the Lemuroidæ. Man and all the Monkeys and Marmosets without exception possess a macula, a circular pupil, and converge when accommodating for near objects. These characteristics are necessary for binocular vision. The Lemuroidæ have not got binocular vision and therefore we find all these peculiarities absent.

Going more into detail we find that every family has some characteristic peculiarity. Thus the eyes of the Gorilla, Chimpanzee, and the Orang closely resemble that of the negro, except that around the disc the whitish fine streaks are more marked. Were they as strongly marked in Man they would be attributed to a congenital defect known as opaque nerve-fibres, although the defective human eye shows these opaque nerve-fibres wholly opaque, whilst in these Apes they are more or less translucent. These translucent nerve-fibres radiating from the disc become somewhat more marked as we descend the scale. In the Gibbon we find an extreme prominence of the choroidal vessels.

In the next family, the Cercopithecidæ, we notice in some genera an approximation to the Simiidæ, notably in the Black Ape,

the Macaques, and the Baboons, and a retrogression of type in the pronounced semi-opacity of the optic nerve-fibres in the Mangabeys.

In the family Cebidæ we notice at once a striking difference between the almost Simian type of the Cebinæ (which includes the genera *Cebus*, *Lagothrix*, and *Ateles*) from the obviously lower type of eye in the Nyctipithecinæ (Dourocoulis and Squirrel Monkeys). The extraordinary development and prominence of the choroidal vessels and the peculiar pigmented background so characteristic of the Lemurs distinguish the latter at once. Only in the Howlers do we get an approximation to a *Cercopithecus*. But if we examine a Howler we notice at once how much more like a *Cercopithecus* it looks than any of the other genera above mentioned.

In the *Chrysothrix* we find a most peculiar change at the macula. This is surrounded by a remarkable rainbow-coloured ring (see Plate IV.). Now this rainbow ring is the characteristic of the Hapalidæ, occurring in every one of that family that I have examined, only differing from that seen in the *Chrysothrix* in being a smooth ring instead of a ring made up of extremely short and thick radiating streaks. This ring is the first indication of the gorgeous colours seen in the background of the eyes of the Galagos, the Loris, and the Aye-Aye.

When we then come to the Lemurs we do not find a single animal which possesses even a trace of a macula or ring, and the discs are all round. Instead of being pink they are quite white, as if atrophied, and the fundus is of a peculiar brown or greyish-brown colour stippled at regular intervals with large dots (see Plate V.). The moment we descend below the true Lemurs the entire fundus changes: instead of being brown it assumes an intensely dazzling golden yellow.

The Galagos, Lorises, and Aye-Aye are all nocturnal animals, and that is perhaps one reason why the fundus is of such a brilliant golden-yellow colour.

In the Galagos the disc is nearly black; the fundus is a rich golden yellow with a tinge of green and covered everywhere with minute black or brown stellate dots. These stellate dots are peculiar to the Galagos. If we examine the eyes of the Galagos we find they are nearly alike; and when we examine the Lemurs we likewise see a family likeness, but fundamentally different in type from the former. Among the latter, however, there is one exception, its fundus is identical with that of the Galagos and yet it is known as Coquerel's Lemur (see Plate VI.). Now I have examined this animal most carefully, and I am convinced it is a Galago and not a Lemur, notwithstanding the disproportionate size of the tarsus, which, however, is not much larger than those of the Lemurs. The difference of its eye is too striking to be overlooked, and in my opinion quite overweighs the other differences of structure and habitat. For the former differences, especially the shape of the ears and face, are very slight compared with the other members of the family; and as regards the habitat, it is at

least conceivable that it may in some way have been transported from Madagascar to the mainland. In any case I think that, having regard to the fact that the fundus oculi is distinctly that of a Galago, it would be well to consider whether the other points show sufficiently prominent characteristics to warrant the classification of that animal as a Lemur.

In concluding the few observations on the eyes of the Primates which I have laid before you I venture to express the belief that the study of both the interior and the outside of the eyes of animals may be conducive to an increase of our knowledge of zoological classification and comparative physiology, and may possibly throw some light on the habits and pursuits of animals. After all, the eye is the chief connecting-link between the outer world and the consciousness of the animal, and it requires vision to find its way, obtain food, and avoid danger.

EXPLANATION OF THE PLATES.

PLATE II. Fundus oculi of a native youth from Nubia.
„ III. Fundus oculi of Ourang-Outang.
„ IV. Fundus oculi of *Hapale penicillata*.
„ V. Fundus oculi of *Lemur brunneus*.
„ VI. Fundus oculi of *Lemur coquereli*.

February 2, 1897.

Prof. GEORGE B. HOWES, F.Z.S., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of January 1897.

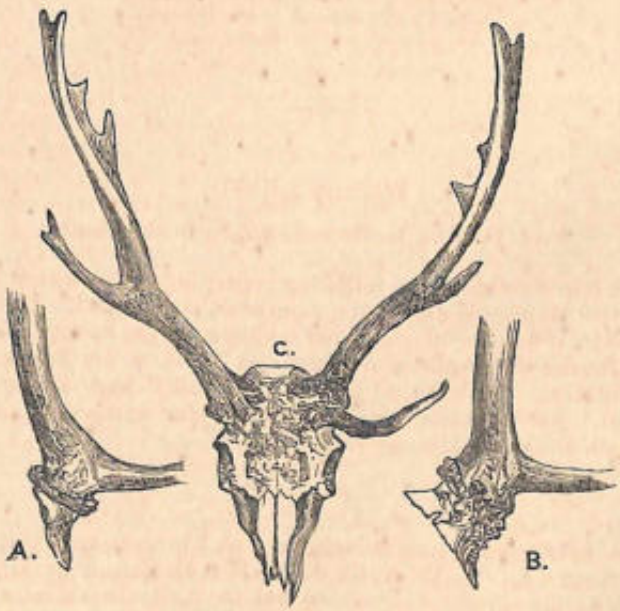
The total number of registered additions to the Society's Menagerie during the month of January was 47, of which 28 were by presentation, 2 by birth, 11 by purchase, and 6 were received on deposit. The total number of departures during the same period by death and removals, was 112.

Mr. Sclater exhibited a collection of 31 bird-skins that had been formed by Mr. W. A. Churchill, H.B.M. Consul at Mozambique, during various shooting-excursions along the shores within 20 miles of the island of Mozambique. Capt. Shelley had kindly examined the collection and had referred the specimens to the following species, as named in his recently published Catalogue ('Birds of Africa,' vol. i. 1896). Mr. Sclater proposed to deposit these specimens in the British Museum, as though the species were mostly well known, the locality (Mozambique) was an

interesting one, and was not well represented in the National Collection of Birds.

Macronyx croceus (Vieill.).
Pholidauges verreauxi, Bocage.
Corvultur albicollis (Lath.).
Corvus scapulatus, Dana.
Merops persicus, Pall.
Lophocerus melanoleucus (Licht.).
Gallirex chlorochlamys, Shelley.
Centropus natalensis, Shelley.
Strix flammea, Linn.
Milvus ægyptius (Gm.).
Nisaëtus bellicosus (Daud.).
Polyboroides typicus, Smith.
Hagedashia hagedasch (Lath.).
Herodias lucida, Raf.
—— *alba* (Linn.).
Ardea ardesiaca, Wagl.
—— *melanocephala*, Vig. et Childr.
Mycteria senegalensis, Shaw.
Anastomus lamelligerus, Temm.
Tantalus ibis, Linn.
Phalacrocorax africanus (Gm.).
Phœnicopterus roseus, Pall.
Plectropterus niger, Scl.
Pternistes nudicollis (Bodd.).
Otis melanogaster, Rüpp.
Totanus nebularius (Gunner).
Numenius arcuatus (Linn.).
—— *phæopus* (Linn.).
Himantopus candidus (Bonn.).

Mr. R. E. Holding exhibited (on behalf of Sir Douglas Brooke,



Horns of Fallow Deer, showing malformations.

A, shed horn, bringing away only a small portion of the outer table of the skull. B, horn shed in the succeeding year, bringing away a much larger portion owing to exostosis at the point of fracture. In C the disease has enveloped the entire frontal bone, causing thickening of the horn-base and other malformations.

Bart.) a head and two pairs of shed horns of a Fallow Deer, the latter showing arrest in development in consequence of disease of the frontal bone, due, probably, to incomplete severance of the horn during the process of shedding.

Mr. G. E. H. Barrett-Hamilton, F.Z.S., gave a short general account of his journey to the Fur-Seal Islands of the North Pacific during the summer of 1896.

The journey had been undertaken on behalf of the Foreign and Colonial Offices, with a view to the investigation of the Natural History of the Northern Fur-Seal (*Otaria ursina*), with special reference to certain disputed points which have a distinct bearing on the industry connected with the skins of the animal.

Mr. Barrett-Hamilton stated that in the very short time at his disposal he would only be able to give a mere outline of his journey, and would hardly be able to speak at all of the Natural History of the Fur-Seal, which he would have very much liked to have done. As, however, he was engaged in reporting in some detail on these matters to the Government, it would have in any case been impossible for him to have gone into the disputed points until his report had been published.

Mr. Barrett-Hamilton left Queenstown in the R.M.S. 'Lucania,' in company with Professor D'Arcy Thompson, on May 24th, for New York, where they were met by Mr. Macoun, who was to proceed to the Seal Islands on behalf of the Canadian Government. Messrs. Macoun and Thompson proceeded at once from New York to Washington, whence they left shortly afterwards for the Pribiloff Islands, on the Alaskan side of Bering Sea, whereas Mr. Barrett-Hamilton had instructions to proceed to the Commander Islands, which are a part of the Russian Empire and lie near the coast of Kamtchatka, on the western side of the Pacific.

From New York Mr. Barrett-Hamilton went across the American Continent to San Francisco. Here, during a stay of several days, while awaiting the arrival of the steamer which was to take him to Yokohama, he was able to observe and photograph the famous Seal-rocks near the entrance to the Harbour, on which may be seen lying examples of two species of Sea-Lion, *Otaria stelleri* and *O. californiana*.

The voyage from San Francisco to Yokohama was taken in the Pacific Mail SS. Company's Steamer 'Peru,' and was an uneventful one. Many notes were, however, made on the sea-birds seen, so far as they could be identified with certainty, the results of which, together with those of his observations in the more northern parts of the Pacific, Mr. Barrett-Hamilton stated that he hoped to publish shortly in the 'Ibis.'

Among the more interesting species observed in the voyage were the Black-footed Albatross (*Diomedea nigripes*), of which a photograph in flight was exhibited, the Frigate-bird, the Bosun-bird or Tropic-bird, the Booby, and many species of Petrels and Shearwaters.

A few hours were spent at Honolulu, in the Sandwich Islands, on the 17th of June, and Yokohama was finally reached on the night of the 29th of the same month.

On arrival at Yokohama Mr. Barrett-Hamilton found H.M.S. 'Edgar' ready to convey him to Hakodate in the northern island of Hokkaido, so that only a few hours were spent in Yokohama and Tokio, as the 'Edgar' sailed on July 1st. Hakodate was reached on the 3rd, and H.M.S. 'Spartan' was found there under orders to convey the speaker to Robben Island and the Commander Islands: various causes, however, delayed the start until the 8th of July.

On the way up from Yokohama to Hakodate, while following the eastern coast of the island of Nippon, on the 2nd of July, the effects of the terrible seismatic wave of the 15th of June were very plainly visible, not only by the quantity of wreckage, dead animals, and even corpses passed at sea, but also by a distinct mark on the shore. The coast was here very much indented and highly suited to assist the action of such a catastrophe.

Hakodate was left on the 8th of July, *en route* for Robben Island, and the coast of Hokkaido followed on that day and the 9th, many sea-birds being seen and occasionally a whale. On the 10th the 'Spartan' passed through the Straits of La Pérouse, and late in the day made Cape Siretoko, a magnificent head which formed the eastern termination of Animama Bay and the south-eastern extremity of the island of Saghalien. Thence the 'Spartan' made for Robben Island, which was reached early on the morning of July the 11th.

Robben Island was a very small rock with a sandy beach all round it. It lay under Cape Patience in the island of Saghalien. It was a most inaccessible island, and there were no means of landing on it in bad weather, so that the 'Spartan' was very lucky to find a fine and clear morning there on the 11th.

There was a small Rookery of the Fur-Seals on Robben Island, which belonged to the Russian Government, and photographs of this as well as of the Rookery were taken. The season was evidently not long begun, and the young Seal-pups were still very small.

The 'Spartan' sailed from Robben Island on the same day, and steered her course across the foggy Sea of Okhotsk for Amphitrite Straits in the Kurile Islands, which were passed through in dense fog on the 13th. On the morning of the 14th she passed up the coast of Kamtchatka from Cape Lopatka to Petropaulowsk, and the weather being now clear a splendid view of the beautiful volcano and mountains of the peninsula was obtained. [Mr. Barrett-Hamilton exhibited some photographs to show the mountains and the character of the coast.]

The 'Spartan' remained three days at Petropaulowsk and in Tareinski Harbour, as some fresh meat was needed. Salmon and trout were exceedingly abundant in the harbour, the former comprising several species of the genus *Onchorhynchus*, and the latter being a species of *Salvelinus*. The fishes of these seas were

very little known and it was believed that more than one of the specimens collected by Mr. Barrett-Hamilton belonged to species new to science.

The Commander Islands were reached on the 19th of July, early on which day Mr. Barrett-Hamilton was left at Nikola by the 'Spartan.' He passed six weeks on the islands, part of the time being spent on the smaller Copper Island, which was about 40 miles from Bering Island. Much valuable information was collected during this stay, not only with regard to the Seals, but also with regard to the natives of the islands, the birds, and the general fauna and flora.

On the 25th of August, Professor Thompson and Dr. Jordan, who had been sent out to the Pribiloff Islands by the U.S. Government, arrived in H.M.S. 'Satellite,' and after a short inspection of the Glinka Rookery on Copper Island, the whole party left for Unalaska, where they arrived on the 29th.

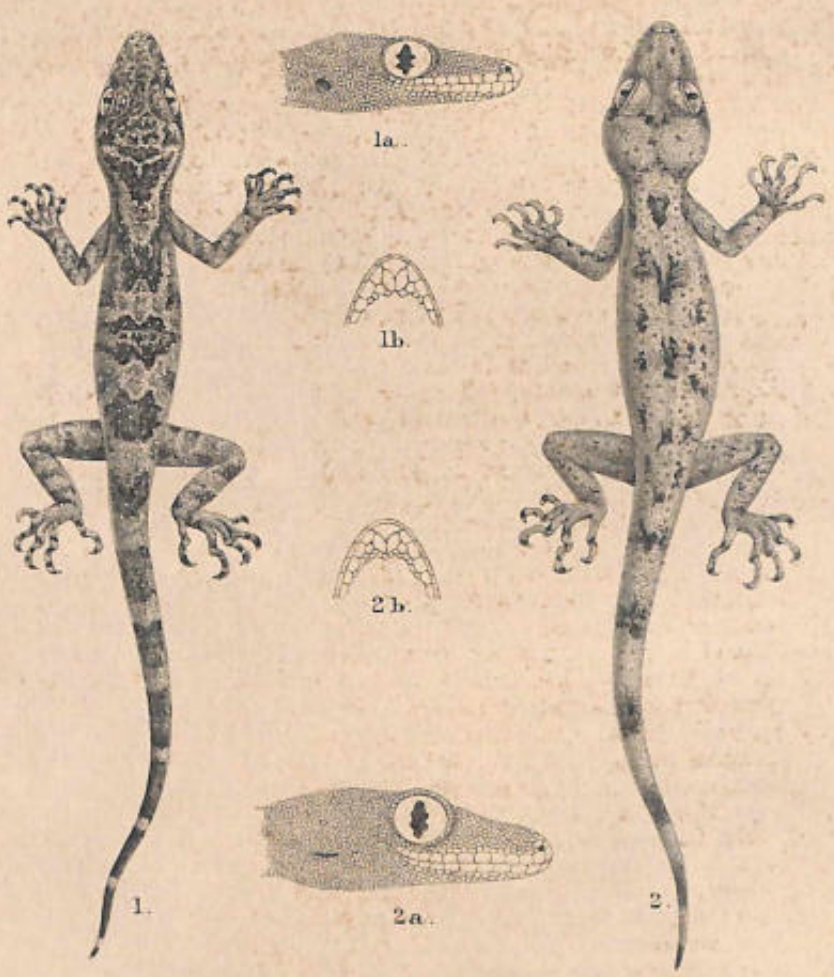
On the 31st the party proceeded in H.M.S. 'Pheasant' to St. Paul Island, the largest of the Pribiloff Group, arriving at the village on the 1st of September.

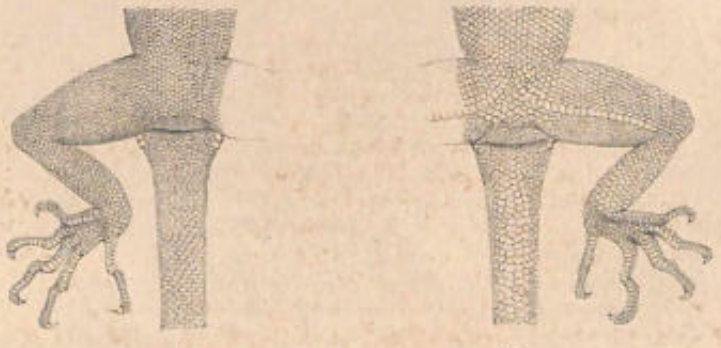
Professor D'Arcy Thompson, Dr. Jordan, and Mr. Lucas (U.S. Commissioners) left the Pribiloff islands on the 8th of September for Seattle, *viâ* Sitka, but Mr. Barrett-Hamilton remained behind to continue his observations on the Fur-Seal and to assist in the count of dead pups, together with Mr. Macoun (Canadian) and Colonel Murray and Mr. Clarke (Americans). He remained on the islands in all for about six weeks, part of which time was spent on the smaller island of St. George.

Finally, he left the islands for good on the 22nd of October, and returned to England by Unalaska, Port Townsend, Victoria, the Canadian Pacific Railway from Vancouver to Ottawa and Montreal, New York, Washington, and Queenstown.

Mr. Barrett-Hamilton stated that it had been his good luck to have had what for one season's work he thought must be an unique experience among the Fur-Seals, having spent six weeks on both the groups of islands, and having actually lived on each of the Seal Islands except Robben Reef, and having passed over on foot nearly every square yard of the Rookeries on all the four Seal Islands in the North Pacific. There was only one part of the season that he had missed, and that was the earliest part of it.

There was, of course, little chance of finding new species among the higher animals of the North Pacific, but, besides the small collection of fishes already alluded to, and which he believed contained examples of some new species, collections had been made of some of the smaller mammals met with, and the British and other Museums had been enriched by additional specimens of the Northern Fur-Seal, as well as by a set of skulls of different ages and sexes of Steller's Sea-Lion (*Otaria stelleri*). This magnificent northern species was, until now, very poorly represented in the National collection, and a young male brought home by Mr. Barrett-Hamilton was being set up for the Gallery now under re-arrangement by Mr. Lydekker.





J.Green del. et lith. Mintern Bros. imp.

1.GYMNODACTYLUS JELLESMÆ 2.G.FUMOSUS.



J. Green del. et lith. Mintern Bros. Chromo.

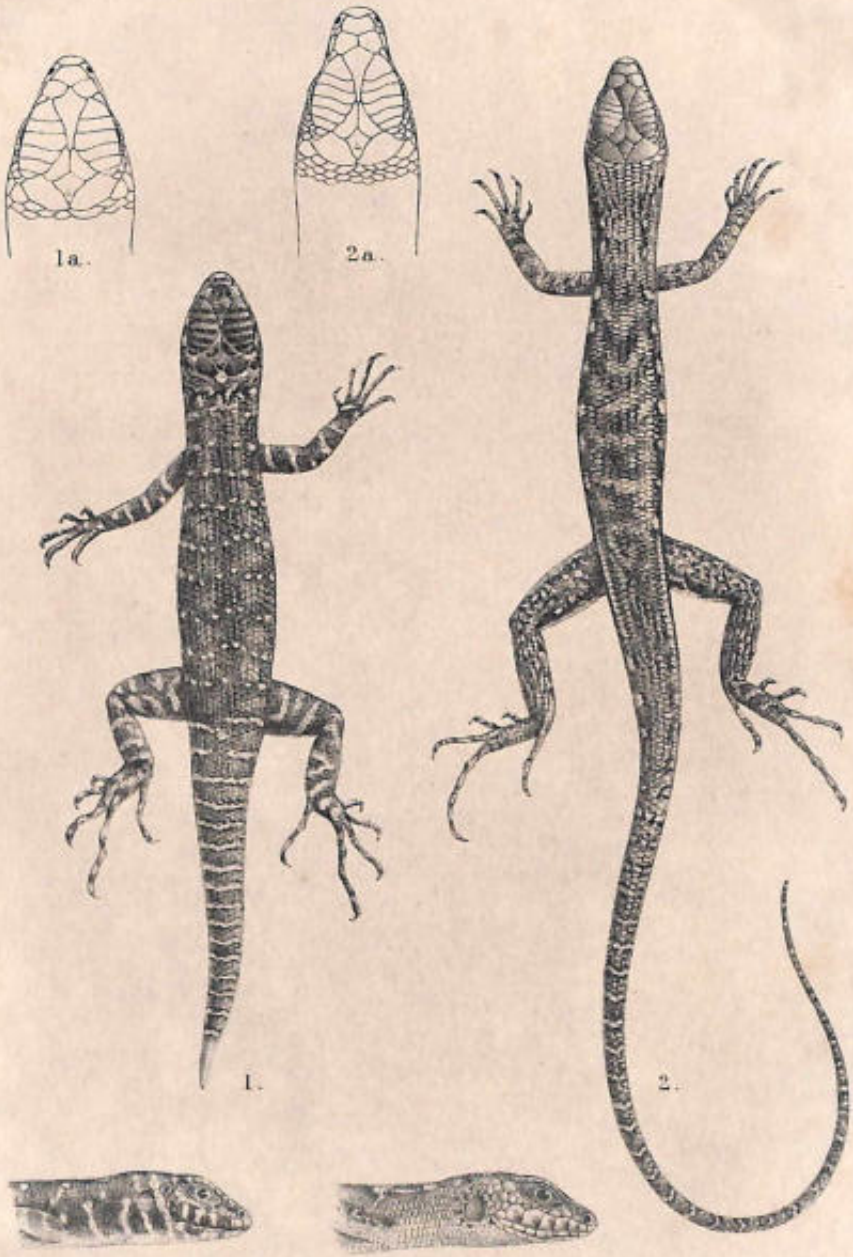
DRACO SPILONOTUS.



J. Green del. et lith.

Mintern Bros. Chromo.

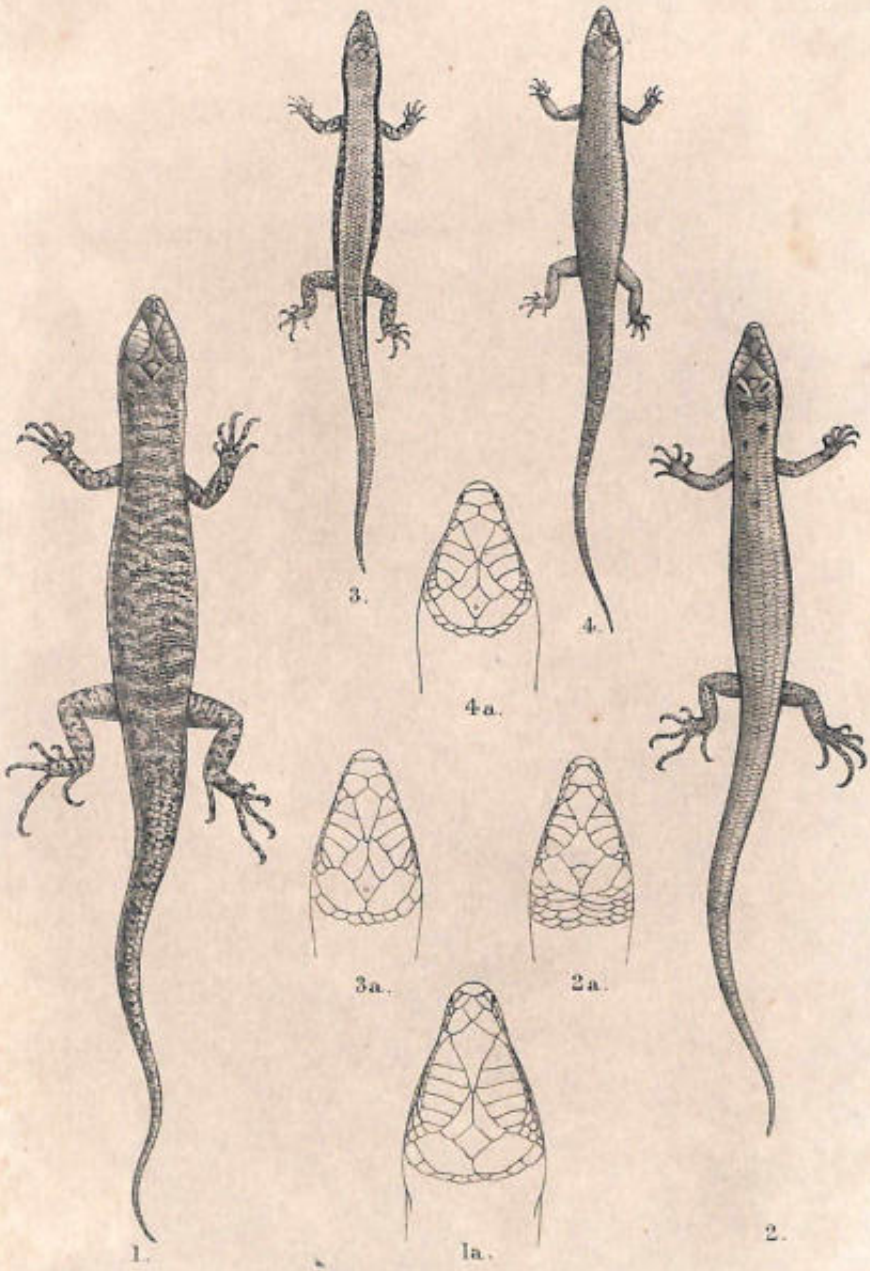
DRACO BECCARII.



J. Green del. et lith.

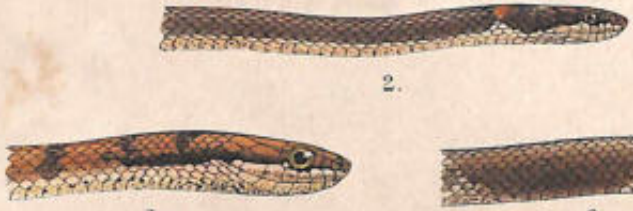
Mintern Bros. imp.

1. LYGOSOMA TROPIDONOTUS. 2. L. SARASINORUM.



J.Green del.et lith. Mintern Bros. imp.

1. LYGOSOMA CELEBENSE. 2. L. INCONSPICUUM.
3. L. TEXTUM. 4. L. PARVUM.

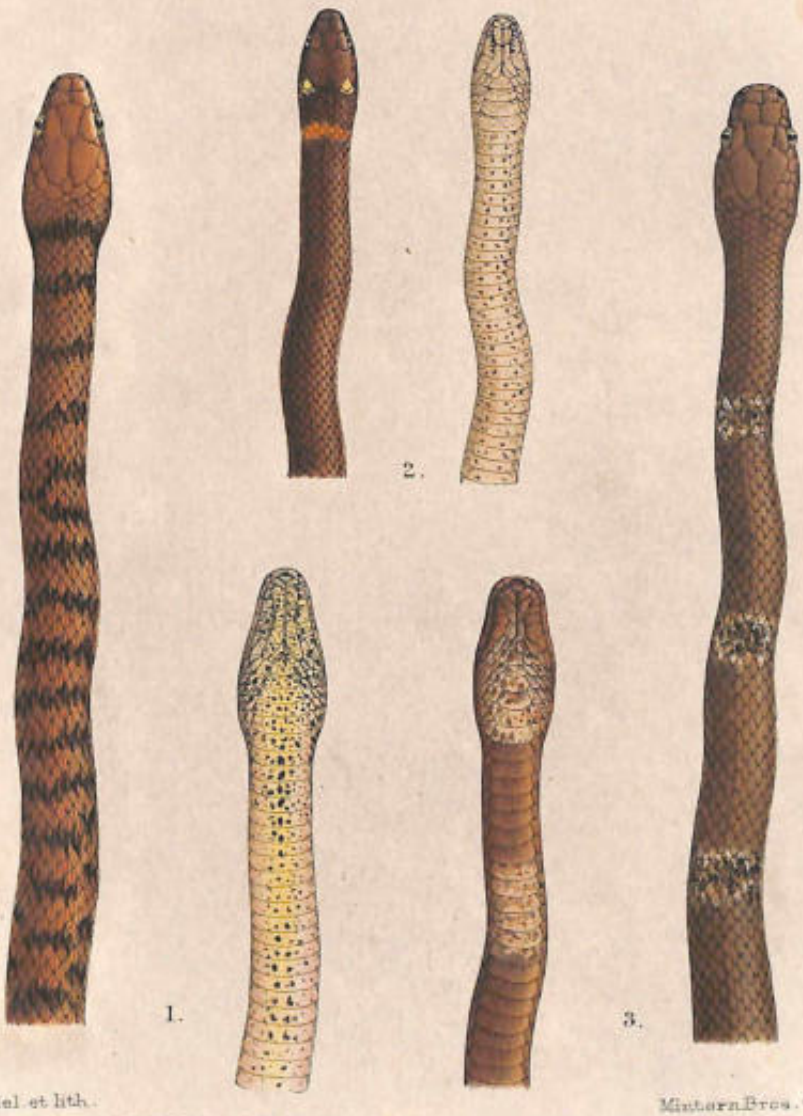


2.

1.



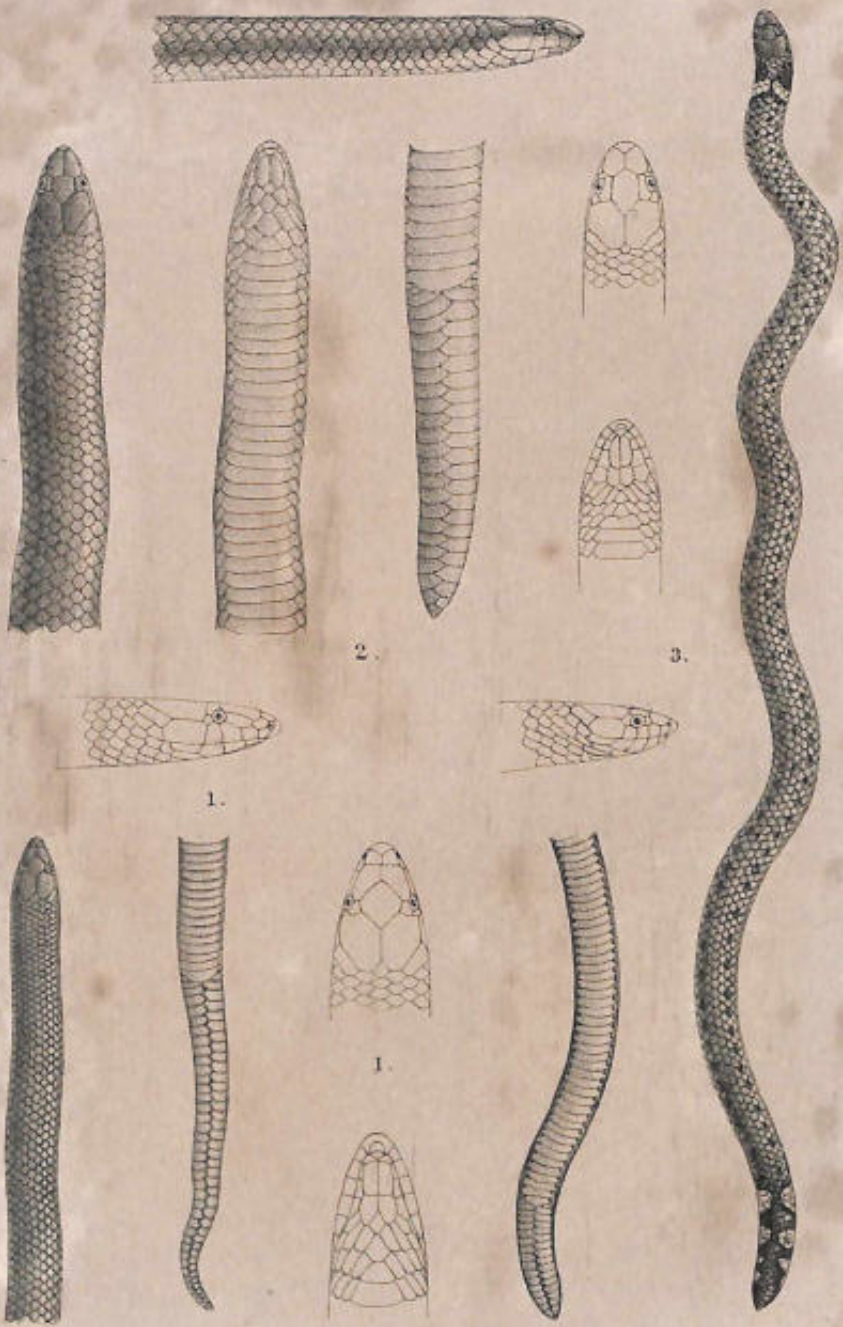
3.



1. 2. 3.

J.Green del. et lith. Mintern Bros. Chromo.

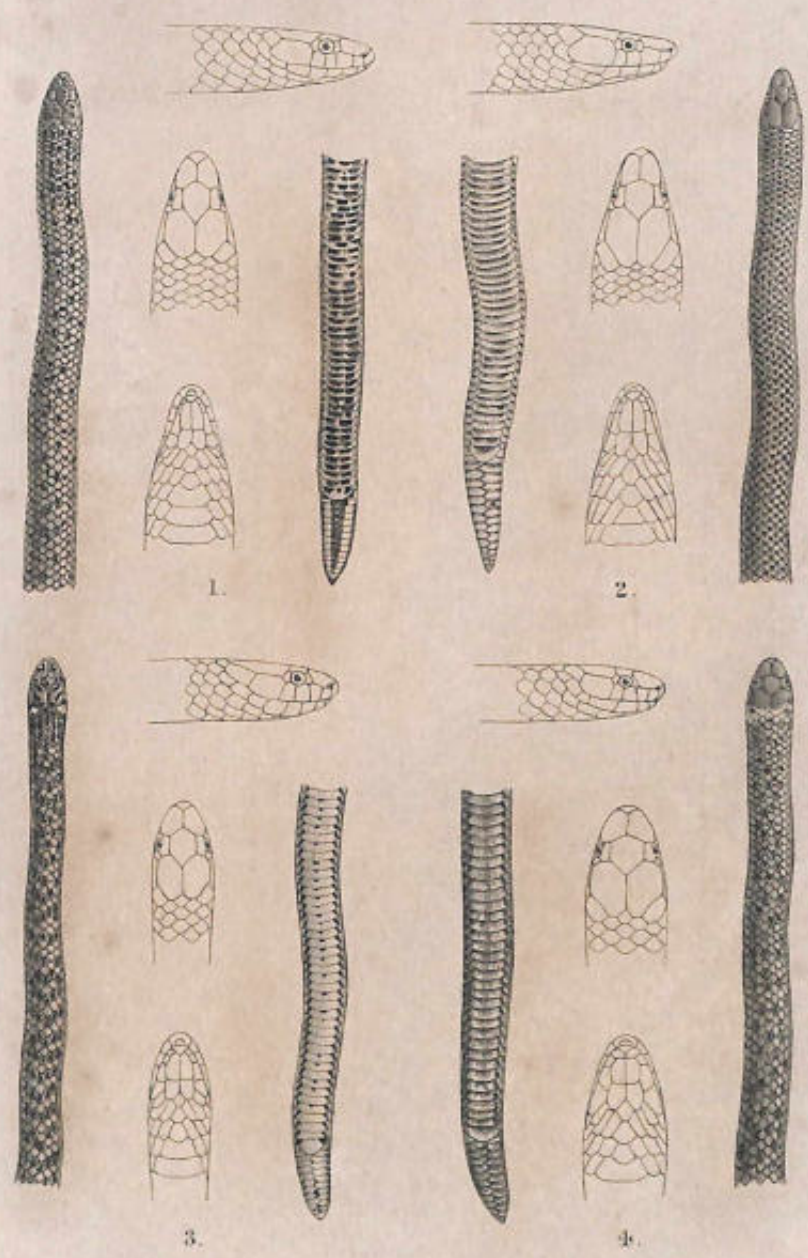
1.TROPIDONOTUS SARASINORUM. 2.T.CELEBENSIS.
3.LYCODON STORMI.



J.Green del. et lith.

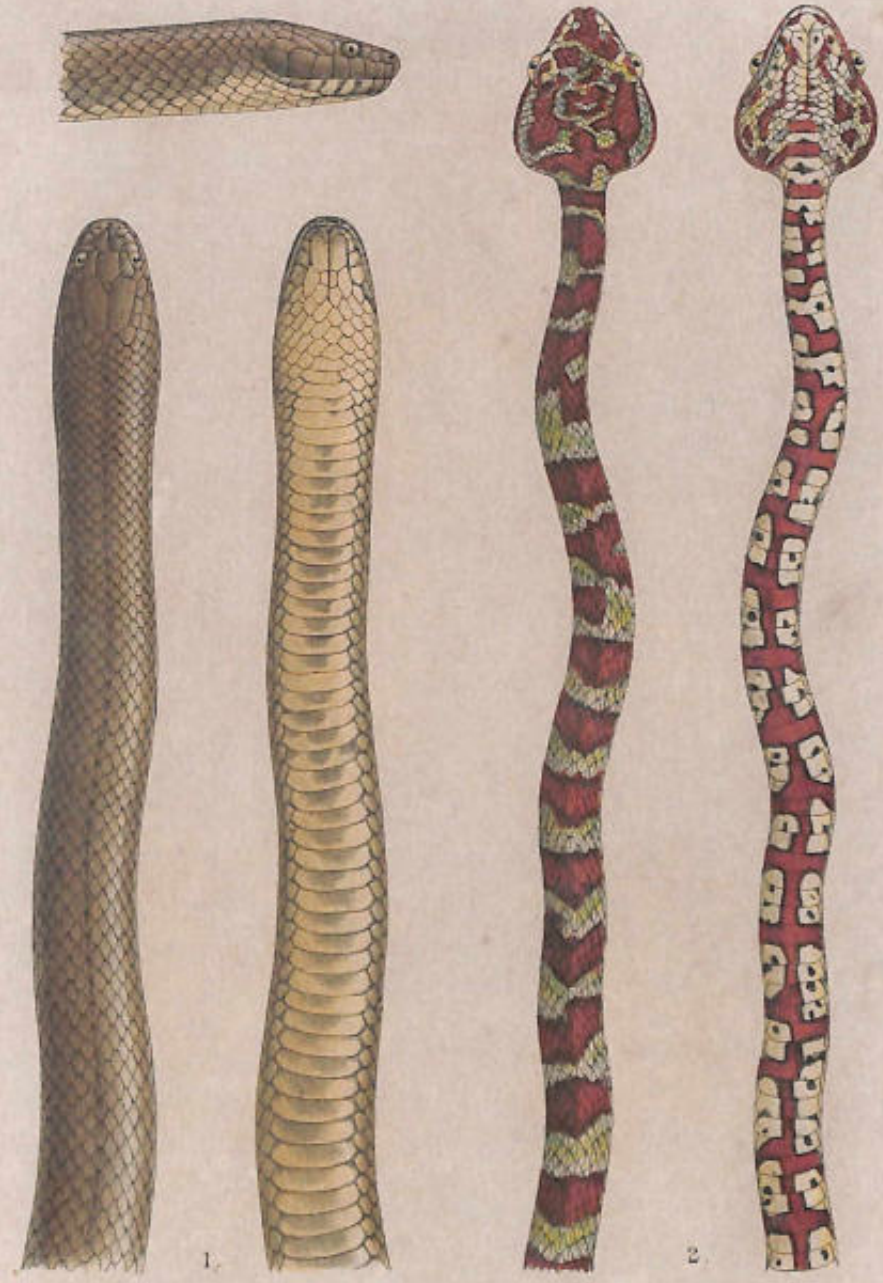
Mintern Bros. imp.

1. AGROPHIS SARASINORUM. 2. CALAMARIA ACUTIROSTRIS.
3. CALAMARIA NUCHALIS.



J.Green del. et lith. Mintern Bros. imp.

1.CALAMARIA MUELLERI. 2.C.CURTA. 3.C.GRACILIS.
4.C.COLLARIS.



J. Green del. et lith.

Mintern Bros. Chromo.

1. HYPSIRHINA MATANNENSIS. 2. LACHESIS WAGLERI, VAR.



J. Green del. et lith. Mintern Bros. Chromo.

1. RANA MACROPS. 2. RHACOPHORUS EDENTULUS. 3. RH. MONTICOLA.
4. SPHENOPHRYNE CELEBENSIS. 5. S. VARIABILIS.

A fair collection of birds had been made, which would be of interest to British naturalists as representing species not often brought to this country by collectors. Besides these, collections had, where possible, been made of the Invertebrate Fauna of the country.

The following papers were read:—

1. A Catalogue of the Reptiles and Batrachians of Celebes, with special reference to the Collections made by Drs. P. & F. Sarasin in 1893–1896. By G. A. Boulenger, F.R.S., F.Z.S.

[Received December 11, 1896.]

(Plates VII.–XVI.)

During their three years' exploration of Celebes, the Drs. Sarasin paid much attention to the herpetological fauna of that island and succeeded in bringing together a collection of 565 selected specimens of Reptiles and Batrachians, representing 86 species, of which 18 proved to be new to science and 11 new to the island, all in excellent state of preservation and with the localities carefully noted. These collections were sent home in several consignments, the first three of which were received by Dr. F. Müller of Basle, who published two preliminary notes on them. At the death of that distinguished herpetologist in 1895, I was offered by the Drs. Sarasin to continue the work of identification and to write a general report on the Reptiles and Batrachians. This I gladly undertook, and in the beginning of 1896 I published descriptions of several new species sent to me from the southern part of the island. Towards the end of the same year, on the return of the explorers, the whole of their collection, including the specimens already studied by Dr. Müller, was made over to me. It seemed, however, that the value of the report would be much increased by not limiting it to the collection made by the Doctors, and I therefore resolved to prepare a complete Catalogue of the Reptiles and Batrachians of Celebes, exclusive of marine species, which would prove practically useful to future students and collectors, as by its means all specimens could be identified. I have given descriptions of the endemic forms, and of a few that are imperfectly known, and a key, as short and simple as the subject permits, by which it is possible to determine all the species so far recorded from Celebes.

The older literature contains but little information on the herpetology of Celebes. But within the last twenty-five years important collections were made, with special attention to localities, and described by Peters, Günther, Doria, M. Weber, van Lidth de Jeude, and myself. These collections will be alluded to throughout in the text, with the names of the collectors, A. B. Meyer, Bruijn, Beccari, M. Weber, and Everett. I have,

however, abstained from introducing a few species of which I have not seen examples, and on the correct determination of which I entertain serious doubts.

The following is a list of the principal publications referring to the herpetological fauna of Celebes :—

W. Peters.—"Ueber einige von Hrn. Dr. A. B. Meyer bei Gorontalo und auf den Togian-Inseln gesammelten Amphibien." Mon. Berl. Ac. 1872, pp. 581–585.

A. Günther.—"Notes on some Reptiles and Batrachians obtained by Dr. Adolf Bernhard Meyer in Celebes and the Philippine Islands." Proc. Zool. Soc. 1873, pp. 165–172, pls. xvii. & xviii.

W. Peters & G. Doria.—"Catalogo dei Rettili e dei Batraci raccolti da O. Beccari, L. M. D'Albertis e A. A. Bruijn nella sotto-regione Austro-Malese." Ann. Mus. Genova, xiii. 1878, pp. 323–450, pls. i.–vii.

A. B. Meyer.—"Verzeichniss der von mir in den Jahren 1870–1873 im Ostindischen Archipel gesammelten Reptilien und Batrachier." Abh. Mus. Dresden, 1887, no. 2, 16 pp.

M. Weber.—"Reptilia from the Malay Archipelago. I. Sauria, Crocodilidæ, Chelonia." Zool. Ergebn. Reise Niederl. Ost-Ind. i. pp. 159–177, pl. xiv. (1890).

T. W. van Lidth de Jeude.—"Reptilia from the Malay Archipelago. II. Ophidia." Op. cit. pp. 178–192, pls. xv. & xvi.

F. Müller.—"Reptilien und Amphibien aus Celebes." Verh. nat. Ges. Basel, x. 1894, pp. 825–843. II. Bericht. T. c. pp. 862–869.

G. A. Boulenger.—"Descriptions of new Reptiles and Batrachians collected in Celebes by Drs. P. & F. Sarasin." Ann. & Mag. N. H. (6) xvii. 1896, pp. 393–395.

G. A. Boulenger.—"Descriptions of new Reptiles and Batrachians collected by Mr. Alfred Everett in Celebes and Jampea." Ann. & Mag. N. H. (6) xviii. 1896, pp. 62–64.

For the position of the localities recorded in this Catalogue, the reader is referred to the five Reports, with maps, published by the Drs. Sarasin in the 'Zeitschrift d. Gesellschaft f. Erdkunde,' Berlin, xxix. 1894, pp. 352–401, xxx. 1895, pp. 226–234, 311–352, and xxxi. 1896, pp. 21–49, and 'Verhandlungen d. Ges. f. Erdk.' 1896, Heft 7. The localities at which Reptiles were collected are here enumerated :—

I. Northern Celebes : Kema, Lilang (near Kema), Tomohon (2500 f.), Sonder (1800 f.), Rurukan (3600 f.), Kakas (Tondano Lake, 2300 f.), the volcanoes Klabat (6550 f.), Lokon (5150 f.), Sudara (4450 f.), Masarang (4000 f.), Mahawu and Emponglar (in the Masarang chain), and Soputan (5800 f.), all in Minahassa; Kottabangon (800 f.), in the kingdom of Bolang Mongondo; and Dumoga besar, Malibagu, Bone Valley, Bone Mts., Totoija Valley; Gorontalo and Lake Limbotto near Gorontalo; Buol, Matinang Mts., Wangkahulu Valley, Paguat, Marisa.

II. Central Celebes: Paloppo, Borau, Lembong-pangi (1600 f.), Manangalu, and the Kalaena River, all in the kingdom of Luhu; the Central Mountains with the Takalekajo (5500 f.), and Lake Posso (1600 f.); Mapana, on the Gulf of Tomini; Bungi, Enrekang, Sosso, Batulappa, in the South-western part.

III. Southern Celebes: Macassar, Barabatuwa Hills, Bonthain, Loka (3800 f.), Bonthain Peak with Lompobatang, Wawo Karang, Pare-Pare.

IV. South-eastern Celebes: Lakes Matanna (1350 f.) and Towuti (1050 f.).

The following table is drawn up with the object of showing at a glance the exact distribution of the species now known to inhabit the island. Column **A** refers to North Celebes, **B** to Central Celebes, **C** to Southern Celebes, and **D** to South-eastern Celebes; whilst in the last column, **E**, the letters W. or E. show whether the species is distributed in the Malay subregion West or East of Celebes, or, if the distribution be a very limited one, the other islands whence the species is on record are indicated in full. One or two asterisks prefixed to a name signifies that the species or the genus is restricted to the island with which this paper deals.

Although rich in endemic species, Celebes possesses but a single genus peculiar to it (*Rhabdophidium*, Blgr.).

REPTILES.

	A	B	C	D	E
1. Crocodilus porosus, *Schn.*	+	...	+	...	W. E.
2. Cyclemys amboinensis, *Daud.*...	+	...	+	...	W. E.
3. Testudo forstenii, *Schl. & Müll.*	+	...	...	...	Gilolo.
*4. Gymnodactylus jellesmæ, *Blgr.*	+	+	...	+	
*5. „ fumosus, *F. Müll.*	+				
6. Hemidactylus frenatus, *D. & B.*	+	+	+	+	W. E.
7. „ platyurus, *Schn.*.	+	...	+	+	W.
8. Gehyra mutilata, *Wgm.*	+	+	+	...	W. E.
9. Lepidodactylus lugubris, *D. & B.*	+	...	...	+	W. E.
10. Gecko verticillatus, *Laur.*	+	...	+	...	W. E.
11. „ monarchus, *Schl.*	+	...	+	+	W. E.
12. Draco reticulatus, *Gthr.*	...	+	...	...	Philippines, Sanghir.
*13. „ spilonotus, *Gthr.*	+				
*14. „ beccarii, *Ptrs. & Dor.* ...	...	+	+	+	
15. Calotes cristatellus, *Kuhl*	+	...	+	+	W. E.
16. Lophura amboinensis, *Schloss.* .	...	+	+	...	Philippines, Amboyna.
17. Varanus salvator, *Laur.*	+	...	...	+	W. E.
*18. „ togianus, *Ptrs.*	...	+	+		
19. Mabuia multifasciata, *Kuhl* ...	+	+	+	+	W. E.
20. „ rudis, *Blgr.*	+	+	+	...	Borneo, Sumatra.
*21. Lygosoma tropidonotus, *Blgr.* .	...	+			
*22. „ nigrilabre, *Gthr.*.....	+	+	+		
*23. „ sarasinorum, *Blgr.*....	...	+			
24. „ variegatum, *Ptrs.* ...	...	...	+	...	W. E.
*25. „ celebense, *F. Müll.*...	+				
26. „ smaragdinum, *Less.* .	+	+	+	...	E.
*27. „ inconspicuum, *F. Müll.*	+				
*28. „ textum, *F. Müll.*.....	+				
29. „ cyanurum, *Less.*	+	+	...	+	E.
30. „ atrocostatum, *Less.*...	+	+	...	+	E.

	A	B	C	D	E
31. Lygosoma bowringii, *Gray*	+	...	...	...	W.
32. „ temminckii, *D. & B.*	+	...	...	...	Java, Sumatra.
*33. „ parvum, *Blgr.*	...	+			
*34. „ infralineolatum, *Gthr.*	+	+	+		
35. Tropidophorus grayi, *Gthr.*	...	+	...	...	Philippines.
36. Dibamus novæ-guineæ, *D. & B.*	+	+	...	...	W. E.
37. Typhlops braminus, *Daud.*	+	...	...	...	W. E.
38. „ ater, *Schl.*	+	...	...	...	Java, Ternate.
39. Python reticulatus, *Schn.*	+	...	+	+	W. E.
40. „ molurus, *L.*	...	...	+	...	W.
41. Enygrus carinatus, *Schn.*	+	...	...	...	E.
42. Cylindrophis rufus, *Laur.*	+	...	+	...	W.
43. Xenopeltis unicolor, *Reinw.*	+	...	...	+	W.
44. Chersydrus granulatus, *Schn.*	+	...	+	...	W. E.
*45. Tropidonotus sarasinorum, *Blgr.*	...	...	+		
*46. „ celebicus, *Ptrs. & Dor.*	+	...	+	+	
47. „ trianguligerus, *Boie*	...	...	+	...	W. E.
48. „ vittatus, *L.*	+	...	...	...	Java.
49. „ subminiatus, *Schl.*	+	...	...	...	W. E.
50. „ chrysargoides, *Gth.*	+	...	...	...	Java.
51. Lycodon aulicus, *L.*	...	...	+	...	W. E.
*52. „ stormi, *Bttgr.*	+				
*53. Zamenis dipsas, *Schl.*	+				
*54. Coluber janseni, *Blkr.*	+	+	+		
55. „ erythrurus, *D. & B.*	+	...	+	+	Philippines, Sooloo.
56. Dendrophis pictus, *Gm.*	+	...	+	...	W. E.
57. Dendrelaphis terrificus, *Ptrs.*	+	...	...	...	Philippines.
*58. Oligodon waandersii, *Blkr.*	+	...	+		
*59. Agrophis sarasinorum, *F. Müll.*	+				
**60. Rhabdophidium forstenii, *D. & B.*	+				
*61. Calamaria acutirostris, *Blgr.*	...	...	+		
*62. „ nuchalis, *Blgr.*	...	...	+		
*63. „ muelleri, *Blgr.*	...	+	+		
*64. „ curta, *Blgr.*	...	...	+		
*65. „ gracilis, *Blgr.*	...	...	+		
*66. „ collaris, *Blgr.*	+				
67. „ virgulata, *Boie*	+	+	...	...	Java, Sumatra.
68. „ linnæi, *Boie*	+	...	...	...	Java.
69. Hypsirhina plumbea, *Boie*	+	...	+	+	W.
*70. „ matannensis, *Blgr.*	...	...	...	+	
71. „ enhydris, *Schn.*	...	...	+	...	W.
72. Cerberus rhynchops, *Schn.*	+	...	+	+	W. E.
73. Dipsadomorphus multimaculatus, *Boie*	+	...	...	...	W.
74. „ dendrophilus, *Boie*	+	...	+	+	W.
75. „ irregularis, *Merr.*	+	...	+	+	E.
*76. „ flavescens, *D. & B.*	...	...	+		
77. Psammodynastes pulverulentus, *Boie*	+	+	...	...	W. E.
78. Dryophis prasinus, *Boie*	+	...	+	+	W. E.
79. Chrysopelea ornata, *Shaw*	+	+	...	...	W.
80. Bungarus candidus, *L.*	+	...	...	...	W.
81. Naia bungarus, *Schl.*	+	...	...	...	W.
82. Doliophis intestinalis, *Laur.*	+	...	...	...	W.
83. Lachesis wagleri, *Boie*	+	+	...	+	W.

BATRACHIANS.

	A	B	C	D	E
1. Oxyglossus lævis, *Gthr.*	+	+	+	...	W.
2. Rana kuhlii, *D. & B.*	+	...	...	...	W.
*3. „ modesta, *Blgr.*	+				
4. „ leytensis, *Bttgr.*	...	+	+	...	Philippines, Borneo, Sooloo.
5. „ microdisca, *Bttgr.*	+	...	...	...	Java, Mentawi.
6. „ palavanensis, *Blgr.*	+	+	+	...	Palawan, Borneo.
7. „ tigrina, *Daud.*	+	+	+	+	W.
8. „ erythræa, *Schl.*	...	...	+	...	W.
9. „ varians, *Blgr.*	+	+	...	...	Philippines, Batjan.
10. „ everetti, *Blgr.*	+	+	+	...	Philippines, Borneo.
*11. „ celebensis, *Ptrs.*	+				
*12. „ macrops, *Blgr.*	+	+			
13. Rhacophorus leucomystax, *Gravh.*	+	+	+	+	W.
*14. „ edentulus, *F. Müll.*	+	...	+		
*15. „ monticola, *Blgr.*	...	...	+		
*16. Sphenophryne celebensis, *F. Müll.*	+	+	+		
*17. „ variabilis, *Blgr.*	...	...	+		
18. Callula baleata, *S. Müll.*	+	+	+	...	W.
19. „ pulchra, *Gray*	...	...	+	...	W.
20. Bufo biporcatus, *Gravh.*	...	+	+	+	W.
*21. „ celebensis, *Gthr.*	+	...	+		

It will be noticed that the single initial W. in the last column occurs 22 times and E. only 5 times, which shows a greater agreement with the Western than with the Eastern islands of the Archipelago, as already pointed out by Peters and Doria. The agreement with Java, Borneo, and Sumatra, so far as the genera are concerned, is much greater than with the Moluccas. Special relation to the Philippines is shown by *Draco reticulatus*, *Lophura amboinensis*, *Tropidophorus grayi*, *Coluber erythrurus*, and *Dendrelaphis terrificus*. Papuasian affinity is only exhibited by the Batrachian genus *Sphenophryne*, the two other species of which inhabit New Guinea. Australian affinity does not exist.

In dealing with the geographical distribution of the Lacertilia, in 1885, I submitted that the then generally accepted Wallace's line does not answer for this group of animals, and the same view has since been shown, especially by Max Weber, to apply to other groups. The present study of the herpetological fauna of Celebes clearly shows that there is no justification for Wallace's line so far as Reptiles and Batrachians are concerned.

Key to the Identification of the Species.

REPTILES.

I. CROCODILES ..... 1. *Crocodilus porosus.*

II. TORTOISES.

Digits distinct, webbed; head covered with undivided skin; carapace tricarinate in the young ..... 2. *Cyclemys amboinensis.*

Limbs club-shaped; head with shields; carapace without keels. 3. *Testudo forsteni.*

III. LIZARDS.

A. Head covered with granules or small scales above.

1. No movable eyelids; pupil vertical.

a. Digits not dilated.

Ear-opening oval, slightly oblique, nearly vertical; lower surface of thighs uniformly granulate ..... 4. *Gymnodactylus jellesmæ.*

Ear-opening a horizontal cleft; male with femoral pores, female with a series of enlarged scales along the lower surface of the thighs. 5. *Gymnodactylus fumosus.*

b. Digits dilated.

a. Digital expansion with two series of lamellæ inferiorly.

Digits free, all clawed ..... 6. *Hemidactylus frenatus.*

Digits webbed, all clawed..... 7. *Hemidactylus platyurus.*

Digits webbed at the base, inner rudimentary and clawless. 8. *Gehyra mutilata.*

Digits with a rudiment of web, inner well developed but clawless. 9. *Lepidodactylus lugubris.*

β. Digital expansion with single lamellæ inferiorly.

Rostral shield not entering the nostril; toes free. 10. *Gecko verticillatus.*

Rostral shield entering the nostril; toes with a rudiment of web. 11. *Gecko monarchus.*

2. Movable eyelids; pupil round.

a. Wing-like lateral membranes, supported by the much-prolonged spurious ribs.

α. No parietal foramen.

Hind limb reaching slightly beyond the elbow of the adpressed fore limb; a continuous series of enlarged keeled scales along each side of the posterior half of the body..... 12. *Draco reticulatus.*

Hind limb reaching the axil or a little beyond; enlarged lateral scales absent or few and far between..... 13. *Draco spilonotus.*

β. Parietal foramen very distinct; hind limb reaching the axil or a little beyond ..... 14. *Draco beccarii.*

b. No wings.

a. Body and tail compressed, crested.

Crest feeble on back and tail .... 15. *Calotes cristatellus.*

Caudal crest high, supported by the neural spines. 16. *Lophura amboinensis.*

β. Body depressed; tail compressed, not crested.

More than 80 transverse rows of ventral scales from gular fold to groin. 17. *Varanus salvator.*

74 transverse rows of ventral scales from gular fold to groin. 18. *Varanus togianus.*

B. Upper surface of head with symmetrical shields.

1. Two pairs of limbs.

a. Tympanum distinct, more or less sunk; fourth toe considerably longer than third.

a. Lower eyelid scaly, without central disk; limbs overlapping when adpressed.

* Dorsal scales pluricarinate; supranasal present.

Dorsal scales tri- or quinquecarinate; hind limb not reaching the axil. 19. *Mabuia multifasciata.*

Dorsal scales very strongly tricarinate; hind limb reaching the axil or beyond. 20. *Mabuia rudis.*

** Dorsal scales smooth or unicarinate.

† 38–50 scales round the middle of the body; no enlarged scale on the heel.

‡ No supranasal; dorsal scales keeled.

Dorsal and lateral scales strongly keeled ..... 21. *Lygosoma tropidonotus.*
Dorsal scales feebly keeled, laterals smooth ..... 22. *Lygosoma nigrilabre.*

‡‡ No supranasal; dorsal scales smooth.

7 or 8 supraoculars; 44–46 scales round the middle of the body.
23. *Lygosoma sarasinorum.*
6 supraoculars; 38–40 scales round the middle of the body.
24. *Lygosoma variegatum.*

‡‡‡ Supranasal present; dorsal scales smooth.
25. *Lygosoma celebense.*

†† 20–26 scales round the middle of the body; an enlarged scale on the heel..... 26. *Lygosoma smaragdinum.*

β. Lower eyelid with a transparent disk.

* Limbs not overlapping when adpressed; no supranasal.

22 scales round the middle of the body ..... 27. *Lygosoma inconspicuum.*
30 scales round the middle of the body ..... 28. *Lygosoma textum.*

** Limbs overlapping when adpressed; supranasal present.

24–26 scales round the middle of the body ..... 29. *Lygosoma cyanurum.*
36–40 scales round the middle of the body ..... 30. *Lygosoma atrocostatum.*

*** Limbs not overlapping when adpressed; supranasal present.
31. *Lygosoma bowringii.*

b. Tympanum distinct, more or less sunk; fourth toe not longer than third.

Frontonasal usually in contact with frontal; ear-opening large.
32. *Lygosoma temminckii.*
Præfrontals forming a median suture; ear-opening small.
33. *Lygosoma parvum.*

c. Tympanum covered with scales ..... 34. *Lygosoma infralineolatum.*

d. Tympanum exposed and superficial; dorsal scales very strongly keeled and ending in a sharp point.
35. *Tropidophorus grayi.*

2. Limbs absent (♀) or hind pair rudimentary and flap-like (♂).
36. *Dibamus novæ-guineæ.*

IV. SNAKES.

A. Eyes under the head-shields.

Præocular in contact with the labials; 20 scales round the body.
37. *Typhlops braminus.*
Præocular separated from the labials by a small shield; 18 scales round the body ..... 38. *Typhlops ater.*

B. Eyes exposed; all the teeth solid.

1. Tail prehensile; ventral and subcaudal shields present; pupil vertical.

a. Upper surface of head with shields; anterior upper labials pitted; scales smooth.

Four upper labials pitted ..... 39. *Python reticulatus.*
Two upper labials pitted ..... 40. *Python molurus.*

b. Upper surface of head covered with small scales; no labial pits; scales keeled ..... 41. *Enygrus carinatus.*

2. Tail not prehensile; parietal shields very small, or separated from each other by an azygous occipital shield.

Ventral shields very small; no azygous occipital. 42. *Cylindrophis rufus.*

Ventrals well developed; a large azygous occipital, in contact with the frontal. 43. *Xenopeltis unicolor.*

3. Tail prehensile; body compressed, covered with uniform, small, juxtaposed, rough scales; no ventral shields. 44. *Chersydrus granulatus.*

4. Tail not prehensile; parietal shields large, forming a suture.

a. Internasal shields distinct from the præfrontals; head distinct from neck.

a. Pupil round; scales in 15 to 21 rows, keeled; anal divided; ventrals fewer than 200.

* Scales in 15 rows.

Scales strongly keeled ..... 45. *Tropidonotus sarasinorum.*

Scales feebly keeled ..... 46. *Tropidonotus celebicus.*

** Scales in 19 rows.

Two superposed anterior temporals; 9 upper labials. 47. *Tropid. trianguligerus.*

A single anterior temporal; 9 upper labials..... 48. *Tropidonotus vittatus.*

Two superposed anterior temporals; 8 upper labials. 49. *Tropidonotus subminiatus.*

*** Scales in 21 rows ..... 50. *Tropid. chrysargoides.*

β. Pupil vertical; scales in 17 or 19 rows.

Scales in 17 rows; subcaudals in two rows ..... 51. *Lycodon aulicus.*

Scales in 19 rows; subcaudals single ..... 52. *Lycodon stormi.*

γ. Pupil round; scales in 13 rows, smooth; ventrals rounded. 53. *Zamenis dipsas.*

δ. Pupil round; scales in 21 to 25 rows; ventrals more than 200.

Scales in 23–25 rows..... 54. *Coluber janseni.*

Scales in 21 rows ..... 55. *Coluber erythrurus.*

ε. Pupil round; scales in 13–15 rows; ventrals angulate laterally, less than 200.

Scales in 15 rows, vertebrals strongly enlarged... 56. *Dendrophis pictus.*

Scales in 13 rows, vertebrals scarcely enlarged... 57. *Dendrelaphis terrificus.*

b. Internasal shields distinct from the præfrontals; head small, not distinct from neck; scales in 15 rows.

a. Parietal separated from labials by temporals; a præocular. 58. *Oligodon waandersii.*

β. Parietal in contact with labials.

Nostril between two nasals; no præocular; præfrontal entering the eye. 59. *Agrophis sarasinorum.*

Nasal single; a præocular ..... 60. *Rhabdophidium forsteni.*

c. Internasals fused with the præfrontals; head small, not distinct from neck; scales in 13 rows.

a. Five upper labials, third and fourth entering the eye.

* Anterior chin-shields in contact with the symphysial.

† Ventrals 130–187.

‡ Frontal three or four times as broad as the supraocular.

Snout pointed; rostral as deep as broad ..... 61. *Calamaria acutirostris.*

Snout rounded; rostral broader than deep ..... 62. *Calamaria nuchalis.*

‡‡ Frontal not more than twice as broad as the supraocular.

Upper portion of rostral as long as or a little longer than its distance from the frontal ..... 63. *Calamaria muelleri.*

Upper portion of rostral hardly half as long as its distance from the frontal. 64. *Calamaria curta.*

†† Ventrals 211–235..... 65. *Calamaria gracilis.*

** First lower labial in contact with its fellow behind the symphysial.

Ventrals 232–265 ..... 66. *Calamaria collaris.*

Ventrals 151–199 ..... 67. *Calamaria virgulata.*

β. Four upper labials, second and third entering the eye; ventrals 135–163 .... 68. *Calamaria linnæi.*

C. Eyes exposed; posterior maxillary teeth grooved.

1. Nostrils superior; nasal shield semidivided and in contact with its fellow behind the rostral.

a. Scales smooth.

Scales in 19 rows; a single internasal (rarely two) 69. *Hypsirhina plumbea.*

Scales in 21 rows; two internasals..... 70. *Hypsirhina matannensis.*

Scales in 21 or 23 rows; a single internasal ..... 71. *Hypsirhina enhydris.*

b. Scales strongly keeled, in 23 or 25 rows. 72. *Cerberus rhynchops.*

2. Nostrils lateral; nasals separated by the internasals.

a. Pupil vertical; scales smooth.

α. Vertebral scales enlarged.

* Two postoculars.

Scales in 17 or 19 rows..... 73. *Dipsadomorphus multimaculatus.*

Scales in 21 or 23 rows; posterior chin-shields not larger than the anterior. 74. *Dipsadomorphus dendrophilus.*

Scales in 21 or 23 rows; posterior chin-shields larger than the anterior. 75. *Dipsadomorphus irregularis.*

** Three postoculars; scales in 19 rows. 76. *Dipsadomorphus flavescens.*

β. Vertebral scales not enlarged ..... 77. *Psammodynastes pulverulentus.*

b. Pupil horizontal; scales smooth..... 78. *Dryophis prasinus.*

c. Pupil round; scales keeled ..... 79. *Chrysopelea ornata.*

D. Eyes exposed; anterior poison-fangs.

1. Upper surface of head covered with shields.

a. Vertebral scales enlarged ..... 80. *Bungarus candidus.*

b. Vertebral scales not enlarged.

Scales in 15 rows on the body; 7 upper labials.. 81. *Naia bungarus.*

Scales in 13 rows; 6 upper labials..... 82. *Doliophis intestinalis.*

2. Upper surface of head covered with small keeled scales. 83. *Lachesis wagleri.*

BATRACHIANS.

I. Upper jaw toothed.

A. Tongue entire, rounded behind..... 1. *Oxyglossus lævis.*

B. Tongue bifid behind.

1. Fingers quite free; belly smooth or indistinctly areolate.

a. Glandular dorso-lateral fold, if present, independent from the supratemporal fold; tips of fingers not or but feebly dilated.

α. Tips of toes dilated into small but very distinct disks.

* Tympanum hidden ..... 2. *Rana kuhlii.*

** Tympanum distinct.

† No dorso-lateral fold.

Tibio-tarsal articulation reaching the tip of the snout, or between the eye and the tip of the snout; toes entirely or nearly entirely webbed. 3. *Rana modesta.*

Tibio-tarsal articulation reaching the nostril, the tip of the snout, or a little beyond the tip of the snout; toes two-thirds or three-fourths webbed; the last three phalanges of the fourth toe extending beyond the fifth toe. 4. *Rana leytensis.*

Tibio-tarsal articulation reaching far beyond the tip of the snout; toes two-thirds webbed ..... 5. *Rana microdisca.*

†† A narrow dorso-lateral fold. 6. *Rana palavanensis.*

β. Tips of toes not dilated ..... 7. *Rana tigrina.*

b. Glandular dorso-lateral fold well developed, continuous with the supratemporal fold; tips of fingers and toes dilated.

a. Sides smooth or with small warts.

First finger extending as far as second; digital disks very small; lateral fold broad ..... 8. *Rana erythræa.*

First finger extending beyond second; digital disks small; lateral fold narrow. 9. *Rana varians.*

First finger not extending quite so far as second; disks of fingers large; lateral fold narrow ..... 10. *Rana everetti.*

β. Sides with large glands; first finger extending as far as second; lateral fold broad ..... 11. *Rana celebensis.*

c. Glandular dorso-lateral fold distinct only anteriorly; tips of fingers and toes strongly dilated ... 12. *Rana macrops.*

2. Fingers with at least a rudiment of web, the tips strongly dilated; belly granulate.

Fingers with a very slight rudiment of web; frontal region rugose. 13. *Rhacophorus leucomystax.*

Outer fingers half-webbed; tibio-tarsal articulation reaching the tip of the snout or beyond ..... 14. *Rhacophorus edentulus.*

Outer fingers two-thirds webbed; tibio-tarsal articulation not reaching the tip of the snout ..... 15. *Rhacophorus monticola.*

II. Jaws toothless.

A. Tips of fingers strongly dilated.

1. No metatarsal tubercles.

Tympanum indistinct, not more than one-third the diameter of the eye; tibio-tarsal articulation reaching the eye or a little beyond. 16. *Sphenophryne celebensis.*

Tympanum feebly distinct, two-thirds to three-fourths the diameter of the eye; tibio-tarsal articulation reaching the shoulder or the tympanum. 17. *Sphenophryne variabilis.*

2. Two metatarsal tubercles, inner large.

Terminal expansions of fingers more than half the diameter of the eye. 18. *Callula baleata.*

Terminal expansions of fingers not half the diameter of the eye. 19. *Callula pulchra.*

B. Tips of fingers not dilated; a large (parotoid) gland behind the eye.

Supraobital bony ridges produced on the occiput. 20. *Bufo biporcatus.*

Supraorbital bony ridges not produced on the occiput; a thick orbito-tympanic bony ridge ..... 21. *Bufo celebensis.*

REPTILIA.

EMYDOSAURIA.

Crocodilidæ.

1. Crocodilus porosus, Schn.

Kema. One skull.
Gorontalo, Macassar (*Meyer*). Pampanna, S. Celebes (*Weber*).

CHELONIA.

Testudinidæ.

2. Cyclemys amboinensis, Daud.

One specimen: Kema. Four specimens: Macassar.
Manado, Macassar (*Meyer*). Macassar (*Beccari*). Macassar, Panjana, S. Celebes (*Weber*).

3. Testudo forstenii, Schleg. & Müll.

One adult and one young: Buol.
Mt. Boliohoeto, near Salamatta, N. Celebes (*Meyer*).
The type specimen is from Gilolo.
Shell of young with strongly serrated anterior and posterior borders, yellowish above and below, with small blackish-brown spots on the dorsal and marginal shields, and a large blotch on each abdominal shield.

LACERTILIA.

Geckonidæ.

4. Gymnodactylus jellesmæ, sp. n. (Plate VII. fig. 1.)

Head large, depressed, oviform; snout longer than the diameter of the orbit, which equals its distance from the ear-opening; forehead concave; ear-opening large, oval, slightly oblique, nearly vertical, measuring about half the diameter of the eye. Limbs rather elongate; digits strong, slightly depressed at the base, strongly compressed in the remaining portion; the basal phalanx with well-developed transverse plates inferiorly. Head granular, the granules largest on the snout, with very small tubercles on the occipital and temporal regions; rostral nearly twice as broad as deep, with ⋀-shaped upper border, with or without median cleft

above; nostril bordered by the rostral, the first labial, and three or four scales; 10 to 12 upper and 10 or 11 lower labials; symphysial triangular, broader than long; two pairs of chin-shields, median largest and forming a suture behind the point of the symphysial; gular granules minute. Body and limbs covered above with small granules intermixed with small roundish, feebly keeled tubercles; lateral abdominal fold very indistinct; ventral scales very small, cycloid, imbricate, smooth, 40 to 45 across the middle of the belly between the lateral folds. No præanal or femoral pores. Tail cylindrical, tapering, covered with uniform small flat scales; a few enlarged, nail-shaped tubercles form transverse series on the upper basal part of the tail. Brown above, with small darker spots and V- or M-shaped cross-bands on the back; a dark temporal streak; tail with dark annuli; lower parts brownish.

	mm.
Total length	115
Head	18
Width of head	11·5
Body	45
Fore limb	20
Hind limb	30
Tail (reproduced)	52

This species differs from *G. marmoratus*, to which the first specimens received from Celebes were referred by Peters and Doria, myself and F. Müller, in the larger ear-opening, the smaller ventral scales, and the total absence of præanal or femoral pores, the lower surface of the thighs being in both sexes covered with uniform granules without any enlarged scales.

Seven specimens: Masarang, Buol, Wankahulu Valley, Kema, and Central Celebes. Obtained in North Celebes by Dr. Meyer and in South-eastern Celebes by Beccari.

It was the intention of my lamented friend Dr. Müller to name this species in honour of Mr. E. J. Jellesma, Resident of Manado, to whom the Drs. Sarasin are indebted for much assistance during their expedition from Manado to Gorontalo and their stay in the Minahassa.

5. Gymnodactylus fumosus, F. Müll. Verh. nat. Ges. Basel, x. 1894, p. 833, fig. (Plate VII. fig. 2.)

Head large, depressed, oviform; snout longer than the diameter of the orbit, which nearly equals its distance from the ear-opening; forehead concave; ear-opening a horizontal cleft, measuring one half to two-thirds the diameter of the eye. Limbs rather elongate; digits strong, slightly depressed at the base, strongly compressed in the remaining portion; the basal phalanx with well-developed transverse plates inferiorly. Head granular, the granules slightly larger on the snout, with few very small tubercles on the temple; rostral nearly twice as broad as deep, subquadrangular, with median cleft above, its upper border in contact with two or three small

shields; nostril bordered by the rostral and three scales, sometimes also by the first upper labial; 9 or 10 upper and 8 or 9 lower labials; symphysial triangular, broader than long; a pair of large chin-shields forming a suture behind the point of the symphysial, with one or two much smaller shields on each side. Body and limbs covered above with small granules and few, widely scattered, roundish, flat and smooth or faintly keeled, small tubercles; a well-marked latero-ventral fold; ventral scales small, cycloid, imbricate, smooth, 35 to 40 across the middle of the belly between the lateral folds. Male with a pubic groove and a long continuous series of 42 præano-femoral pores, pierced in enlarged scales which are traceable in the female. Tail cylindrical, tapering, covered with small flat scales which are larger on the lower surface; a few enlarged, nail-shaped scales on the upper surface. Grey, grey-brown, or pinkish brown above, with blackish spots which may form irregular cross-bands on the body; a more or less distinct dark streak from the eye to the shoulder; lower parts whitish or brownish, uniform or with dark dots.

	mm.
Total length	127
Head	19
Width of head.....	13
Body	42
Fore limb.....	22
Hind limb	28
Tail	66

Four specimens: Bone Mts. ("Boelawa," Müller, *errore*), Rurukan, Masarang.

6. Hemidactylus frenatus, D. & B.

Numerous specimens: Coast between Paguat and Gorontalo, Mapane (Tomini Gulf), Wangkahulu Valley (Paguat), Buol, Kema, Enrekang, Macassar.

Manado, Minahassa (*Meyer*). Macassar, Kandari (*Beccari*). Macassar, Pare-Pare, Luhu (*Weber*).

7. Hemidactylus platyurus, Schn.

Several specimens: Buol, Pare-Pare, Macassar.

Manado, Macassar (*Meyer*). Kandari (*Beccari*). Pare-Pare, Tempe (*Weber*).

8. Gehyra mutilata, Wiegm.

Several specimens: Buol, Kema, coast between Paguat and Gorontalo, C. Celebes, Macassar.

Manado, Minahassa (*Meyer*). Macassar (*Weber*).

9. Lepidodactylus lugubris, D. & B.

Four specimens: Tomohon, Rurukan.

Kandari (*Beccari*).

10. GECKO VERTICILLATUS, Laur.

One specimen: Kema. Four specimens: Macassar.
Manado, Minahassa, Macassar (*Meyer*). Macassar (*Beccari*). Macassar (*Weber*).

The specimen from Kema has been erroneously referred to *G. stentor* by Dr. Müller.

11. GECKO MONARCHUS, Schleg.

Two specimens: Macassar.
Manado, Minahassa (*Meyer*). Kandari (*Beccari*).

AGAMIDÆ.

12. DRACO RETICULATUS, Gthr.

One female specimen: C. Celebes, Luhu, 3300 ft.

13. DRACO SPILONOTUS, Gthr. (Plate VIII.)

Numerous specimens: Kema, Tomohon.
Manado (*Meyer*, *Bruijn*).

Head small; snout as long as or a little shorter than the orbit; nostril lateral, directed outwards; tympanum sometimes scaly, usually naked; no parietal foramen (pineal eye). Upper head-scales very unequal, keeled; 4 to 6 series of very small scales along the interorbital region between the enlarged, strongly keeled supra-oculars; nasal shield separated from the rostral and from the first labial by one, rarely by two, series of scales; 6 to 8 upper and as many lower labials. The male's gular appendage one-half to two-thirds the length of the head. A very slight nuchal crest. Dorsal scales subequal, smooth or faintly keeled, slightly larger than the ventrals, which are strongly keeled; no dorso-lateral series of enlarged scales, although two or three such scales may be exceptionally present. The fore limb stretched forwards extends much beyond the tip of the snout; the hind limb reaches the axil or the shoulder.

The late Dr. Müller has drawn attention to the differences in colour which exist between specimens of this species. These differences are, however, much greater still, for the female specimens referred by Peters and Doria, Müller, and others to *D. lineatus* belong to this species. Head, body, and limbs of a bluish grey, marbled with dark grey or brown; a black nuchal spot; sides of neck usually reticulated with dark bluish grey; gular appendage of male lemon-yellow; throat of females speckled with black; wing-membranes of males lemon-yellow or deep orange, speckled all over with black, or with small black spots on the basal portion, unspotted below; wing-membranes of females orange with black spots forming more or less regular cross-bands, or nearly entirely black with white longitudinal lines and mere traces of orange cross-bars; their lower surface immaculate or with a few small black spots.

	♂. mm.	♀. mm.
Total length	182	242
Head	13	16
Width of head	8·5	11
Body	49	60
Fore limb	29	32
Hind limb	35	41
Tail	120	166

14. Draco beccarii, Peters & Doria. (Plate IX.)

Numerous specimens: Luhu, South Coast near Bonthain, Macassar.

Kandari, S.E. Celebes (*Beccari*). S. Celebes (*Everett*).

Head small; snout as long as the orbit; nostrils lateral, directed outwards; tympanum usually naked, rarely scaly; parietal (pineal) foramen distinct. Upper head-scales very unequal, keeled; 2 to 4 series of small scales along the interorbital region between the enlarged, strongly keeled supraoculars; nasal shield separated from the rostral and from the first labial by two, rarely by one, series of scales; 8 to 10 upper and as many lower labials. The male's gular appendage two-thirds to three-fourths the length of the head. A very slight nuchal crest. Dorsal scales subequal, more or less distinctly keeled, rarely nearly smooth, a little larger than the ventrals, which are strongly keeled; no lateral series of enlarged scales. The fore limb stretched forward extends much beyond the tip of the snout; the hind limb reaches the axil or the shoulder. Pale greyish above, with brown marblings or wavy cross-bars; black nuchal spot small or absent; female with black lines on the head, one of which passes through the eye and forms an angle on the occiput; sides of head, in the male, reticulated with dark grey; gular appendage of male bright orange; throat of female with black dots; wing-membranes of male orange, rusty brown or grey at the base, blackish towards the outer border, with two or more large black spots above and usually one or two below the anterior border; wing-membranes of female orange or yellow, spotted and dotted with black, with two to four black cross-bands on the outer portion and one or two black spots below, near the anterior border.

	♂. mm.	♀. mm.
Total length	205	217
Head	15	15
Width of head	9	10
Body	55	60
Fore limb	33	34
Hind limb	40	42
Tail	135	142

The specimens that have been referred to *D. volans* and *D. maculatus* will, on proper examination, probably turn out to belong to *D. beccarii*.

15. Calotes cristatellus, Kuhl.

Four specimens: Tomohon. Three specimens: Kema. Two specimens: Kottabangon.

Manado (*Meyer*). Manado, Kandari (*Bruijn*, *Beccari*). Bantimurong, S. Celebes (*Weber*).

Dr. Müller has expressed his doubts as to the specific distinctness of *C. celebensis*. After examining the material collected by the Drs. Sarasin, I agree with him, and no longer think that form can be regarded as more than a variety of *C. cristatellus*, with which it is connected by the form named *intermedia* by Peters and Doria. The specimens recorded above have 57 to 65 scales round the middle of the body, and the tympanum measures two-fifths to one-half the diameter of the orbit.

Calotes jubatus is represented in the British Museum by a specimen labelled "Manado: Meyer." As Dr. Meyer does not indicate this species in the list of Reptiles collected by him, I suppose some mistake has taken place, and I therefore leave out this *Calotes* from the Catalogue of Celebes Reptiles.

16. Lophura amboinensis, Schloss.

Paloppo (Luhu), C. Celebes. A single specimen.

Posso, C. Celebes; Togian Ids. (*Meyer*). Tempe and Pampanna, S. Celebes (*Weber*).

The single specimen, an adult male, agrees in the coloration with Peters's *L. celebensis*, but the enlarged scales on the neck and body are nothing like the size of the tympanum. The largest scale on the side of the body measures 5 millim., the tympanum 9. Seven femoral pores on one side, eleven on the other.

Varanidæ.

17. Varanus salvator, Laur.

Two specimens: Kema.

Manado, Gorontalo, Posso (*Meyer*). Manado, Kandari (*Bruijn*, *Beccari*).

18. Varanus togianus, Peters.

Timotto, one of the Togian Ids., in the Bay of Tomini (*Meyer*). Macassar and Tello, near Macassar (*Weber*).

Scincidæ.

19. Mabuia multifasciata, Kuhl.

Numerous specimens: Kema, Tomohon, Kingdom of Luhu, Loka.

Manado, Minahassa, Gorontalo (*Meyer*). Macassar, Kandari, Manado (*Beccari*, *Bruijn*). Macassar (*Weber*).

20. Mabuia rudis, Blgr.

One specimen: Kema. One specimen: Tomohon. Two specimens: Macassar.

Luhu (*Weber*).

21. Lygosoma tropidonotus, sp. n. (Plate X. fig. 1.)

Section *Hinulia*. Habit lacertiform; the distance between the end of the snout and the fore limb contained once and one-fifth in the distance between axilla and groin. Snout short, obtuse; supraocular region much swollen. Lower eyelid scaly. Nostril pierced in a single nasal; no supranasal; two superposed loreal shields behind the nasal, separated from the lower præocular by a third loreal; rostral forming a straight suture with the frontonasal, which is nearly twice as broad as long and forms a narrow suture with the frontal; latter shield twice as long as broad, much narrowed behind, in contact with the three anterior supraoculars; six supraoculars, first nearly twice as long as second; ten supraciliaries; frontoparietals and interparietal distinct, subequal in size; parietals forming a short suture behind the interparietal; nuchal present on one side; fourth, fifth, and sixth upper labials below the eye. Ear-opening large, oval, a little smaller than the eye-opening; no auricular lobules. 42 scales round the middle of the body; lateral scales smallest; dorsal and lateral scales strongly keeled. A pair of enlarged præanals. The hind limb reaches a little beyond the shoulder. Digits elongate, compressed; subdigital lamellæ unicarinate, 27 under the fourth toe. Blackish brown above, with irregular transverse series of small, round, yellowish-white spots; sides of head and neck with yellowish-white vertical bars; limbs and tail with light cross-bars; lower parts brownish white.

	mm.
Total length (tail in process of regeneration)..	118
Head	14
Width of head	10
Body	47
Fore limb	23
Hind limb	36

Kingdom of Luhu, Central Celebes, 1200 feet. A single specimen.

22. Lygosoma nigrilabre, Gthr.

Lygosoma (*Hinulia*) *amabile*, F. Müller, Verh. nat. Ges. Basel, x. 1894, p. 833.

Habit lacertiform; the distance between the end of the snout and the fore limb contained once and one-sixth to once and one-third in the distance between axilla and groin. Snout short, obtuse; supraocular region much swollen. Lower eyelid scaly. Nostril pierced in a single nasal; no supranasal; two superposed loreal shields behind the nasal, the lower usually in contact with the lower præocular; rostral forming a straight suture with the frontonasal, which is twice as broad as long; prefrontals usually forming a median suture, rarely meeting by their inner angles; frontal as long as or a little shorter than frontoparietals and interparietal together, more or less narrowed posteriorly, in contact with the three anterior

15. Calotes cristatellus, Kuhl.

Four specimens: Tomohon. Three specimens: Kema. Two specimens: Kottabangon.

Manado (*Meyer*). Manado, Kandari (*Bruijn*, *Beccari*). Bantimurong, S. Celebes (*Weber*).

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Two specimens: Kema.

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Scincidæ.

19. Mabuia multifasciata, Kuhl.

Numerous specimens: Kema, Tomohon, Kingdom of Luhu, Loka.

Manado, Minahassa, Gorontalo (*Meyer*). Macassar, Kandari, Manado (*Beccari*, *Bruijn*). Macassar (*Weber*).

20. Mabuia rudis, Blgr.

One specimen: Kema. One specimen: Tomohon. Two specimens: Macassar.

Luhu (*Weber*).

21. Lygosoma tropidonotus, sp. n. (Plate X. fig. 1.)

Section *Hinulia*. Habit lacertiform; the distance between the end of the snout and the fore limb contained once and one-fifth in the distance between axilla and groin. Snout short, obtuse; supraocular region much swollen. Lower eyelid scaly. Nostril pierced in a single nasal; no supranasal; two superposed loreal shields behind the nasal, separated from the lower præocular by a third loreal; rostral forming a straight suture with the frontonasal, which is nearly twice as broad as long and forms a narrow suture with the frontal; latter shield twice as long as broad, much narrowed behind, in contact with the three anterior supraoculars; six supraoculars, first nearly twice as long as second; ten supraciliaries; frontoparietals and interparietal distinct, subequal in size; parietals forming a short suture behind the interparietal; nuchal present on one side; fourth, fifth, and sixth upper labials below the eye. Ear-opening large, oval, a little smaller than the eye-opening; no auricular lobules. 42 scales round the middle of the body; lateral scales smallest; dorsal and lateral scales strongly keeled. A pair of enlarged præanals. The hind limb reaches a little beyond the shoulder. Digits elongate, compressed; subdigital lamellæ unicarinate, 27 under the fourth toe. Blackish brown above, with irregular transverse series of small, round, yellowish-white spots; sides of head and neck with yellowish-white vertical bars; limbs and tail with light cross-bars; lower parts brownish white.

	mm.
Total length (tail in process of regeneration)..	118
Head	14
Width of head	10
Body	47
Fore limb	23
Hind limb	36

Kingdom of Luhu, Central Celebes, 1200 feet. A single specimen.

22. Lygosoma nigrilabre, Gthr.

Lygosoma (*Hinulia*) *amabile*, F. Müller, Verh. nat. Ges. Basel, x. 1894, p. 833.

Habit lacertiform; the distance between the end of the snout and the fore limb contained once and one-sixth to once and one-third in the distance between axilla and groin. Snout short, obtuse; supraocular region much swollen. Lower eyelid scaly. Nostril pierced in a single nasal; no supranasal; two superposed loreal shields behind the nasal, the lower usually in contact with the lower præocular; rostral forming a straight suture with the frontonasal, which is twice as broad as long; prefrontals usually forming a median suture, rarely meeting by their inner angles; frontal as long as or a little shorter than frontoparietals and interparietal together, more or less narrowed posteriorly, in contact with the three anterior

supraoculars; six supraoculars, first much longer than second; 11 to 13 supraciliaries; frontoparietals and interparietal distinct, subequal, or former longer than latter; parietals forming a short suture behind the interparietal; nuchals absent or one pair; fourth and fifth, fifth and sixth, or fourth, fifth, and sixth upper labials below the eye. Ear-opening large, oval, a little smaller than the eye-opening; no auricular lobules. 40 to 50 scales round the middle of the body; dorsals largest and feebly keeled, laterals smallest. A pair of enlarged præanals. The hind limb reaches the axilla, the shoulder, or a little beyond the latter. Digits elongate, compressed; subdigital lamellæ unicarinate, 20 to 27 under the fourth toe. Tail once and a half to once and three-fourths the length of head and body. Brown above, with very variable markings. A more or less distinct dorso-lateral series of yellowish spots; back sometimes with blackish cross-bars; a black lateral streak on the head and neck, passing through the eye, often extending along the side of the body, where it may be edged above with a yellowish streak, replacing the dorso-lateral series of yellowish spots; a large black spot, or ocellus with light centre, sometimes present above the shoulder; the flanks may be dotted with whitish; upper lip yellowish white, uniform or with a black streak, or with blackish spots or vertical bars; a black streak often present along each side of the base of the tail. Lower parts yellowish white, throat sometimes bluish in males; throat and breast sometimes much spotted with black.

	mm.
Total length	235
Head	21
Width of head	15
Body	74
Fore limb	35
Hind limb	52
Tail	140

The type specimen was obtained at Manado by Dr. A. B. Meyer. The Drs. Sarasin's specimens, 24 in number, are from the Sudara Volcano, Tomohon, Matinang Mts. (2600–3400 ft.), Kingdom of Luhu (1000–1600 ft.), L. Posso and Mapane on the Tomini Gulf. Specimens were also obtained in South Celebes by Mr. Everett.

As the description shows, this species varies remarkably in scaling and in coloration. The Drs. Sarasin's specimens have from 40 to 48 scales round the body, and from 20 to 27 lamellæ under the fourth toe. One specimen with 40 scales agrees in coloration with the type, and others also show the absence of correlation between the two characters. I am therefore unable to maintain as a distinct species Müller's *L. amabile*, which was founded on specimens with 40 scales, 21 lamellæ under the fourth toe, and a large black spot above the shoulder.

23. Lygosoma sarasinorum, sp. n. (Plate X. fig. 2.)

Section *Hinulia*. Habit lacertiform; the distance between the

end of the snout and the fore limb contained once and one-sixth to once and one-third in the distance between axilla and groin. Snout short, obtuse; supraocular region much swollen. Lower eyelid scaly. Nostril pierced in a single nasal; no supranasal; two superposed loreals behind the nasal, the lower in contact with the lower præocular; rostral forming a straight or slightly curved suture with the frontonasal, which is twice as broad as long; præfrontals forming a median suture; frontal as long as frontoparietals and interparietal together, much narrowed behind, in contact with the three or four anterior supraoculars; seven or eight supraoculars, first much longer than second; twelve to fifteen supraciliaries; frontoparietals and interparietal distinct, subequal in size; parietals forming a short suture behind the interparietal; no nuchals; fifth and sixth, or fourth, fifth, and sixth upper labials below the eye. Ear-opening large, oval, a little smaller than the eye-opening; no auricular lobules. 44 or 46 smooth scales round the middle of the body, laterals smallest. A pair of enlarged præanals. The hind limb reaches the shoulder or a little beyond. Digits elongate, compressed; subdigital lamellæ unicarinate, 22 to 24 under the fourth toe. Tail about twice as long as head and body. Brown above, with small darker spots and more or less distinct, wavy, yellowish-brown cross-bars; a more or less distinct dorso-lateral series of small yellowish spots; limbs with dark brown or blackish vertical bars; a black stripe on each side of the pelvis and the base of the tail, bordered above by a yellowish streak or a series of yellowish spots; lower parts yellowish white.

	mm.
Total length	236
Head	18
Width of head	12
Body	58
Fore limb	24
Hind limb	46
Tail	160

Six specimens were obtained in Central Celebes, in the low-land and in the hills up to an altitude of 650 feet.

24. Lygosoma variegatum, Ptrs.

Numerous specimens: Loka, Bonthain Peak, 3800 feet. Bantimurong, near Maros, Loka (*Weber*). Indrulaman (*Everett*).

The Celebes specimens have 38 or 40 scales round the middle of the body, and 20–24 lamellæ under the fourth toe. The dorso-lateral series of light spots are often confluent and form a pair of yellowish streaks along the neck and body; the throat of the males is often blue or bluish.

Peters has recorded *Lygosoma fasciatum*, Gray, a Philippine species of the Section *Hinulia*, as having been obtained by Dr. A. B. Meyer at Gorontalo. Not having the means of verifying the determination, I prefer to leave the species out of this list.

25. Lygosoma celebense, F. Müll. (Plate XI. fig. 1.)

Lygosoma (*Otosaurus*) *celebense*, F. Müll. Verh. nat. Ges. Basel, x. 1894, p. 836, fig.

Section *Otosaurus*. Habit lacertiform; the distance between the end of the snout and the fore limb contained once and one-fifth to once and a half in the distance between axilla and groin. Snout short, obtuse. Lower eyelid scaly. Nostril pierced in a single nasal; two pairs of superposed loreals; a large supranasal, forming a suture with its fellow, or separated from it by the fronto-nasal, which is small, situated between the internasals and the præfrontals, and in contact with the frontal; latter as long as or a little shorter than frontoparietals and interparietal together, in contact with the three anterior supraoculars; six supraoculars, first much longer than second; 11 to 13 supraciliaries; fronto-parietals and interparietal distinct, subequal; parietals forming a short suture behind the interparietal; no nuchals; fourth and fifth upper labials below the eye. Ear-opening large, oval, smaller than the eye-opening; no auricular lobules. 40 to 44 smooth scales round the middle of the body, laterals smallest. A pair of enlarged præanals. The hind limb reaches the wrist or the elbow of the adpressed fore limb. Digits elongate, compressed; subdigital lamellæ unicarinate, 17 to 20 under the fourth toe. Tail once and one-third to once and three-fifths the length of head and body. Pale brown or reddish above, spotted or tessellated with dark brown, or dark brown with yellowish-brown spots or irregular cross-bars; an interrupted blackish dorso-lateral streak may be present; lower parts whitish, uniform or throat speckled with black; throat sometimes bluish.

	mm.
Total length	144
Head	13
Width of head	8
Body	43
Fore limb	17
Hind limb	25
Tail	88

Seven specimens: Mahawu Volcano, near Tomohon; Masarang Volcano; Upper Bone Valley.

26. Lygosoma smaragdinum, Less.

L. acutirostre, Oudemans, in Semon, Zool. Forsch. p. 141, fig. (1894).

10 specimens: Buol, Mapane (Tomini Gulf), Pare-Pare, Macassar.

Minahassa, Macassar (*Meyer*). Macassar (*Beccari*, *Bruijn*).

The specimens vary in scaling and in coloration. Some are of the usual emerald-green colour, without or with small black spots; others olive or pale brown, with small black spots or with two dorsal series of very large black blotches. Eight have six upper

labials anterior to the suboculars, two have seven; in one the interparietal separates the parietals; and two (one green, one brown) have 20 scales round the body, the others 22. The number of scales round the body thus varies from 20 to 26 in this species; and Prof. Weber was therefore well advised in referring to it his specimen from Saleyer with 20 scales, seven anterior upper labials, and the parietals completely separated by the interparietal—specimen which afterwards became the type of Oudemans's *L. acutirostre*.

27. Lygosoma inconspicuum, F. Müll. (Plate XI. fig. 2.)

Lygosoma (*Leiolepisma*) *inconspicuum*, F. Müll. Verh. nat. Ges. Basel, x. 1894, p. 837.

Section *Liolepisma*. Body rather elongate; the distance between the end of the snout and the fore limb contained once and three-fifths in the distance between axilla and groin. Snout pointed. Lower eyelid with an undivided transparent disk. Nostril pierced in a single nasal; no supranasal; frontonasal broader than long, broadly in contact with the rostral and with the frontal; latter little longer than the frontoparietal, and in contact with the two anterior supraoculars; four supraoculars, first and fourth longest; eight supraciliaries; frontoparietal single, longer than the interparietal; parietals forming a suture behind the interparietal; three pairs of nuchals; fifth upper labial below the centre of the eye. Ear-opening oval; smaller than the eye-opening; no auricular lobules. 22 smooth scales round the middle of the body; dorsals largest, especially the two median series. A pair of enlarged præanals. The adpressed limbs fail to meet. Digits subcylindrical; subdigital lamellæ smooth, 18 under the fourth toe. Grey above; a dark brown lateral stripe along the head and body, narrow and faint on the head; a few dark brown spots on the occiput and nape, one pair on the parietal shields and another on the nuchals; lower parts white, chin grey.

	mm.
Total length	106
Head	10
Width of head	6
Body	40
Fore limb	11
Hind limb	15
Tail (reproduced)	56

A single specimen: Bone Mts., 3900 feet.

28. Lygosoma textum, F. Müll. (Plate XI. fig. 3.)

Lygosoma (*Leiolepisma*) *textum*, F. Müll. Verh. nat. Ges. Basel, x. 1894, p. 838.

Section *Liolepisma*. Body rather elongate, the distance between the end of the snout and the fore limb contained once and one-third to once and two-thirds in the distance between axilla and

groin. Snout short, pointed. Lower eyelid with an undivided transparent disk. Nostril pierced in a single nasal; no supranasal; frontonasal nearly twice as broad as long, forming a broad suture with the rostral; prefrontals forming a median suture; frontal nearly as long as frontoparietals and interparietal together, in contact with the first and second supraoculars; five supraoculars, first longest; eight or nine supraciliaries; frontoparietals and interparietal distinct, subequal; parietals forming a suture behind the interparietal; no enlarged nuchals; fourth and fifth upper labials below the eye. Ear-opening oval, smaller than the eye-opening; no auricular lobules. 30 or 32 smooth scales round the middle of the body, laterals smallest. A pair of enlarged præanals. The adpressed limbs fail to meet. Digits subcylindrical; subdigital lamellæ smooth, 13 to 15 under the fourth toe. Reddish brown above, freckled with dark brown, or dark brown with light dots or small spots; a more or less distinct blackish lateral stripe; lower parts yellowish white, throat and sides more or less speckled with dark brown.

	mm.
Total length	95
Head	9
Width of head	5
Body	33
Fore limb	10
Hind limb	13
Tail (reproduced)	53

The type specimen was obtained on the summit of the Sudara Volcano (4450 feet); three specimens were further obtained in the Masarang Range.

29. Lygosoma cyanurum, Less.

Several specimens: Kema, Paloppo, Posso.

Minahassa, Gorontalo, Tomini Bay (*Meyer*). Kandari (*Beccari*). Luhu (*Weber*).

The specimen from Kandari, S.E. Celebes, referred to *L. baudinii* by Peters and Doria, and which has been kindly sent to me for inspection by Dr. Gestro, proves to belong to this species.

30. Lygosoma abrocostatum, Less.

Several specimens: Buol (N. Celebes), Paloppo (C. Celebes), and south coast of N. Celebes, near Paguat and Malibagu.

Gorontalo (*Meyer*). Kandari (*Beccari*).

31. Lygosoma bowringi, Gray.

This species was known from Hong Kong, Burma, Singapore, and Borneo (*L. whiteheadi*, Mocquard). Two specimens were obtained at Buol by the Drs. Sarasin. One has 28 scales round the middle of the body, the other 26.

32. Lygosoma temminckii, D. & B.

This species appears to be common in the mountains of Java; it has been found at Padang, Sumatra, by Prof. M. Weber; and we are now able to add Celebes to its habitat, three specimens having been brought from the Masarang by the Drs. Sarasin.

33. Lygosoma parvum, sp. n. (Plate XI. fig. 4.)

Section *Homolepida*. Body much elongate, limbs weak; the distance between the end of the snout and the fore limb is contained once and two-thirds in the distance between axilla and groin. Snout short, obtuse. Lower eyelid scaly. Nostril pierced in the nasal; no supranasal; frontonasal twice as broad as long, forming a broad suture with the frontal; præfrontals forming a median suture; frontal nearly as long as frontoparietals and interparietal together, in contact with the first and second supraoculars; four supraoculars; eight supraciliaries; frontoparietals and interparietal distinct, latter a little smaller than the former; parietals forming a suture behind the interparietal; no enlarged nuchals; third to fifth upper labials below the eye, from which they are separated by a series of scales. Ear-opening roundish, much smaller than the eye-opening; no auricular lobules. 30 smooth scales round the middle of the body, ventrals largest. A pair of slightly enlarged præanals. The length of the hind limb equals the distance between the centre of the eye and the fore limb; fourth toe not longer than third, with 10 smooth lamellæ inferiorly. Tail little longer than head and body, gradually tapering to a fine point. Dark brown above, with yellowish-brown dots on the sides; pale brown inferiorly.

	mm.
Total length	78
Head	8
Width of head	5
Body	28
Fore limb	7
Hind limb	10
Tail	42

A single specimen from Luhu, Central Celebes, between 1000 and 1600 feet.

This species is closely allied to *L. temminckii*, but distinguished by the much smaller ear-opening and the separation of the frontonasal from the frontal. The latter character is, however, not absolutely distinctive, since out of about one hundred Javan specimens of *L. temminckii* I have found two in which the præfrontals form a short median suture.

34. Lygosoma infralineolatum, Gthr.

Habit lacertiform; the distance between the end of the snout and the fore limb contained once and two-fifths to once and three-fourths in the distance between axilla and groin. Snout

moderately long, pointed. Lower eyelid with an undivided transparent disk. Nostril pierced in the centre of the nasal; no supranasal; frontonasal broader than long, forming a suture with the rostral and with the frontal; præfrontals small; frontal a little longer than the frontoparietal, in contact with the first and second supraoculars; four supraoculars, first and fourth longest; seven to nine supraciliaries; frontoparietal single; interparietal distinct; parietals forming a suture behind the interparietal; two or three pairs of nuchals; fourth and fifth or fifth and sixth upper labials largest and below the eye. Ear concealed under the scales, but indicated by a depression. 22 smooth scales round the middle of the body, those of the two vertebral series much broader than the others. A pair of enlarged præanals. The adpressed limbs fail to meet, meet, or slightly overlap. Digits moderately long, strongly compressed distally; subdigital lamellæ smooth, 18 to 25 under the fourth toe. Tail once and a half as long as head and body. Yellowish, with four black stripes, the median pair extending to the supraoculars, the lateral to the eyes; or dark brown with a golden or silvery vertebral stripe commencing from the snout and a more or less distinct light dorso-lateral stripe; or pale bronzy, with a lighter black-edged stripe along each side of the back; digits with brown cross-bars; whitish beneath, with or without brown longitudinal lines running between the series of scales; throat sometimes dark brown.

	mm.
Total length	92
Head	10
Width of head	6
Body	39
Fore limb	12
Hind limb	16
Tail (reproduced)	43

Ten specimens: wood near Dumoga besar; Kema; Buol; Bungi; Sosso; Macassar.

Siao (Sangir Is.), Manado (*Meyer*). I suspect the specimen from Gorontalo, referred by Peters to *L. quadrivittatum*, will prove to belong to this species.

L. quadrivittatum (with 18 rows of scales) is now represented in the British Museum by two specimens from Sandakan, North Borneo, presented by Mr. Douglas Cator and Governor C. V. Creagh.

35. Tropidophorus grayi, Gthr.

Two specimens: Kingdom of Luhu, C. Celebes.
Luhu (*Weber*).

Dibamidæ.

36. Dibamus novæ-guineæ, D. & B.

Six specimens: Tomohon and Rurukan.
Luhu (*Weber*).

OPHIDIA.

Typhlopidæ.

37. Typhlops braminus, Daud.

Two specimens: Kema.
Manado (*Meyer*).

38. Typhlops ater, Schleg.

A single specimen, 165 millim. long, from Tomohon, has been referred to this species by Dr. Müller, and there can be no doubt his identification is correct. The species was previously known from Java and Ternate.

I cannot help thinking that Peters's *T. conradti*, from North Celebes, is based on a specimen of this species in which the division of the præocular shield has been overlooked.

Boidæ.

39. Python reticulatus, Schn.

A single specimen: Kema.
Minahassa, Gorontalo, Macassar (*Meyer*). Kandari (*Beccari*).

40. Python molurus, L.

Macassar (*Meyer*).

41. Enygrus carinatus, Schn.

Minahassa (*Meyer*).

Ilysiidæ.

42. Cylindrophis rufus, Laur.

Four specimens: Tomohon and southern slope of Matinang Mts., 3300 feet.
Macassar, Manado (*Meyer*). Manado (*Bruijn*). Tempe (*Weber*).

Xenopeltidæ.

43. Xenopeltis unicolor, Reinw.

Two specimens: Kema (V. 164, 164; C. 25, 26).
Manado, Kandari (*Bruijn, Beccari*).

Colubridæ.

Acrochordinæ.

44. Chersydrus granulatus, Schn.

Three specimens: Kema and Macassar.
Macassar (*Beccari*).

COLUBRINÆ.

45. TROPIDONOTUS SARASINORUM, Blgr. (Plate XII. fig. 1.)

Tropidonotus sarasinorum, Boulenger, Ann. & Mag. N. H. (6) xvii. 1896, p. 393.

Maxillary teeth 25, the posterior very feebly enlarged. Snout rather prominent, obtusely truncate; eye moderate. Rostral much broader than deep, not visible from above; internasals as long as broad, as long as the præfrontals; frontal twice as long as broad, longer than its distance from the end of the snout, shorter than the parietals; loreal as long as deep; one præ- and three postoculars; temporals 1+2 or 3; eight upper labials, third, fourth, and fifth entering the eye; four lower labials in contact with the anterior chin-shields, which are shorter than the posterior. Scales in 15 rows, all strongly keeled. Ventrals 137–141; anal divided: subcaudals 65–75. Reddish brown anteriorly, with more or less distinct blackish cross-bands and a dark nuchal blotch, connected with a dark streak on each side of the head along the upper border of the labials; latter whitish, speckled or vermiculate with brown; body olive or dark grey posteriorly; belly yellow, reddish on the sides, dotted with blackish; posterior ventrals and subcaudals, in the male, dark grey.

Total length 530 millim.; tail 150.

Two specimens, male (V. 141; C. 75) and young (V. 137; C. 65), were obtained by the Drs. Sarasin at Loka, Bonthain Peak, at an elevation of about 3800 feet.

This species is intermediate between *T. picturatus*, Schleg., and *T. celebicus*, Peters & Doria.

46. TROPIDONOTUS CELEBICUS, Ptrs. & Doria. (Plate XII. fig. 2.)

Maxillary teeth 20, the posterior very feebly enlarged. Snout scarcely prominent, truncate; eye moderate. Rostral twice as broad as deep, not visible from above; internasals a little broader than long, a little shorter than the præfrontals; frontal once and two-thirds to once and four-fifths as long as broad, longer than its distance from the end of the snout, shorter than the parietals; loreal as long as deep; one præ- and three postoculars; temporals 1+2; eight upper labials, third, fourth, and fifth entering the eye; four lower labials in contact with the anterior chin-shields, which are shorter than the posterior. Scales in 15 rows, feebly keeled, smooth on the anterior part of the body. Ventrals 125–142; anal divided; subcaudals 45–53. Brown or blackish above, with or without two irregular ochraceous stripes; nape black, with an orange cross-band behind, and a yellow bar or two yellow spots just behind the parietals; a few light cross-bands may be present on the neck; upper lip white, speckled or powdered with brown; yellowish white beneath, uniform or dotted with black.

Total length 450 millim.; tail 90.

The type specimen came from Kandari, South-eastern Celebes

(Beccari collection); a male specimen (V. 125; C. 53) was obtained at Buol by the Drs. Sarasin, and a female (V. 142; C. 45) in Southern Celebes, at an altitude of 2000 feet, by Mr. Everett.

47. TROPIDONOTUS TRIANGULIGERUS, Boie.

Macassar (*Meyer*).

A single specimen (♂, V. 150; C. 72) was collected in Southern Celebes, at an altitude of 2000 feet, by Mr. Everett.

48. TROPIDONOTUS VITTATUS, L.

Manado (*Meyer*).

The specimens preserved in the British Museum are apparently referred to *T. quincunciatus* in Dr. Meyer's list.

49. TROPIDONOTUS SUBMINIATUS, Schleg.

Manado (*Meyer*). *T. manadensis*, Gthr.

50. TROPIDONOTUS CHRYSARGOIDES, Gthr.

10 specimens: Bone Valley (E. of Gorontalo), Kema, Tomohon. Manado (*Meyer*). Manado (*Bruijn*).

The fine series collected by the Drs. Sarasin shows that *T. callistus*, Gthr., is nothing but the young of *T. chrysargoides*, the short head and brilliant coloration of the former being juvenile characters which gradually disappear with age. Two to four postoculars; temporals 2+2 or 2+3; eight or nine upper labials, fourth and fifth, fifth and sixth, or fourth, fifth, and sixth entering the eye. Ventrals 148–160; subcaudals 70–85.

51. LYCODON AULICUS, L.

A single specimen from Macassar.

Macassar (*Meyer*). Tempe (*Weber*).

52. LYCODON STORMI, Bttgr. (Plate XII. fig. 3.)

Head strongly depressed; eye small. Rostral broader than deep, just visible from above; internasals much shorter than the præfrontals, which are longer than broad; frontal once and a half as long as broad, as long as its distance from the rostral or the tip of the snout, much shorter than the parietals; loreal a little longer than deep, not entering the eye, not touching the internasal; one præocular, not reaching the frontal; two postoculars (the upper, in one specimen, fused with the supraocular); temporals small, 1+3+4, or 3+4+4; eight or nine upper labials, third and fourth or third, fourth, and fifth entering the eye; five lower labials in contact with the anterior chin-shields, which are longer than the posterior. Scales smooth, in 19 rows. Ventrals 217–231, angulate laterally; anal entire; subcaudals 73–78, all single. Slate-colour or dark brown, with whitish annuli speckled with black, the white most marked on the lower surface; 23 annuli on the body.

Total length 720 millim.; tail 135.

The type specimen, described by Boettger, came from Celebes.

Two specimens from Buol are in the Drs. Sarasin's collection.

53. ZAMENIS DIPSAS, Schleg.

Snout scarcely projecting, obtuse; eye very large. Rostral broader than deep, just visible from above; internasals shorter than the præfrontals; frontal once and a half to once and three-fifths as long as broad, as long as or longer than its distance from the end of the snout, a little shorter than the parietals; loreal as long as deep or a little longer than deep; præocular single or divided, not touching the frontal, with a small subocular below it; two postoculars; temporals 1+2 or 2+2; eight upper labials, fourth and fifth entering the eye; four or five lower labials in contact with the anterior chin-shields; posterior chin-shields longer than the anterior, and in contact anteriorly. Scales smooth, in 13 rows. Ventrals 187–197; anal entire; subcaudals 102–139. Adult blackish brown or black; the anterior part of the body pale brown or yellow on the sides and yellowish white beneath, with vertical black bars on the sides; upper lip yellow. Young pale yellowish brown above, with dark olive spots or cross-bands, or with two blackish dorsal stripes, uniform olive-brown posteriorly; a bright yellow nuchal collar, sometimes interrupted in the middle.

Total length 2 metres; tail 55 centim.

An adult male and a young specimen were obtained at Tomohon by the Drs. Sarasin; also two young specimens at Rurukan (Minahassa).

Manado (*Bleeker*, *Bruijn*).

54. COLUBER JANSENI, Blkr.

Five specimens; Kema, Tomohon, Kottabangu, Mapane, Luhu. Manado, Macassar (*Meyer*). Manado (*Bruijn*).

Body compressed. Snout subacuminate, elongate, obliquely truncate and projecting. Rostral broader than deep, just visible from above; internasals as long as broad, a little shorter than the præfrontals; frontal once and one-fourth to once and a half as long as broad, as long as or a little shorter than its distance from the end of the snout, a little shorter than the parietals; loreal at least twice as long as deep; one large præocular, in contact with the frontal; two postoculars; temporals 1+2 or 2+3; nine or ten upper labials, fifth to seventh entering the eye; five or six lower labials in contact with the anterior chin-shields, which are much longer than the posterior. Scales smooth or faintly keeled, in 23 or 25 rows. Ventrals angulate laterally, 247–256; anal divided; subcaudals 133–140. Olive or yellowish brown above, some or all of the scales black-edged, entirely black posteriorly and on the tail; back of the head sometimes black; a black lateral stripe may be present. Young pale olive anteriorly, with or without small blackish markings, greyish olive posteriorly.

Total length 1990 millim.; tail 450.

The Drs. Sarasin have observed this snake to inflate its neck when irritated.

A young specimen appears to have been referred to *C. oxycephalus* by Peters and Doria.

55. Coluber erythrurus, D. & B.

Two specimens: Kema.

Gorontalo, Macassar (*Meyer*). Manado, Kandari (*Bruijn, Beccari*).

This snake also inflates its neck, and, owing to the V- or Λ-shaped black marking on that region, bears some resemblance to a Cobra.

56. Dendrophis pictus, Gm.

Two specimens: Kema. One specimen: Macassar.

Manado, Gorontalo, Macassar (*Meyer*).

57. Dendrelaphis terrificus, Ptrs.

Manado, Gorontalo, Minahassa (*Meyer*).

58. Oligodon waandersi, Blkr.

Oligodon tæniurus, F. Müll. Verh. nat. Ges. Basel, x. 1894, p. 826.

Nasal entire or semidivided; portion of rostral seen from above as long as or shorter than its distance from the frontal; suture between the internasals as long as or a little longer than that between the præfrontals; frontal once and a half as long as broad, longer than its distance from the end of the snout, as long as or a little shorter than the parietals; loreal small, as deep as long, or absent; one præ- and two postoculars; temporals 1+2; seven upper labials, third and fourth entering the eye; three or four lower labials in contact with the anterior chin-shields, which are as long as or longer than the posterior. Scales in 15 rows. Ventrals 134–163; anal divided (exceptionally entire); subcaudals 21–28. Coloration very variable. Orange, brick-red, brown, or black above, with or without small yellow or orange, dark-edged spots, which may be disposed in pairs or form transverse series; a yellowish collar may be present; a more or less distinct yellow or reddish vertebral stripe on the posterior part of the body and on the tail; yellowish white or pinkish beneath, with or without greyish dots or small black spots; a black lateral stripe usually present, occupying the outer ends of the ventrals.

Total length 355 millim.; tail 45.

Bleeker's specimens came from Boni. 11 specimens were obtained by the Drs. Sarasin at Pinogo (Bone valley), Masarang, Tomohon, and Rurukan. I have also examined 4 specimens collected by Mr. Everett in Southern Celebes. With this material before me, I cannot hesitate to unite Müller's *O. tæniurus* with *O. waandersii*. Out of the 17 specimens, 6 lack the loreal shield, and two have the anal entire. The ventrals vary from 134 to 151 in males, from 143 to 163 in females; the subcaudals from 26 to 28 in males, from 21 to 25 in females.

59. Agrophis sarasinorum, F. Müll. (Plate XIII. fig. 1.)

Agrophis sarasinorum, F. Müll. Verh. nat. Ges. Basel, x. 1894, p. 827, fig.

Maxillary teeth 14, subequal; mandibular teeth slightly decreasing in size posteriorly. Head small, not distinct from neck; snout long, obtusely pointed; eye very small, with round pupil. Rostral large, the portion visible from above a little shorter than its distance from the frontal; nostril between two nasals, the anterior of which is very small; præfrontals twice as long as nasals; frontal large, rhomboidal, as broad as long, as long as its distance from the end of the snout, shorter than the parietals; supraocular very small; no præocular, loreal and præfrontal entering the eye, a minute postocular; five upper labials, third and fourth entering the eye, fifth largest and forming a long suture with the parietal; symphysial not quite touching the anterior chin-shields, which are a little shorter than the posterior. Scales smooth, in 15 rows. Ventrals 139–164; anal entire; subcaudals 36–40. Tail pointed. Blackish brown above, strongly iridescent, whitish beneath; ventrals and subcaudals darker in front.

Total length 235 millim.; tail 45.

Summit of Sudara Volcano, 4450 feet; Lokon Volcano, near Tomohon, 5150 feet; Masarang Volcano, 4000 feet.

The genus *Agrophis*, which was established by F. Müller for this species, is closely allied to the American genus *Geophis*, from which it differs in the smaller anterior nasal. A second species has recently been described from Borneo by Günther, under the name of *Geophis albonuchalis*.

60. Rhabdophidium forsteni, D. & B.

Snout rather pointed. Rostral broader than deep, well visible from above; internasals shorter than the præfrontals; frontal longer than broad, longer than its distance from the end of the snout, a little shorter than the parietals, about twice as broad as the supraocular; a rather large præocular, reaching or nearly reaching the nasal; one postocular; five or six upper labials, third and fourth entering the eye, fifth largest and in contact with the parietal; first lower labial in contact with its fellow behind the symphysial; three lower labials in contact with the anterior chin-shields, which are longer than the posterior. Scales in 15 rows. Ventrals 137–160 (♂, 137–151; ♀, 153–160); anal entire; subcaudals 21–34 (♂, 30–34; ♀, 21–26). Adult uniform blackish above, young with yellowish variegations; lower parts and upper lip pale brown or yellowish white, with or without a blackish streak along the middle of the tail.

Total length 470 millim.; tail 80.

The genus *Rhabdophidium* is confined to Celebes.

11 specimens from Northern Celebes: 9 from Tomohon, and 2 from Rurukan.

61. Calamaria acutirostris, Blgr. (Plate XIII. fig. 2.)

Calamaria acutirostris, Bouleng. Ann. & Mag. N. H. (6) xvii. 1896, p. 394.

Snout pointed. Rostral small, as deep as broad, just visible from above; frontal pentagonal, as long as broad or slightly longer than broad, as long as its distance from the end of the snout, much shorter than the parietals, four times as broad as the supraocular; one præ- and one postocular; the diameter of the eye hardly equals its distance from the mouth; five upper labials, third and fourth entering the eye; a pair of large anterior chin-shields, in contact with the symphysial; posterior chin-shields small and separated by a scale. Scales in 13 rows. Ventrals 156–179 (♂, 156–172; ♀, 164–179); anal entire; subcaudals 14–24 (♂, 20–24; ♀, 14–16). Uniform blackish above, white beneath.

Total length 250 millim.; tail 43.

12 specimens: Loka, Bonthain Peak about 3500 feet. Several specimens were also obtained in Southern Celebes by Mr. Everett.

This species connects *Calamaria* with *Pseudorhabdium*.

62. Calamaria nuchalis, Blgr. (Plate XIII. fig. 3.)

Calamaria nuchalis, Bouleng. Ann. & Mag. N. H. (6) xviii. 1896, p. 62.

Rostral broader than deep, its upper portion as long as its distance from the frontal; frontal once and two-thirds as long as broad, thrice as broad as the supraocular, as long as the parietals; one præ- and one postocular; diameter of the eye greater than its distance from the mouth; five upper labials, third and fourth entering the eye; two pairs of chin-shields in contact with each other, the anterior in contact with the symphysial. Scales in 13 rows. Ventrals 135; anal entire; subcaudals 16. Tail ending in an obtuse point. Dark brown above, with small round black spots; head dark brown above, speckled with black; nape yellowish, with two large black blotches; a black lateral streak, running along the second row of scales; outer row of scales white; belly white, with a black dot at the outer end of each ventral; tail with three or four yellow blotches on each side; subcaudals white, with a black line between them in the posterior half of the tail.

Total length 180 millim.; tail 15.

A single male specimen was obtained in Southern Celebes by Mr. Everett.

63. Calamaria muelleri, Blgr. (Plate XIV. fig. 1.)

Calamaria muelleri, Bouleng. Ann. & Mag. N. H. (6) xvii. 1896, p. 394.

Rostral large, as deep as broad, the portion visible from above as long as or a little longer than its distance from the frontal; frontal hexagonal, much longer than broad, much longer than its distance from the end of the snout, as long as or a little shorter than the parietals, twice as broad as the supraocular; one præ- and one

postocular; diameter of the eye exceeding its distance from the mouth; five upper labials, third and fourth entering the eye; anterior chin-shields in contact with the symphysial; posterior chin-shields shorter and in contact with each other. Scales in 13 rows. Ventrals 130–187 (♂, 130–164; ♀, 161–187); anal entire; subcaudals 11–21 (♂, 16–21; ♀, 11–14). Tail ending in a point. Coloration very variable. Dark brown above, uniform or spotted with black, or reddish brown, or brick-red, the scales speckled and edged with black; a black streak on each side of the head, passing through the eye; upper lip white; white beneath, the ventrals edged or spotted with black, or edged with vermilion, or with a lateral series of black spots; a black or red band between two white ones along the lower surface of the tail.

Total length 235 millim.; tail 20.

12 specimens: Loka, Bonthain Peak, 3500 feet; 1 specimen: Luhu, C. Celebes; 2 specimens: between Posso Lake and Tomini Gulf. Several specimens were collected in Southern Celebes by Mr. Everett.

The specimens from Macassar referred by A. B. Meyer to *C. gervaisii* will probably be found to belong to *C. muelleri*.

64. Calamaria curta, Blgr. (Plate XIV. fig. 2.)

Calamaria curta, Bouleng. Ann. & Mag. N. H. (6) xviii. 1896, p. 62.

Rostral small, nearly as deep as broad, its upper portion hardly half as long as its distance from the frontal; frontal once and two-thirds as long as broad, twice as broad as the supraocular, much shorter than the parietals; one præ- and one postocular; diameter of the eye greater than its distance from the mouth; five upper labials, third and fourth entering the eye; two pairs of chin-shields in contact with each other, the anterior in contact with the symphysial. Scales in 13 rows. Ventrals 154; anal entire; subcaudals 14. Tail ending in a point. Olive-brown above, each scale with a black basal spot; head uniform; two outer rows of scales white, black at the base; ventrals black at the base, white on the border; subcaudals white.

Total length 315 millim.; tail 15.

A single specimen (♀) from Southern Celebes, 2000 feet, collected by Mr. Everett.

65. Calamaria gracilis, Blgr. (Plate XIV. fig. 3.)

Calamaria gracilis, Bouleng. Ann. & Mag. N. H. (6) xviii. 1896, p. 63.

Rostral a little broader than deep, its upper portion about half as long as its distance from the frontal; frontal once and a half as long as broad, twice as broad as the supraocular, much shorter than the parietals; one præ- and one postocular; diameter of the eye equal to its distance from the mouth; five upper labials, third and fourth entering the eye; two pairs of chin-shields

in contact with each other, the anterior in contact with the symphysial. Scales in 13 rows. Ventrals 211–235 (♂, 216; ♀, 211–235); anal entire; subcaudals 10–13 (♂, 13; ♀, 10–11). Tail rounded at the end. Grey-brown above, with small black spots; outer row of scales white, black at the base; ventrals white, black on the outer edge, with a continuous or interrupted median series of small black spots.

Total length 320 millim.; tail 8.

Three specimens were collected by Mr. Everett: one in Southern Celebes, at an altitude of 2000 feet, and two on Bonthain Peak, 6000 feet.

The specimen from Celebes, referred by Schlegel to *C. lumbricoidea*, may prove to belong to the present species.

66. Calamaria collaris, sp. n. (Plate XIV. fig. 4.)

Rostral small, broader than deep, just visible from above; frontal once and one-third to once and a half as long as broad, twice or twice and a half as broad as the supraocular, much shorter than the parietals; one præ- and one postocular; diameter of eye equal to its distance from the mouth; five upper labials, third and fourth entering the eye; two pairs of chin-shields in contact with each other; first lower labial in contact with its fellow behind the symphysial. Scales in 13 rows. Ventrals 232–265 (♂, 243; ♀, 232–265); anal entire; subcaudals 10–30 (♂, 30; ♀, 10–17). Tail very obtuse. Dark grey-brown above, with black dots or small spots; scales of outer row whitish in the centre; a yellowish collar behind the parietals, most distinct in the young; yellowish white beneath, spotted or edged with dark brown, or with a median series of dark brown spots.

Total length 380 millim.; tail 10.

Nine specimens: Bone Mts., Tomohon, Rurukan.

These specimens were referred by F. Müller to *C. virgulata*, from which they differ in the much more slender body.

67. Calamaria virgulata, Boie.

A single specimen: Lake Posso.

Manado (*Meyer*).

68. Calamaria linnæi, Boie.

Manado (*Meyer*).

Homalopsinæ.

69. Hypsirhina plumbea, Boie.

Two specimens: Kema.

Macassar (*Meyer*). Kandari, Macassar (*Beccari*). Tempe (*Weber*).

70. Hypsirhina matannensis, sp. n. (Plate XV. fig. 1.)

Rostral broader than deep; internasal divided; frontal broader than the supraocular, twice as long as broad, longer than its

distance from the end of the snout, shorter than the parietals; loreal slightly longer than deep, not in contact with the internasal; one præ- and one postocular; temporals 1+2; eight upper labials, fourth and fifth entering the eye; five lower labials in contact with the anterior chin-shields; posterior chin-shields smaller and separated by scales. Scales in 21 rows. Ventrals 137; anal divided; subcaudals 43. Dark olive-brown above, with a very indistinct darker line along the middle row of scales; throat yellowish white; anterior ventrals yellowish white, with large transverse olive-brown spots, middle ventrals nearly entirely olive-brown, posterior ventrals and subcaudals olive-brown at the base, yellowish white on the border; an olive-brown line along the middle of the lower surface of the tail.

Total length 240 millim.; tail 65.

A single male specimen from Lake Matanna, South-eastern Celebes.

This species is very closely allied to *H. plumbea*.

71. Hypsirhina enhydris, Schn.

Macassar (*Meyer*).

72. Cerberus rhynchops, Schn.

Two specimens: Kema.
Kandari (*Beccari*). Pare-Pare (*Weber*).

Dipsadomorphinæ.

73. Dipsadomorphus multimaculatus, Boie.

Minahassa (*Meyer*).

74. Dipsadomorphus dendrophilus, Boie.

Three specimens: Kema. Var. *gemmicincta*, D. & B.
Macassar (*Meyer*). Manado, Kandari (*Bruijn, Beccari*).

75. Dipsadomorphus irregularis, Merr.

Five specimens: Kema. One specimen: Barabatuwa, N. of Macassar.

Minahassa, Gorontalo, Macassar (*Meyer*). Manado, Kandari (*Bruijn, Beccari*).

76. Dipsadomorphus flavescens, D. & B.

This species is known from a single specimen obtained at Macassar many years ago. Closely allied to *D. irregularis*. Præocular not extending to the upper surface of the head; three postoculars; eight upper labials. Scales in 19 rows. Ventrals 260; anal entire; subcaudals 116. Yellowish brown above, with mere traces of darker cross-bands; uniform yellowish beneath.

77. Psammodynastes pulverulentus, Boie.

Five specimens: summit of Sudara, 4450 feet; Upper Bone

Valley; Buol; Matinang Mts., near Buol, 1700 feet; south of L. Posso, 2000 feet.

Togian Islands (*Meyer*).

78. Dryophis prasinus, Boie.

Five specimens: Kema, Macassar, Marapo R. near Batulappa. Manado, Macassar (*Meyer*). Manado, Kandari (*Beccari*, *Bruijn*). S. Celebes, 2000 feet (*Everett*).

79. Chrysopelea ornata, Shaw.

Six specimens: Kema, Marissa, Posso.

These specimens have been referred by Müller to *C. rhodopleuron*. The markings become very indistinct or disappear in the adult. Two of the specimens have the scales in 15 rows. Young pale brownish above, with black and yellow bars on the head and nape, a chain of small black spots along the vertebral line and a series of transverse vermilion spots on the posterior part of the body; ventrals and subcaudals pale olive, with black lateral keels.

Gorontalo, Macassar (*Meyer*). Manado, Kandari (*Bruijn*, *Beccari*).

Elapinæ.

80. Bungarus candidus, L.

Manado (*Meyer*).

81. Naia bungarus, Schleg.

A single young specimen, black above, with narrow angular yellow cross-bars, barred black and yellow beneath, was obtained by the Drs. Sarasin in Minahassa, at the foot of the Soputan volcano.

82. Doliophis intestinalis, Laur.

Manado (*Meyer*).

Viperidæ.

83. Lachesis wagleri, Boie. (Plate XV. fig. 2.)

Five specimens: Bone Valley, 650–1000 feet, Sonder, and between L. Posso and Tomini Gulf.

The three specimens from the Bone Valley belong to the typical form, green, with white blue- or purple-edged transverse lines. The two others form remarkable colour-varieties. The specimen from Minahassa is green above, with large brick-red black-edged spots; white beneath, with black spots and marblings powdered with brick-red. The specimen from Central Celebes (figured Pl. XV.) is green on the head, with red spots and a red lateral stripe; the body is annulate with red, the annuli edged with white and separated by narrower green interspaces; a red stripe extends along the middle of the body; end of tail red.

Minahassa (*Meyer*). Kandari (*Beccari*).

BATRACHIA.

ECAUDATA.

RANIDÆ.

1. OXYGLOSSUS LÆVIS, Gthr.

12 specimens: Masarang, Kakas, Matinang Mts., Lembongpangi, 1700 feet, Takalekadjo Mts., 3300 feet.

Adult and larval specimens were collected by Mr. Everett in Southern Celebes, at an altitude of 2000 feet.

The largest specimen measures 42 millim. from snout to vent. The toes may be fully webbed, with rectilinear membrane, or the web may be deeply emarginate, as described by Peters in *O. martensii* from Siam, which I am now very much inclined to think is based on an individual variation of *O. lævis*.

The habitat of this Frog would thus extend from Burma and Siam to Sumatra, Borneo, the Philippines, and Celebes.

I am able to append a description of the tadpole, from specimens collected by Mr. Everett in Southern Celebes:—

Length of body once and a half to once and two-thirds its width, two-fifths the length of the tail. Nostrils nearer the eyes than the end of the snout. Eyes on the upper surface, nearer the end of the snout than the spiraculum, the distance between them twice as great as the distance between the nostrils. Spiraculum on the left side, directed upwards and backwards, equally distant from the eye and the posterior extremity of the body. Anal opening median. Tail four or five times as long as deep, acutely pointed, with low crests. Mouth small, with horseshoe-shaped lip without horny teeth, the closed mouth appearing as a vertical slit; beak black. Olive above, white beneath; tail speckled with dark brown.

Total length 51 millim.; body 14; tail 37; depth of tail 7.

2. RANA KUHLII, D. & B.

Minahassa (*Meyer*). A specimen, labelled as from Celebes, presented by Sir A. Smith, is in the British Museum.

3. RANA MODESTA, Blgr.

Vomerine teeth in two strong oblique series, originating between the choanæ or on a level with their posterior border and extending posteriorly to or beyond the palatines; lower jaw, in the adult, with two bony prominences in front, which are most developed in the male. Head moderate; snout short, rounded or rather pointed; canthus rostralis angular; loreal region concave; nostril nearer the tip of the snout than the eye; interorbital space nearly as broad as the upper eyelid in the adult, narrower in the young; tympanum distinct, two-fifths to two-thirds the diameter of the eye. Fingers moderate, the tips swollen into small disks, first extending beyond second; toes moderate, entirely or nearly

entirely webbed, the tips dilated into small disks; a cutaneous fringe along the outer side of the fifth toe; subarticular tubercles moderate; inner metatarsal tubercle oval or elliptical, flat, measuring one-third to one-half the length of the inner toe. The tibio-tarsal articulation reaches the tip of the snout or between the eye and the tip of the snout. Skin of the back with small warts or rather indistinct, short, interrupted longitudinal glandular folds; a strong supratemporal fold; upper eyelids tubercular; a more or less distinct fold of the skin between the latter. Brown, grey-brown, or blackish olive above, with or without rather indistinct darker spots; sometimes two lighter stripes on the back and the canthi rostrales, meeting on the tip of the snout; sometimes a light vertebral stripe; a dark cross-bar between the eyes often present; a black spot sometimes present on the tympanum; upper lip with dark vertical bars, two below the eye; limbs with dark cross-bands; hinder side of thighs dark brown, with light spots or whitish marblings; lower parts white, uniform or speckled or spotted with brown. Male with internal vocal sacs.

From snout to vent 85 millim.

Several specimens: Tomohon, Buol, Matinang Mts.

Manado, Gorontalo (*Meyer*). The specimens referred by Peters to *R. macrodon* belong to this species.

4. Rana leytensis, Bttgr.

Rana leytensis, Boettger, Zool. Anz. 1893, p. 365.

One specimen: Kingdom of Luhu; one specimen: Takalekadjo Mts., towards L. Posso, 3000 feet. Several specimens were obtained in Southern Celebes by Mr. Everett.

Originally described from Leyte, Philippines, this species has been rediscovered at Tawi-Tawi, Sooloo Islands, by Mr. Everett, and at Sandakan, North Borneo, by Mr. Douglas Cator.

This small Frog (the largest specimen measures only 38 millim. from snout to vent) is closely allied to the preceding, with young specimens of which it may easily be confounded. But the toes are more slender, two-thirds or three-fourths webbed, the three last phalanges of the fourth toe are free from the web and extend beyond the fifth toe, the terminal disk of which corresponds to the second subarticular tubercle of the fourth toe.

The first finger extends as far as the second, or slightly beyond. The tibio-tarsal articulation reaches the nostril, the tip of the snout, or a little beyond. The skin of the upper part is warty, some of the warts forming interrupted longitudinal folds, but the dorso-lateral folds of *R. palavanensis* are absent. The coloration is very variable; some specimens have a bright yellow or orange spot covering the snout between the canthi and the anterior part of the interocular region: one specimen has a broad yellow vertebral stripe; others have a pair of yellowish dorsal stripes corresponding in position to the dorsal folds of *R. palavanensis*. Males are provided with a pair of internal vocal sacs.

5. Rana microdisca, Bttgr.

Rana microdisca, Boettg. Ber. Offenb. Ver. Nat. 1892, p. 137, and in Semon, Zool. Forsch. pl. v. fig. 2 (1894).

Described from the mountains of Java, this small Frog was soon after recorded from Mentawi, south of Sumatra (Boulenger, Ann. Mus. Genova, 2, xiv. 1894, p. 616), and Celebes (Müller). The first Celebes specimen was obtained in the Bone Mts. by the Drs. Sarasin, and was compared with the type by Prof. Boettger. A second specimen is from Tomohon.

R. microdisca is closely allied to the two preceding and the following species, but is well distinguished by its extremely long hind limbs, the tibio-tarsal articulation reaching far beyond the tip of the snout, and the tibia measuring two-thirds the length of head and body. The toes are incompletely webbed, the last three phalanges of the fourth being nearly entirely free; the extremity of the fifth toe extends a little beyond the second subarticular tubercle of the fourth toe. No dermal fringe along the outer border of the fifth toe. First finger extending considerably beyond second. Upper parts with small smooth warts; no dorso-lateral fold. Olive above, with or without a pair of light dorsal stripes; a dark cross-bar between the eyes; upper lip with dark vertical bars; limbs with regular dark cross-bars; yellowish beneath, throat marbled with brown; lower lip dark brown, with regular white interruptions.

6. Rana palavanensis, Blgr.

Rana palavanensis, Bouleng. Ann. & Mag. N. H. (6) xiv. 1894, p. 85.

Vomerine teeth in two short oblique series commencing on a line with the hinder edge of the choanæ. Head moderate, as long as broad; snout short, rounded, as long as the diameter of the orbit; canthus rostralis angular; loreal region slightly concave; nostril equidistant from the orbit and the end of the snout; interorbital space as broad as or a little narrower than the upper eyelid; tympanum distinct, three-fifths the diameter of the eye. Fingers moderate, the tips swollen or dilated into very small disks; first finger extending slightly beyond second; toes moderate, two-thirds webbed, the tips dilated into small but very distinct disks; subarticular tubercles moderate; inner metatarsal tubercle elliptical, flat, measuring two-fifths or one-half the length of the inner toe; no outer metatarsal tubercle; no tarsal fold. Tibio-tarsal articulation reaching the tip of the snout or beyond; tibia as long as or a little shorter than the fore limb. Skin nearly smooth; posterior half of upper eyelids warty; a fold from the eye to the shoulder; a narrow glandular dorso-lateral fold, beginning behind the upper eyelid, above the supratemporal fold. Brown or greyish brown above; sides of snout below the canthi blackish or dark grey, with some more or less distinct dark vertical bars on the lip; supratemporal and dorso-lateral folds

edged with dark brown or black on the outer side; a dark cross-bar between the eyes and a dark Λ-shaped interscapular marking usually present; limbs with regular dark cross-bands; lower parts whitish, uniform, or throat and breast spotted with brown. Male with internal vocal sacs.

From snout to vent 43 millim.

This species was discovered in Palawan by Mr. A. Everett, who has since found it on Mt. Kina Balu, Borneo. Several specimens were obtained by the Drs. Sarasin in Celebes, some of which were taken for the young of *R. modesta* by Müller.

Tomohon, Matinang, Masarang, Rurukan, Posso, Loka. Tasosso, S. Celebes, 4000 feet (*Everett*).

7. Rana tigrina, Daud.

One specimen: L. Limbotto; three specimens: Kema; one specimen: L. Posso; two specimens: Macassar.

Manado, Gorontalo (*Meyer*). Macassar, Kandari (*Beccari*)

8. Rana erythræa, Schleg.

Four specimens: Macassar.

Macassar (*Beccari*).

9. Rana varians, Blgr.

Rana varians, Bouleng. Ann. & Mag. N. H. (6) xiv. 1894, p. 86.

Vomerine teeth in two oblique series between the choanæ, or extending beyond the level of the hinder edge of the latter. Head depressed, longer than broad; snout obtusely or acutely pointed, prominent, longer than the diameter of the orbit; canthus rostralis angular; loreal region nearly vertical, strongly concave; nostril nearer the tip of the snout than the eye; interorbital space as broad as the upper eyelid or a little narrower; tympanum very distinct, as large as the eye or a little smaller. Fingers moderate, first extending considerably beyond second, longer than the fourth; toes nearly entirely webbed, the last two phalanges of the fourth free; tips of fingers and toes dilated into small but well-developed disks; subarticular tubercles well developed; inner metatarsal tubercle oval, blunt; a small round outer metatarsal tubercle; no tarsal fold. Tibio-tarsal articulation reaching the tip of the snout, or a little beyond; tibia as long as or a little shorter than the fore limb. Skin finely granulate, with or without small warts; a narrow glandular dorso-lateral fold. Brown, pink, or grey above; a dark brown or black streak below the canthus rostralis and a temporal blotch; a whitish streak along the upper lip; limbs with dark cross-bands; hinder side of thighs brown or marbled with brown; some specimens with a pale vertebral line and another pale line along the upper surface of the tibia; throat and breast sometimes dark brown. Male with internal vocal sacs and without humeral gland.

From snout to vent 70 millim.

First described from Palawan, this species has since been found

in Luzon, in Batjan, and in Celebes. The specimens (12) collected by the Drs. Sarasin are from the following localities:—Masarang, Tomohon, Rurukan, Buol, Wangkahulu Valley, and Lake Posso.

10. RANA EVERETTI, Blgr.

Nine specimens: Masarang Chain, Tomohon, Bone Valley (named *R. chalconota* by Müller), Wangkahulu Valley; Luhu, lowland. S. Celebes, 2000 feet (*Everett*).

The specimens referred to *R. chalconota* by Peters probably belong to this species, first described from the Philippines and since found in Borneo. *R. everetti* is easily distinguished from *R. varians* by having the first finger shorter, not extending quite so far as the second, and larger disks to the fingers, their diameter equalling one-half to two-thirds that of the tympanum. The tibio-tarsal articulation reaches the tip of the snout or a little beyond. Males with internal vocal sacs and no humeral gland. A white streak usually borders the upper lip.

The Drs. Sarasin have observed this Frog to lay its eggs in a frothy mass out of the water, forming a sort of nest as in *Rhacophorus*. A series of specimens at various larval stages, collected by Mr. Everett at Indrulaman, S. Celebes, enable me to give a description of the tadpole:—

Length of body once and a half to once and two-thirds its width, about half as long as the tail. Nostrils nearly equally distant from the eyes and the tip of the snout. Eyes on the upper surface, equally distant from the tip of the snout and the spiraculum, the distance between them a little greater than the distance between the nostrils. Spiraculum on the left side, directed upwards and backwards, nearer the posterior extremity of the body than the end of the snout. Anal opening on the right side close to the lower edge of the caudal crest. Tail about thrice and a half as long as deep, acutely pointed; crests lower than the muscular portion, the dorsal not extending on the body. Mouth as broad as the interocular space; series of labial teeth $\frac{4}{3}$, the outer upper and the three lower continuous, the others restricted to the sides; lower lip bordered by a double series of papillæ; beak broadly edged with black. Dark brown or blackish above, greyish below; upper caudal crest dark brown, lower greyish.

Total length 45 millim.; body 14; tail 31; depth of tail 8.

This tadpole is essentially that of a typical *Rana*.

11. RANA CELEBENSIS, Ptrs.

Vomerine teeth in two small oblique series between the choanæ. Head moderate, depressed, as long as broad; snout subacuminate, prominent, as long as the diameter of the orbit; canthus rostralis strong; loreal region concave; nostril a little nearer the tip of the snout than the eye; interorbital space as broad as the upper eyelid; tympanum very distinct, three-fourths the diameter of the eye and close to it. Fingers moderate, first extending as far as

second; toes moderate, nearly entirely webbed; tips of fingers and toes dilated into small but well-developed disks; subarticular tubercles well developed; inner metatarsal tubercle small, oval; a very distinct outer metatarsal tubercle. The tibio-tarsal articulation reaches the tip of the snout. A very broad and very prominent glandular lateral fold; below it several large, prominent, oval glands; a glandular fold from beneath the eye to the shoulder, followed by a strong glandule. Chestnut-brown above, sides of head and body rather darker; a light streak along the upper lip; limbs with dark cross-bars; hinder side of thighs brown-and-white marbled: whitish beneath, throat and breast closely speckled with brown. Male with internal vocal sacs and an oval flat gland at the base of the arm.

From snout to vent 47 millim.

This species was described by Peters from a single specimen from Manado. The specimen in the British Museum is without a locality.

12. Rana macrops, sp. n. (Plate XVI. fig. 1.)

Vomerine teeth in two very small oblique groups between the choanæ. Head rather large, as long as broad; snout rounded, with sharp canthus; loreal region nearly vertical, concave; nostril a little nearer the tip of the snout than the eye; latter very large, diameter of the orbit greater than the length of the snout; interorbital space as broad as the upper eyelid; tympanum distinct, half the diameter of the eye. Fingers rather slender, first extending as far as second, tips dilated into well-developed disks; toes two-thirds webbed, the terminal disks smaller than those of the fingers; subarticular tubercles moderate; a small oval inner metatarsal tubercle; no outer metatarsal tubercle; no tarsal fold. The tibio-tarsal articulation reaches the nostril or the tip of the snout. Skin smooth, or with a few small flat warts on the back; glandular lateral fold very feebly developed and distinct only anteriorly. Olive-green above; a blackish streak below the canthus rostralis; a blackish band on the temporal region and above the shoulder, broken up into spots posteriorly; sides greyish, marbled with dark brown; a whitish streak from below the eye to above the arm; limbs with more or less distinct dark cross-bands; hinder side of thighs marbled with dark brown; brownish beneath, throat dark brown, with or without small white spots. Male with internal vocal sacs and an oval flat gland at the base of the arm.

From snout to vent 45 millim.

Eight specimens: Masarang Mts., Matinang Mts., 3300 feet, and Takalekadjo Mts., towards Lake Posso, 3000 feet.

Dr. A. B. Meyer records *Rana natatrix*, Gthr., from Gorontalo, but the determination requires revision.

13. Rhacophorus leucomystax, Gravh.

Numerous specimens: Buol, Tomohon, Kema, Rurukan,

L. Posso, Loka (Bonthain Peak), 3600 feet, Macassar, and between L. Matanna and Towuti.

Manado, Macassar (*Meyer*). Kandari (*Beccari*).

14. Rhacophorus edentulus, F. Müll. (Plate XVI. fig. 2.)

Rhacophorus edentulus, F. Müll. Verh. nat. Ges. Basel, x. 1894, p. 840.

Vomerine teeth absent, or reduced to two very small indistinct groups near the inner edges of the rather large choanæ. Snout rounded, a little shorter than the diameter of the orbit; canthus rostralis distinct; loreal region slightly concave; nostril nearer the tip of the snout than the eye; interorbital space as broad as the upper eyelid; tympanum moderately distinct, two-fifths to one-half the diameter of the eye. Outer fingers half-webbed; disks of fingers large, as large as or a little larger than the tympanum; toes webbed to the disks of the third and fifth, penultimate phalanx of fourth free; subarticular tubercles feeble; a very small inner metatarsal tubercle; no tarsal fold. The tibio-tarsal articulation reaches the tip of the snout or beyond. Skin smooth or finely shagreened above, granulate on the belly and under the thighs; a fold from the eye to the shoulder. Green above (bluish grey or lilac in spirit), uniform or with dark dots; one specimen with a large rust-red blotch on the head and another on the body; humerus yellowish white; femur yellowish white with a narrow green stripe; white beneath. Male without vocal sacs.

From snout to vent 40 millim.

Ten specimens: Bone Mts., Tomohon, Totoija Valley, Rurukan, Loka (Bonthain Peak).

Specimens were obtained in Southern Celebes by Mr. Everett.

15. Rhacophorus monticola, Blgr. (Plate XVI. fig. 3.)

Rhacophorus monticola, Bouleng. Ann. & Mag. N. H. (6) xvii. 1896, p. 395.

Vomerine teeth in two oblique series between the choanæ. Snout more or less pointed, as long as the diameter of the orbit; canthus rostralis distinct; loreal region slightly concave; nostril equally distant from the eye and the tip of the snout; interorbital space as broad as the upper eyelid; tympanum moderately distinct, half the diameter of the eye. Outer fingers two-thirds webbed; disks of fingers large, as large as or a little larger than the tympanum; toes webbed to the disks of the third and fifth, penultimate phalanx of fourth free; subarticular tubercles feeble; a very small inner metatarsal tubercle; no tarsal fold. Tibio-tarsal articulation reaching the eye or the anterior border of the orbit. Skin finely shagreened above, granulate on the belly and under the thighs: a fold from the eye to the shoulder. Coloration very variable. Grey or green (bluish or purplish in spirit) above, uniform or dotted, spotted or vermiculate with darker, or with large symmetrical dark markings, viz., a cross-band between the eyes, an hourglass- or X-shaped blotch on the anterior part of the back, and a cross-band on the sacrum; one specimen green

with scattered small yellow spots; limbs with more or less distinct dark cross-bands; flanks white, or purple with large white spots; lower parts white. Male without vocal sacs.

From snout to vent 48 millim.

Nine specimens: Loka (Bonthain Peak), 3500 feet, and north slope of Bonthain Peak, 2600 feet.

Indrulaman, S. Celebes, 2000 feet (*Everett*).

Rhacophorus pardalis, Gthr., is recorded from Minahassa by Dr. Meyer, probably through confusion with *R. edentatus*.

16. Sphenophryne celebensis, F. Müll. (Plate XVI. fig. 4.)

Sphenophryne celebensis, F. Müll. Verh. nat. Ges. Basel, x. 1894, p. 841, fig.

Tongue large, oval, entire. Snout short, rounded, with feebly marked canthus; interorbital space as broad as or a little broader than the upper eyelid; tympanum scarcely distinct, about one-third the diameter of the eye. Tips of fingers dilated into very large disks; first finger shorter than second; toes short, free, the disks much smaller than those of the fingers; no subarticular or metatarsal tubercles. Tibio-tarsal articulation reaching the eye or a little beyond. Skin smooth above, or with scattered small flat warts; a small tubercle sometimes present on the upper eyelid; belly granulate. Coloration very variable. Yellowish, reddish, pink, or brown above, uniform or with darker spots or marblings; a triangular dark marking between the eyes, or an X-shaped or hourglass-shaped marking from between the eyes to the inter-scapular region; upper surface of snout sometimes pink; a dark canthal streak; a light vertebral line sometimes present; greyish or brownish beneath, uniform or mottled with dark brown. Male without vocal sacs.

From snout to vent 30 millim.

Numerous specimens: Bone Mts., 4000 feet, Masarang Volcano, Emponglar Volcano, Matinang Mts., 850 feet, Luhu, 300–1600 feet, north slope of Takalekadjo.

Several specimens were collected at Indrulaman, S. Celebes, by Mr. Everett.

17. Sphenophryne variabilis, Blgr. (Plate XVI. fig. 5.)

Sphenophryne variabilis, Boulenger. Ann. & Mag. N. H. (6) xviii. 1896, p. 64.

Tongue large, oval, entire. Snout short, rounded, with feebly marked canthus; interorbital space broader than the upper eyelid; tympanum feebly distinct, two-thirds or three-fourths the diameter of the eye. Tips of fingers dilated into very large disks; first finger shorter than second; toes short, free, the disks much smaller than those of the fingers; no subarticular or metatarsal tubercles. Tibio-tarsal articulation reaching the shoulder or the tympanum. Skin smooth above; belly granulate. Coloration very variable. Grey, brown, purple, pink, or crimson above, uniform or with darker marblings, or with a lighter yellow or pink lateral streak; a light vertebral line sometimes present; sides of

head usually dark brown; a dark, light-edged ocellus may be present on the lumbar region; beneath uniform whitish, or greyish with yellow spots, or dark brown with yellow spots. Male without vocal sacs.

From snout to vent 28 millim.

Eight specimens: Bonthain Peak, 5000–6500 feet.

Numerous specimens were also obtained on Bonthain Peak by Mr. Everett.

Microhyla achatina, Boie, is recorded from Minahassa and Macassar by Meyer. The specimens will probably prove to belong to *Sphenophryne celebensis* or *S. variabilis*.

18. CALLULA BALEATA, S. Müll.

Several specimens: Buol, Tomohon, Kema, and near Borau, coast of Luhu.

Minahassa, Gorontalo (*Meyer*). Indrulaman, S. Celebes (*Everett*). The colour-variety *celebensis*, Gthr., has been raised to specific rank by Peters, and the present species therefore appears under two different names in Meyer's list.

19. CALLULA PULCHRA, Gray.

Five specimens: Macassar.

Macassar (*Beccari*).

20. BUFO BIPORCATUS, Gravh.

Four specimens: Kingdom of Luhu, Macassar, L. Towuti.

Macassar (*Meyer*).

21. BUFO CELEBENSIS, Gthr.

Skin of upper surface of head united with the cranial ossification; canthus rostralis sharp, raised; interorbital space broad, deeply concave; a broad bony ridge between the eye and the parotoid; this ridge feebly prominent in the young, very large, elevated, knob-like in the adult; tympanum more or less distinct, measuring two-fifths to three-fifths the diameter of the eye. Fingers obtuse, first extending beyond second; toes nearly half-webbed, with single subarticular tubercles; two moderate metatarsal tubercles; no tarsal fold. The tarso-metatarsal articulation reaches the eye or the tip of the snout. Upper parts with more or less prominent, more or less conical warts, tipped with black horny spines; parotoids very prominent, variable in shape, triangular, oval, or elliptical, continuous with or detached from the postorbital bony ridge. Olive, greyish, blackish, or crimson above, uniform or with indistinct darker spots; greyish or pale olive beneath, uniform or marbled with dark brown. Male with an internal subgular vocal sac.

From snout to vent 98 millim.

Numerous specimens: Kema, Tomohon, Buol, Loka.

Manado, Minahassa, Gorontalo, Boliohuto Mt., near Sumalatta, Macassar (*Meyer*).

EXPLANATION OF THE PLATES.

Plate VII.

Fig. 1. *Gymnodactylus jellesmæ*, Blgr., p. 203.
2. „ *fumosus*, F. Müll., p. 204.
a. Side view of head; *b*. Chin; *c*. Anal region and lower surface of hind limb.

Plate VIII.

Draco spilonotus, Gthr. Males and females.
With side view of heads, p. 206.

Plate IX.

Draco beccarii, Ptrs. & Dor. Male and female.
With side view of head of male, p. 207.

Plate X.

Fig. 1. *Lygosoma tropidonotus*, Blgr., p. 209.
2. „ *sarasinorum*, Blgr., p. 210.
a. Enlarged upper view of head.
b. Side view of head and neck.

Plate XI.

Fig. 1. *Lygosoma celebense*, F. Müll., p. 212.
2. „ *inconspicuum*, F. Müll., p. 213.
3. „ *textum*, F. Müll., p. 213.
4. „ *parvum*, Blgr., p. 215.
a. Enlarged upper view of head.

Plate XII.

Fig. 1. *Tropidonotus sarasinorum*, Blgr., p. 218.
2. „ *celebicus*, Ptrs. & Dor., p. 218.
3. *Lycodon stormi*, Bttgr., p. 219.

Plate XIII.

Fig. 1. *Agrophis sarasinorum*, F. Müll., p. 222.
2. *Calamaria acutirostris*, Blgr., p. 223.
3. „ *nuchalis*, Blgr., p. 223.

Plate XIV.

Fig. 1. *Calamaria muelleri*, Blgr., p. 223.
2. „ *curta*, Blgr., p. 224.
3. „ *gracilis*, Blgr., p. 224.
4. „ *collaris*, Blgr., p. 225.

Plate XV.

Fig. 1. *Hypsirhina matannensis*, Blgr., p. 225.
2. *Lachesis wagleri*, Boie, var., p. 227.

Plate XVI.

Fig. 1. *Rana macrops*, Blgr., p. 233.
2. *Rhacophorus edentulus*, F. Müll., p. 234.
3. „ *monticola*, Blgr., p. 234.
4. *Sphenophryne celebensis*, F. Müll., p. 235.
5. „ *variabilis*, Blgr., p. 235.

2. Further Contributions to the Knowledge of the Phytophagous Coleoptera of Africa, including Madagascar. By Martin Jacoby, F.E.S.

Part I.

[Received January 5, 1897.]

(Plate XVII.)

Since my last papers on African Phytophaga in the Transactions of the Entomological Society of London for 1895 and in the 'Deutsche entom. Zeitschrift' of the same year, a good deal of new material has come into my hands. M. Alluaud, of Paris, has kindly submitted to me the Madagascar species obtained by him, which, as the number of species was not large, I have included here, although the fauna of Madagascar has little in common with that of Africa, while Mr. Guy Marshall has been busy collecting in Natal and Mashonaland with good results; and although not much is gained for science, in my opinion, by continuing to add new species to the already enormous material known and unknown, it is to be hoped that one day we shall be enabled to work out a Biologia of the country now under investigation, as has been done in the case of Central America with such splendid results by Messrs. Godman and Salvin.

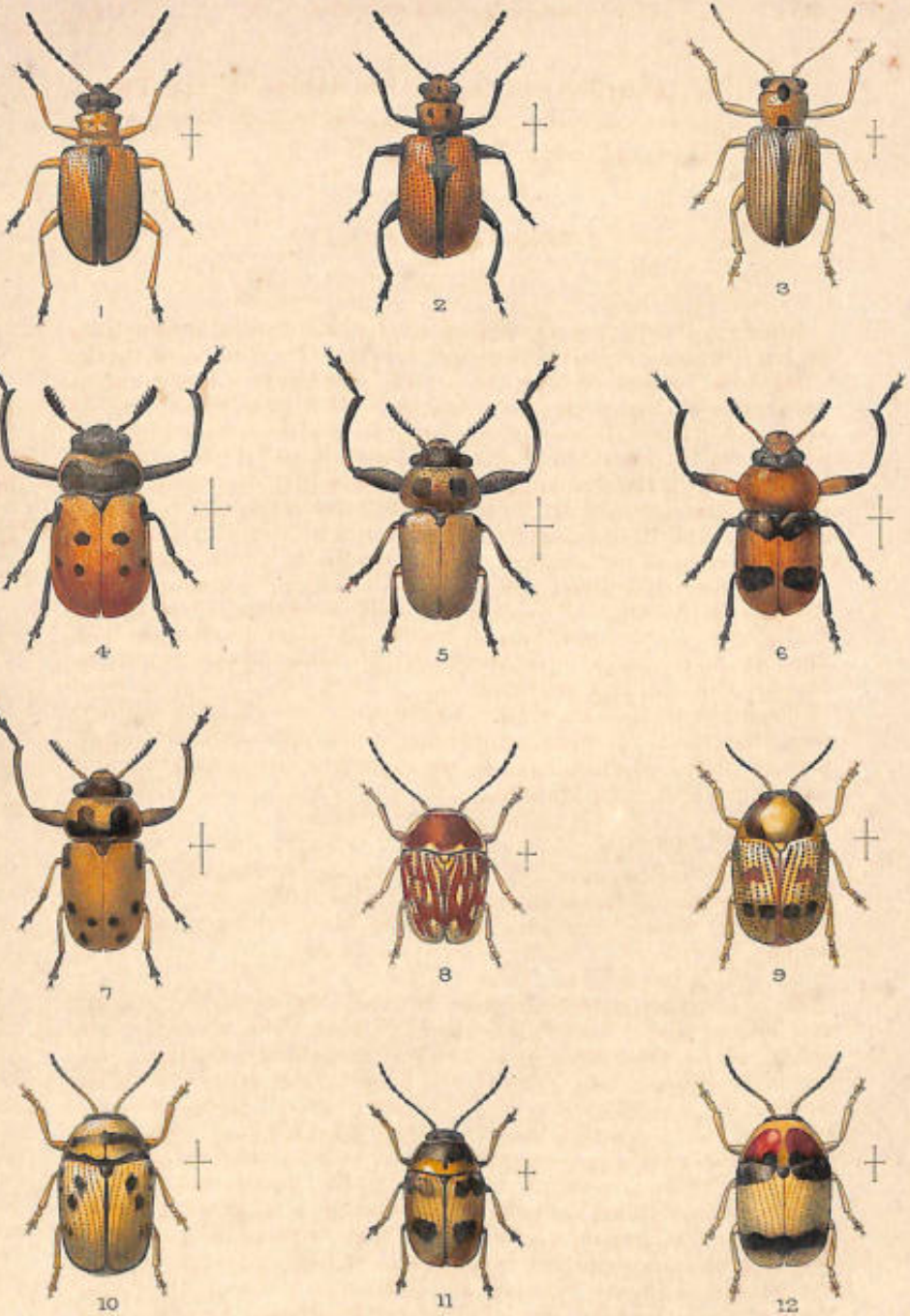
The present paper deals only with the *Criocerinæ*, *Cryptocephalinæ*, and *Clythrinæ*; the other families I hope to deal with in a future paper. Types of all the species are contained in my collection and in that of the British Museum.

Lema princeps, n. sp.

Rufous; the antennæ (the basal joints excepted) and the tarsi black; thorax foveolate at the sides; elytra metallic bright blue or violaceous, deeply foveolate below the base, strongly punctate-striate.

Length 3½ lines.

Head impunctate, bituberculate between the eyes, the clypeus and labrum black; antennæ long and slender, black, the lower five joints rufous, the fourth joint one-half longer than the third one, the fifth very elongate; thorax not longer than broad, the sides moderately constricted, rather strongly produced above the constriction, the base with a deep transverse sulcus, a small transverse fovea is also placed immediately above the constriction at the sides, the disc with two rows of punctures at the middle, some other punctures also placed near the anterior angles; scutellum fulvous, not longer than broad; elytra with a deep depression below the base near the suture, bright metallic blue, strongly punctate-striate, the punctures slightly elongate and distinct to the apex, the interstices at the latter place strongly costate, the others flat and smooth;



W.Purkiss del. et lith.

West, Newman imp.

Phytophagous Coleoptera from Africa and Madagascar.

underside and legs fulvous, nearly impunctate; the sides of the breast clothed with short golden-yellow pubescence; terminal joints of the tarsi more or less black.

Hab. West Coast of Africa.

Amongst the large-sized metallic-blue species of Africa, the present one may be known by the colour of the antennæ, their slender shape, the sculpturing of the thorax, and the deep elytral impression and their strong punctuation, as well as by the colour of the tarsi. I received several specimens from Mr. Alluaud in Paris.

LEMA MARSHALLI, n. sp. (Plate XVII. fig. 2.)

Greenish black; the vertex and the thorax fulvous, the latter with two spots on the disc and the base greenish; elytra fulvous, strongly punctate-striate; a spot on the shoulder, the suture, and a transverse spot across the latter, below the base, metallic dark green.

Length 3 lines.

Head strongly and remotely punctured, the vertex fulvous with two greenish spots and a central similarly-coloured fovea; eyes deeply notched; lower portion of face greenish black; the entire head sparingly clothed with fulvous short hairs; palpi long and slender, black; antennæ rather short, greenish black, pubescent, the fifth and following joints gradually but slightly widened; thorax about one-half broader than long, the sides but moderately constricted, the anterior angles slightly tuberculiform, the surface with two rows of central punctures and some others anteriorly, fulvous, two triangular-shaped spots at the middle and a transverse band occupying the basal portion below the sulcus greenish black; scutellum of the same colour, subquadrate, sparingly pubescent; elytra with a slight depression below the base, reddish fulvous, deeply and regularly punctate-striate, the interstices longitudinally costate at the apex; an elongate spot on the shoulders, a transverse short spot across the suture below the base, and the suture itself narrowly metallic dark green; underside and legs greenish black.

Hab. Natal (collected by Mr. G. Marshall).

Of this handsome species, two specimens were obtained by Mr. Marshall in the neighbourhood of Natal. This *Lema* seems very closely allied to *L. insignis*, Lac., likewise from Africa, in regard to coloration; but is smaller, the thorax is distinctly broader than long (not scarcely so long as broad as in *L. insignis*), the elytra have only a shallow depression below the base, not a deep one, and the band and subquadrate spot of which Lacordaire speaks are absent.

LEMA BREVICORNIS, n. sp.

Below blackish; antennæ very short, black; basal and apical joint fulvous; head and thorax obscure dark fulvous, minutely

punctured; elytra greenish black, strongly punctate-striate; last abdominal segment and the legs more or less flavous.

Length 1½ line.

Head dark fulvous, the vertex very convex, not constricted behind the eyes, minutely punctured, the sides and the middle deeply longitudinally sulcate; eyes large, very slightly notched; antennæ extending to the base of the thorax only, the lower five and the apical joint fulvous, the others black, basal joints very short, nearly moniliform, the following five joints transverse, broader than long; thorax scarcely longer than broad, the sides but very little constricted at the base, the surface without a sulcus, very minutely punctured and finely granulose, of a dark fulvous colour, with a slight æneous gloss; scutellum broader than long; elytra with a slight depression below the base, closely and strongly punctate-striate, the punctures rather elongate, the interstices flat, except near the extreme apex, impunctate; legs flavous, the femora marked with piceous at the middle; breast and abdomen greenish black, the last abdominal segment flavous.

Hab. Tsipango, Natal (*G. Marshall*); also Mashonaland.

This is a very interesting little *Lema*, and unlike any other with which I am acquainted, on account of the very short antennæ and their transversely-shaped joints and the scarcely constricted thorax. I have seen six specimens of this species.

LEMA FUSCITARSIS, n. sp.

Testaceous; the apical joints of the antennæ and the tarsi more or less fuscous; head and thorax impunctate; elytra very deeply punctate-striate, the interstices at the apex convex.

Length 2 lines.

Head scarcely constricted behind the eyes, impunctate, the space between the eyes strongly swollen, with a deep central fovea, the supraocular grooves moderately deep, with some yellow pubescence; eyes not very deeply notched; antennæ scarcely extending to the middle of the elytra, the basal joint short and thick, the second very short, the third and fourth equal, twice as long as the second one, the apex of each joint slightly stained with fuscous, the terminal joints entirely of that colour; thorax not longer than broad, the sides moderately constricted, the basal sulcus not very deep, the disc entirely impunctate, shining; scutellum with the apical margin emarginate; elytra scarcely perceptibly depressed below the base, deeply foveolate-punctate at the base, less strongly punctured posteriorly, the interstices not raised, except at the sides and apex; underside entirely testaceous, clothed with fine yellow pubescence; the legs of the same colour, the apex of each tarsal joint and the claws fuscous.

Hab. Tsipango (Natal); collected by Mr. G. Marshall.

Allied to *L. infima*, Lac., from Senegal, but differing in the colour of the antennæ and tarsi, in the impunctate head and thorax, and the deep elytral punctuation at the base; the punctures at the lower portion are rather elongate in shape and as large as the space

dividing each puncture; in one specimen the last joint of the antennæ is fulvous, the preceding ones fuscous, and the basal joints as in the type.

LEMA SEMIPURPUREA, n. sp.

Black, with bluish gloss; antennæ short; thorax with rounded sides, finely punctured; elytra purplish or bluish, deeply and closely punctate-striate, the ninth row entire.

Length 2½ lines.

Head with some deep punctures at the vertex, the latter with two obscure small fulvous spots, more or less distinct, and a central longitudinal groove, frontal elevations absent, the space surrounding the eyes rugose; antennæ scarcely extending to the middle of the elytra, black, pubescent, the fifth and following joints rather robust and widened, one-half longer than broad; thorax subquadrate, scarcely one-half broader than long, but very moderately constricted at the sides, the anterior half rather widened or thickened, but rounded, the anterior angles not produced, the basal sulcus deep, the space at the sides within the constriction transversely rugose, the rest of the surface finely punctured throughout, with some larger punctures intermixed; scutellum not longer than broad; elytra subcylindrical, without basal depression, metallic purplish or bluish, deeply and strongly punctured, the punctures large and closely placed, but diminishing at the apex, where the interstices are as usual, convex; underside and legs black, with a bluish gloss, the posterior femora only extending to the second abdominal segment.

Hab. Mashonaland (*G. Marshall*).

From the smaller metallic species of *Lema* from Africa, *L. semipurpurea* is well distinguished by the shape and punctuation of the thorax, the former is far more approaching to a cylindrical shape than is the case in most species from that region, although not to the extent that is found in two or three species; the glabrous upper surface and want of an elytral depression separate the species from *L. azurea*, Klug, and its allied forms.

LEMA TARSATA, n. sp. (Plate XVII. fig. 1.)

Head, antennæ (the basal four joints excepted), the breast, and the tarsi black; thorax flavous, foveolate, and punctured; elytra deeply punctate-striate, flavous, the suture and the lateral margins bluish; legs and abdomen flavous.

Var. Elytra without dark bands, underside entirely black.

Length 2 lines.

Head black, strongly rugose and finely pubescent, the neck more or less fulvous, sometimes with a small black central spot, the space between the eyes with a deep central groove; labrum and palpi black; antennæ extending to the middle of the elytra, black, the lower four joints flavous, terminal joints rather robust, twice as long as broad; thorax subquadrate, one-half broader than long, the sides strongly widened towards the apex, the latter with a

small tubercle at the anterior angles; the surface flavous, strongly punctured at the middle, with two fovew placed anteriorly near the middle, and another more transverse one at each side, the basal sulcus deep, the anterior margin sometimes with a small black spot at the middle; scutellum black, its apex truncate; elytra not depressed below the base or scarcely so, with regular rows of moderately strong punctures, which get much finer towards the apex, where they are slightly elongate in shape, the ninth row entire, the margins narrowly, the suture more broadly bluish black; underside black; the abdomen more or less fulvous; legs flavous, the tarsi black.

Hab. Natal, Estcourt, 4000 ft. (*G. Marshall*).

Allied to *L. aperta*, Lac., in coloration, but quite distinct on account of the lateral and central thoracic foveæ; in the variety, of which several specimens are before me, there is no trace of any elytral blue bands, but in other respects these specimens agree in everything. Mr. Marshall found this species under bark of trees.

LEMA CONSOBRINA, n. sp.

Black, thorax impunctate, bifoveolate; elytra metallic blue, strongly punctate-striate, depressed below the base; posterior femora at the lower portion fulvous.

Length 2 lines.

Head impunctate, black, the space between the eyes with two strongly raised elongate tubercles; eyes deeply emarginate; antennæ extending to the middle of the elytra, black, pubescent, the third and fourth joint elongate, the fifth the longest, terminal joints longer than broad; thorax one half broader than long, the sides obliquely diverging outwards from the sulcation, the anterior angles rather acute, the disc impunctate, black, with a deep transverse subbasal sulcus and two small foveæ anteriorly at the sides; scutellum truncate at its apex; elytra distinctly depressed below the base, metallic blue; the punctures regular and rather deep, extending to the base and apex, the ninth row entire, the interstices flat and impunctate, except near the extreme apex; underside and legs black, the posterior femora, their apex excepted, fulvous.

Hab. Mashonaland (*G. Marshall*).

Closely allied to *L. affinis*, Clark, and *L. rufo-femorata*, Cl.; but differing from the former in the sculpture of the head and in the black abdomen, also in its smaller size, and from the latter in the black, not blue, colour, the bifoveolate thorax, and smooth, not rugose, elytral interstices.

Two specimens are before me.

CRIOCERIS CYLINDRICOLLIS, n. sp.

Obscure fulvous; the antennæ, tibiæ, and tarsi black; thorax subcylindrical, with two rows of punctures; elytra pale fulvous, regularly and deeply punctured, the interstices convex at the apex.

Length 2¼ lines.

Head impunctate at the vertex, the space round the eyes finely punctured and pubescent, with a short central groove; antennæ very short and robust, black, the basal two joints fulvous; thorax subcylindrical, but slightly constricted at the base; the sulcus indistinct and placed close to the base, the disc with two rows of rather deep punctures at the middle and a few others near the anterior angles; elytra with deep round punctures, placed in closely approached rows, the punctuation getting finer towards the apex, the interstices sparingly impressed with minute punctures, convex near the apex, there are some slight transverse wrinkles to be seen below the base; underside and the femora fulvous, clothed with extremely short yellow pubescence, tibiæ and tarsi piceous or black.

Hab. Madagascar, Diego-Suarez (*C. Alluaud*).

Smaller than *C. livida*, Dahlm.; the thorax more cylindrical and with two rows of punctures only; the antennæ also differently coloured.

CRIOCERIS MADAGASCARIENSIS, n. sp.

Dark fulvous; antennæ short, the last four joints black; thorax flat, strongly and closely punctured; elytra finely punctate-striate, the interstices sparingly and finely punctured.

Length 3 lines.

Head deeply constricted at the base, with a short central and deep lateral grooves; eyes deeply notched; clypeus finely punctured; palpi filiform; antennæ extending to the base of the thorax only, the second joint moniliform, third and fourth short, equal, the following joints triangularly widened, the terminal ones strongly transverse, the lower seven joints fulvous, the others black; thorax subquadrate, slightly longer than broad, but moderately constricted at the middle, the anterior angles rounded, the surface rather flattened, strongly, irregularly, and closely punctured, the space near the base nearly impunctate, with a very feeble transverse sulcation; scutellum narrowly elongate; elytra not depressed below the base, nor raised near the scutellum, with very regular rows of punctures, which are larger anteriorly on the inner disc, the interstices flat, with a single row of fine punctures which are more or less interrupted, lateral margin strongly thickened; underside nearly smooth and impunctate; tarsi blackish.

Hab. Madagascar, Diego-Suarez (*Alluaud*).

Closely allied to *C. antennalis*, Lac., also from Madagascar; but smaller, the last four, not five joints of the antennæ black, the thorax much more strongly and closely punctured, and the elytral interstices likewise finely punctulate. *C. dimidiaticornis*, Lac., is described as having the antennæ one-third the length of the body, the interstices of the elytra finely alutaceous and convex posteriorly, and the apex of the tibiæ black as well as the tarsi. M. Alluaud has sent me three specimens of the present species which show no differences in any way.

PEDRILLIA MADAGASCARIENSIS, n. sp.

Fulvous, pubescent; the apical six joints of the antennæ, the apex of the tibiæ, and the tarsi, black; thorax finely, elytra strongly punctured.

Length 1½ line.

Head broad, very sparingly and finely punctured, with some few hairs; clypeus narrow, semicircular; antennæ widely separated at the base, extending scarcely beyond the base of the elytra, fulvous, the terminal seven joints black; thorax but slightly broader than long, constricted below the middle, the latter projecting angularly, the disc with a shallow transverse groove near the base, the sides below the groove thickened, with some stiff hairs, the surface finely and remotely punctured, each puncture provided with a blackish stiff hair; scutellum subtriangular, punctured and pubescent; elytra slightly flattened along the suture, broader at the base than the thorax, much more strongly punctured than the latter and sparingly clothed with yellowish hairs; underside and legs fulvous; the apex of the posterior femora, (sometimes) that of the tibiæ and the tarsi, black.

Hab. Madagascar, Diego-Suarez (*Alluaud*).

This is the first species of the genus known to me from this locality. In the collection of M. Alluaud and my own.

HEMYDACNE, n. g.

Elongate, parallel; head broad, not constricted; antennæ widely separated, filiform; eyes small, slightly emarginate; thorax narrowed at the base, without lateral margin; elytra wider than the thorax, deeply punctate-striate; first two abdominal segments much longer than the following ones; posterior femora slightly incrassate; the four posterior tibiæ with a tooth near the apex; the first tarsal joint as long as the two following ones, claws appendiculate; prosternum proportionately broad, yet twice as long as broad, its base truncate.

The insect for which this genus is proposed is difficult to place in any of the earlier groups of Phytophaga, since it exhibits a number of characters peculiar to several of them; thus the widely separated antennæ and the broad head agree with *Megascelis*, the thorax is somewhat similar to *Orsodacna*, but the broad prosternum and the posterior tibiæ widened into a tooth at the apex are not found amongst any of these sections. The insect had perhaps best find its place near *Orsodacna* at present, but would form a special group if other similarly structured species should be found.

HEMYDACNE MACULICOLLIS, n. sp. (Plate XVII. fig. 3.)

Below black, above and the legs testaceous; head with one, the thorax with two black spots, remotely punctured; elytra deeply punctate-striate; the interstices longitudinally costate, flavous, the suture black.

Length 1½–2 lines.

Head with a few fine punctures, testaceous or flavous; the vertex with a triangular black spot; clypeus not separated from the face; labrum deeply emarginate; apex of the mandibles black; palpi rather robust; antennæ inserted below the inner margin of the eyes, not extending to the middle of the elytra, testaceous, the second joint one-half shorter than the third, this latter shorter than the fourth, the following joints elongate, the terminal ones shorter again and slightly thickened; thorax gradually narrowed towards the base, about one-half broader than long, the surface remotely but rather strongly punctured, with an obsolete transverse depression near the base, the disc flavous or testaceous, with a triangular black spot at the middle of the anterior margin and another at the middle of the base, the flanks of the thorax likewise black; elytra with rows of deep and regular punctures, all the interstices longitudinally costate, the lateral margin not visible from above, narrowly black, like the suture; underside black; legs flavous or testaceous.

Hab. Madagascar, Diego-Suarez (*C. Alluaud*).

Miopristis (Lophobasis) natalensis, n. sp. (Plate XVII. fig. 5.)

Black, pubescent, lower portion of the face flavous; thorax flavous with two large black spots, coarsely punctured; elytra finely and closely punctured, flavous or testaceous, the margins narrowly and a spot on the shoulders black, the base with a ridge.

Mas. The anterior legs very long, femora robust, tibiæ curved, tarsi slender.

Fem. Legs equal, entirely flavous; the elytra more closely and strongly punctured.

Length 3–3½ lines.

♂. Head black at the upper portion and closely pubescent, the sides prolonged below the eyes, these small, feebly notched below; clypeus flavous, deeply triangularly emarginate at the anterior margin; mandibles broad, flavous, strongly curved inwards at the tip, the latter black; palpi flavous, the apex black; antennæ extending to about the base of the thorax, black, the lower three joints fulvous, the basal joint black above, the second and third short, equal, the following joints very strongly triangularly dentate and widened; thorax twice as broad as long, the sides and the posterior angles rounded, the surface sparingly and coarsely punctured, flavous, shining, the disc more or less fulvous, with a large black subquadrate spot at each side of variable size; scutellum black, pubescent at its base, its apex truncate; elytra with a narrow transverse ridge at the basal margin, closely punctured in irregular rows, flavous, opaque, the sutural and lateral margins very narrowly black, the shoulders with a small black spot; underside and the legs black, the extreme base of the femora and the tibiæ more or less flavous; the first joint of the anterior tarsi in the male as long as the following two joints together.

Hab. Natal, Estcourt (*G. Marshall*).

This and the following species seem to me to find their places best in Lacordaire's subgenus *Lophobasis*, on account of the basal ridge of the elytra, although some of the other structural characters do not agree with the genus, but in that respect scarcely two species are similar amongst these variable insects. Of both sexes a good many specimens are before me: in some the elytra are without the dark margins and the thoracic spots are much smaller; the females differ much in the more strongly and closely punctured elytra, which are also more shining, and in having entirely flavous legs.

MIOPRISTIS SUBRUGOSA, n. sp. (Plate XVII. fig. 7.)

Black, pubescent; the clypeus and the legs fulvous; thorax remotely and strongly punctured, flavous with two large black spots; elytra very closely and strongly punctured, testaceous, a spot on the shoulder and three others placed triangularly near the apex, black.

Var. Some or all the elytral spots absent.

Mas. The anterior legs elongate, the tibiæ strongly curved.

Fem. Legs normal, thorax and elytra nearly rugosely punctured.

Length 2½–3 lines.

Head pubescent and of the same sculpture and colour as in the preceding species; the antennæ also exactly similar, as well as the thorax; elytra with the basal margin likewise in shape of a ridge, very closely and strongly punctured, with an elongate spot on the shoulders and three round spots near the apex black—of these latter, one is placed close to the suture and two near the lateral margin, forming together a triangle; legs fulvous, the femora above and the tarsi black.

Hab. Natal, Estcourt (*G. Marshall*).

Closely allied to the preceding species, but quite distinct on account of the almost rugose punctuation of the elytra and their pattern; and even if the spots of the elytra are absent, both sexes may be at once known from *M. natalensis* by their sculpture, which renders the elytra opaque, the female of the last-named species, on the contrary, having the elytra distinctly shining; the spots of the thorax are as variable as usual in these insects.

MIOPRISTIS ATROFASCIATA, n. sp. (Plate XVII. fig. 6.)

Fulvous, the upper part of the head, the tibiæ, tarsi, and sides of the breast black; thorax nearly impunctate; elytra with fine rows of punctures, fulvous, a triangular band at the base, and a transverse spot below the middle, black.

Mas. The anterior legs elongate; the first joint of the tarsi as long as the two following joints together.

Length 3 lines.

Head strongly covered with transverse and longitudinal strigæ, the vertex smoother, black, in shape of a transverse band with its anterior edge concave, lower portion of face fulvous, the anterior margin of the clypeus deeply triangularly emarginate, eyes moderate, distinctly notched, sides of the face produced into a

transverse ridge; mandibles robust, fulvous, the apex angularly curved, black; antennæ extending to the base of the thorax, black, the lower five joints flavous, basal joint widened and curved, third one-half longer than the second, fourth more elongate, the others triangularly widened; thorax twice as broad as long, the sides strongly rounded, the posterior angles distinct, the sides with a narrow reflexed margin, the disc very strongly convex, sulcate near the anterior margin at the middle, strongly punctured at the same place, the rest of the surface impunctate, reddish fulvous or rufous; scutellum broad, black, its apex slightly raised: elytra parallel, finely punctured in widely separated rows, fulvous, the base with a transverse black band, which is gradually widened towards the suture and is slightly obliquely cut at the same place; it extends as far as the shoulders only, where it ends in a spot; below the middle is another transversely subquarate short band: the underside and the base of the femora fulvous, the apex of the anterior femora and all the tibiæ and tarsi, as well as the sides of the breast, black.

Hab. Natal, Estcourt (*G. Marshall*).

Both male and female specimens are before me; the anterior legs of the former are, as usual, very elongate and their tibiæ curved. The system of coloration in this species differs from any of those placed in this genus; but I see no structural differences of importance to separate it from *Miopristis*, although it might perhaps be equally well placed in *Antipus*. The females only differ in the shorter legs and less transverse thorax, the mandibles also are smaller.

MELITONOMA EPISTOMALIS, Lac.

The specimens which Mr. Marshall obtained at Mashonaland agree very nearly with Lacordaire's description. The species differs from any other contained in the genus by the truncate margin of the epistome, which leaves a cavity exposing broadly the labrum; this cavity is bounded at the sides by flattened projections, which are turned inwards (Lacordaire says "tubercles"). All the specimens before me have the thorax marked with two large black spots joined at the base, and the elytra instead of having five spots have only one on the shoulder, a transverse band at, and another below, the middle black; as the elytral spots are often confluent in these insects I do not think that the Mashonaland specimens represent a new species, but only a variety.

In the female the head is normal.

PEPLOPTERA QUADRIPUNCTATA, n. sp.

Black; thorax rufous, finely punctured; elytra rather strongly and closely punctate-striate, flavous, two spots near the base and two behind the middle, placed transversely, black.

Length 3½ lines.

Head black, the vertex rather closely and finely punctured, the space between the eyes with a round fovea, strongly and closely punctured; antennæ not extending to the base of the thorax,

black, the lower three joints fulvous; thorax rather more than twice as broad as long, narrowed in front, the sides but slightly rounded, the surface very finely but not closely punctured, with a slight depression near the posterior angles, which is a little more strongly punctured, basal lobe broadly produced, narrowly margined with black as well as the anterior margin at the middle; scutellum broader than long, black, shining; elytra strongly lobed at the sides below the shoulders, very closely and rather regularly punctured in rows, flavous or fulvous, a small spot on the shoulders, another near the suture below the scutellum, and two rather larger ones below the middle, placed transversely, black, of these spots the inner ones are the largest; underside and legs clothed with yellowish pubescence, tarsi broad and robust.

Hab. Praetoria, also East Africa.

Closely allied to *P. ecklони*, Lac., but the thorax without any band or spots and the general size smaller. The two specimens contained in my collection agree in every way with each other; for all that, it may be that the species represents but a variety of *P. ecklони*.

PEPLOPTERA COLLARIS, n. sp.

Black; basal joints of the antennæ fulvous; thorax convex, impunctate, fulvous, the base with two large black spots; elytra finely and remotely punctured, flavous, a sutural and lateral narrow stripe black.

Length 4 lines.

Head black; the vertex convex and smooth, the other part finely rugose and depressed between the eyes; the clypeus more sparingly punctured; labrum and palpi black; antennæ only extending to the middle of the thorax, black, the lower four joints fulvous, basal joint strongly incrassate; thorax twice as broad as long, the sides rounded, the anterior margin concave, the surface rather strongly convex, impunctate, reddish fulvous, the base with a large subquadrate black patch at each side, extending upwards to the middle, but both well separated; scutellum black, its apex truncate; elytra finely but distinctly punctured in semi-regular but rather widely separated rows, flavous, the suture with a narrow black band, not extending to the base, the sides with a similar band (leaving only the basal lobe of the ground-colour), abbreviated near the apex, the extreme apical margin likewise narrowly black; underside and legs black, finely pubescent, the tarsi broad and robust.

Hab. Tabora, Ounyamyembe.

Of this species I possess a single example; it is a comparatively large species, and differs from its congeners in the broad subquadrate black patches of the thorax in connection with the sculpture and pattern of the elytra.

PEPLOPTERA FULVITARSIS, n. sp.

Subcylindrical, black; thorax extremely finely punctured, rufous a central elongate and two lateral round spots black; elytra

flavous, strongly and semi-regularly punctured, a spot on the shoulders and a transverse band near the apex black; tibiæ and tarsi flavous.

Length 3–3½ lines.

Head black; the vertex smooth, convex, the lower portion rugose-punctate; antennæ scarcely extending to the middle of the elytra, black, the lower four joints fulvous; thorax with strongly deflexed sides, the lateral margins but slightly rounded, the surface subcylindrical, extremely sparingly and finely punctured, reddish-fulvous, a short elongate spot at the middle and a small spot at each side black; scutellum broad, black; elytra with closely approached rows of strong punctures, which are rather irregularly placed at the base, flavous, a spot on the shoulder and a transverse band at some distance from the apex extending to the sides black; underside closely pubescent, the greater portion of the tibiæ and the tarsi flavous.

Hab. Delagoa Bay, Zambezi River.

Of this species I possess three specimens, which agree very nearly with each other, except that in two of them the small lateral spot on the thorax is wanting. I am unable to find any species or variety described by Lacordaire or others which agrees with the present insect; there are no lateral stripes of the elytra or sutural ones, as in so many species of this genus, and the punctuation of the elytra is strong and closely placed; the tibiæ and tarsi in all the specimens are nearly entirely fulvous.

PEPLOPTERA ANGULATO-FASCIATA, n. sp.

Black; thorax fulvous, with a short central black stripe, the sides punctured; elytra paler, strongly punctured anteriorly; a spot on the shoulders and an angulate narrow band below the middle black.

Length 3½ lines.

Subcylindrical; the vertex convex, finely punctured, with a deep central groove; lower portion of face rugose; antennæ extending to half the length of the thorax only, fuscous, the lower four joints fulvous; thorax twice as broad as long, the sides nearly straight, narrowed anteriorly, the median lobe slightly produced, truncate, the surface convex, reddish fulvous, with some distinct punctures near the anterior margin and at the posterior angles, as well as along the basal margin, the latter at the middle narrowly black, the centre with another short longitudinal black stripe; scutellum black, impunctate, its apex truncate; elytra distinctly lobed at the sides below the shoulders, strongly punctured in closely approached, semi-regular rows, the posterior portion nearly impunctate; the shoulders with an elongate black spot, a strongly angulate narrow transverse band is placed immediately below the middle, the angulate portion being directed towards the apex; the suture is likewise black near the extreme apex; underside and legs strongly pubescent; legs and tarsi very robust.

Hab. Transvaal.

Of this species I possess two specimens; they are at once distinguished by the strongly angulate band which forms a right angle near the sides, without extending to either margin.

PEPLOPTERA HUMERALIS, n. sp.

Subcylindrical, black, clothed with grey pubescence below, above fulvous; thorax minutely punctured, the sides and the anterior margin fulvous, the base black; elytra regularly punctate-striate, fulvous, the suture and the lateral margin posteriorly, a broad transverse band near the apex, and an oblique stripe on the shoulder black.

Var. Thorax fulvous, with three black bands; elytra more finely punctured, the posterior band absent; rest as in the type; tibiæ fulvous.

Length 4 lines.

Head finely and closely punctured, black; the vertex swollen, separated by a transverse groove from the face; eyes large, but slightly notched; antennæ extending to half the length of the thorax, black, the lower three joints fulvous; thorax scarcely twice as broad as long, the sides nearly straight at the base, evenly rounded in front, the surface convex, extremely minutely and sparingly punctured, black, the sides and the anterior margin narrowly fulvous, this colour narrows gradually towards the base, but widens into the black portion at its anterior margin at each side; scutellum black, small; elytra rather strongly and regularly punctate-striate, the punctures much finer and irregular near the apex, the space between the shoulders and the lateral margins impunctate, each elytron with about nine or ten rows of punctures, of which some are more closely approached than others, especially those near the suture and at the sides, the colour flavous or pale fulvous, a broad black band is placed across the suture near the apex, sending upwards a narrow sutural branch as well as a marginal one, both of which extend slightly beyond the middle of the elytra, another oblique short stripe, directed inwards, is placed on the shoulders, not touching the lateral band, the extreme lateral and apical margins are likewise black; underside and legs of the same colour, densely clothed with silvery-grey pubescence; tarsi broad, prosternal ridge distinct.

Hab. Lake Nyassa; var. Port Natal.

This and the following species of *Peploptera* (Diapromorpha) seem to be distinct from any species described by Lacordaire or since, although closely allied to many of them, nor do they agree with any of the varieties given, and I must look upon them as distinct; the general coloration is, however, more or less the same in nearly all species, which makes their determination very difficult unless other characters are taken in connection. The present species seems closely allied to *P. postica*, Lac., but differs in several details, principally in the oblique elytral shoulder-stripe, which is not found in any of the allied species; the variety agrees in that respect, but the posterior band is absent and the thorax is fulvous,

with three longitudinal black bands; this design is peculiar to many species and subject to great variation; all the tibiæ in this variety are likewise fulvous, and the locality is a different one, the elytral punctuation also differs: in spite of all this, the differences are so entirely those of degree, and the elytral pattern and direction of the bands are so similar, that I believe to be right in looking upon this form as a local variety only, more especially as the wide distribution of African insects is well known.

PEPLOPTERA LATERALIS, n. sp.

Black; thorax impunctate, rufous with a central black spot; elytra finely and semiregularly punctured, flavous, a sutural and sublateral stripe, as well as the lateral margins, black; tibiæ fulvous.

Length 3¼ lines.

Head and antennæ as in the preceding species; thorax rufous, very narrowly edged with black, the sides slightly rounded, straight at the base, the surface entirely impunctate, the space in front of the scutellum depressed, with a few punctures, the middle with a narrow black stripe not extending to the apex; scutellum black, small; elytra flavous, with rows of small punctures rather regularly placed, which nearly disappear near the apex; the suture to the whole extent narrowly black, forming a band which is slightly widened near the apex and angulate below the base, another narrow and regular band, slightly narrowed at its middle, extends from the shoulder nearly to the apex, the lateral margin from the middle downwards is likewise narrowly edged with black; underside clothed with silvery pubescence; tibiæ fulvous; tarsi very broad.

Hab. Tabora, Ounyamyembe.

In this species the lateral black stripe of the elytra is placed not at, but before the margin, leaving a space as broad as the band itself between the latter and the lateral edge; in this respect the species differs from any of its allies. A single specimen is contained in my collection.

LACHNÆA MARSHALLI, n. sp. (Plate XVII. fig. 4.)

Black; the head and thorax finely pubescent, the anterior margin and the sides of the latter flavous; elytra very finely punctured, fulvous, each with four small black spots placed transversely (2. 2).

Length 4 lines.

Head closely rugose and sparingly pubescent, the vertex finely punctured, the front with a longitudinal central groove, anterior margin of the clypeus triangularly emarginate, mandibles large; antennæ extending to the base of the thorax, black, the apex of the first, and the second and the third joint entirely, fulvous, third joint very short, fourth triangularly elongate, the following joints very strongly transversely widened; thorax more than twice as broad as long, the sides strongly rounded, as well as the posterior

angles, the surface finely and closely punctured, clothed with whitish long pubescence, black, the anterior and lateral margins narrowly flavous; scutellum raised, black, its apex truncate; elytra opaque, very finely punctured, fulvous, with four small black spots, one on the shoulders, another lower down near the suture, and two placed transversely immediately below the middle; underside and legs black, pubescent, anterior legs very elongate, the tibiæ slightly curved and mucronate at the apex, the first joint of the tarsi elongate, as long as the following two joints together.

Hab. Natal, Ulundi, on flowers at the summit of Niginya, 6500 ft. (*Marshall*).

Very closely allied to *L. marginata*, Lac., but the epistome only moderately concave at the anterior margin; the first joint of the antennæ black, and the following two joints fulvous only, instead of the first four joints of that colour; the elytra reddish fulvous, not pale testaceous, and with four spots only instead of five, the spots of nearly equal size: there are two male specimens before me which are exactly similar in these respects.

GYNANDROPHTHALMA ELONGATA, n. sp.

Pale flavous or fulvous, antennæ (the three or four basal joints excepted) black; thorax impunctate; elytra with rows of very fine punctures.

Length 1½–3 lines.

Of narrowly elongate shape, the female double the length of the male; the head impunctate, the upper portion slightly swollen, obsoletely depressed between the eyes; the clypeus broad and flattened, impunctate, its anterior margin semicircularly emarginate; eyes prominent, slightly notched at their lower portion; antennæ extending to the base of the thorax, black, the lower three or four joints fulvous, the third extremely small, the fifth and following joints very strongly transverse; thorax twice as broad as long, the sides moderately rounded, but slightly narrowed anteriorly, the angles rather obtuse, posterior margin straight at the sides, its median lobe very slightly produced, straight, the base slightly depressed in front of this lobe, with a few distinct punctures, rest of the surface entirely impunctate; scutellum triangular; elytra subcylindrical, with rows of very fine punctures rather distantly placed; abdomen flavous like the rest of the underside; the first joint of the posterior tarsi as long as the following two joints together.

Hab. Sierra Leone, Rhobomp, also Togo, Central Africa.

Evidently very closely allied to *G. miochiroides*, Lefèbv., from Abyssinia, but the author describes his species as having a finely punctured thorax and smooth elytra, which is not the case in the present insect; the female is of very elongate shape, and double the size of the male, but differs in no other way: the insect cannot be mistaken for *Miochira filiformis*, Lac., which has a similar elongate shape and colour, but differs in the structure of the tarsi.

GYNANDROPHTHALMA NATALENSIS, n. sp.

Elongate, narrow, black, the vertex with two small fulvous spots; thorax impunctate; elytra very strongly and semi-regularly punctured, fulvous, a spot below the middle, near the suture, black.

Var. Elytra without spots.

Length 2 lines.

Of narrow, nearly cylindrical shape; the head impunctate at the vertex, the latter with a small fulvous spot above the eyes, lower portion rugosely punctured, the middle with a distinct round fovea; antennæ scarcely extending to the base of the thorax, black, the second and third joints obscure fulvous; thorax more than twice as broad as long, the sides obliquely rounded, narrowed in front, the surface rather convex, entirely impunctate, shining black; scutellum very broad, triangular, the apex slightly raised, the surface impunctate; elytra very strongly punctured in closely-approached semi-regular rows, the sides with a more or less distinct narrow costa from the shoulder to the apex, a small black spot is placed near the suture below the middle; underside and legs covered with greyish pubescence, black; the first joint of the tarsi scarcely longer than the second.

Hab. Natal.

The narrow subcylindrical shape of this species, the colour of the head and thorax, and the two small fulvous spots on the vertex will help to distinguish it from any of its allies. I possess three specimens, two of which are without the elytral spots.

GYNANDROPHTHALMA ATRIPENNIS, Lac.

Specimens were obtained by Mr. G. Marshall at Estcourt, Natal, which entirely agree with Lacordaire's description: a specimen in my collection is, however, of an entirely pale fulvous colour, but differs in no other way whatever; it was likewise obtained at Natal. Lacordaire in his description gives the thorax as twice as long as broad, which of course should be reversed, it being evidently a misprint.

GYNANDROPHTHALMA SEMINIGRA, Jac.

I have now found, unfortunately too late, that this species, described by me in the 'Entomologist,' 1891, is identical with *Clythra intersecta*, Illig.

CRYPTOCEPHALUS LIVINGSTONI, n. sp. (Plate XVII. fig. 11.)

Black; thorax coarsely punctured, flavous, with a transverse black band; elytra strongly punctate-striate, the interstices finely wrinkled, flavous, two connected spots at the base, another below the middle, and the extreme margins black.

Var. *a*. Thorax black, narrowly margined with flavous.

Var. *b*. Thorax as in the type; elytra with a single shoulder-spot only.

Length $1\frac{1}{2}$–$1\frac{3}{4}$ line.

Head strongly rugosely punctured, black, sparingly pubescent; the anterior portion of the clypeus flavous; antennæ extending to the middle of the elytra, slender, black, the basal joint flavous below, the third joint slightly shorter than the fourth; thorax with the sides almost straight, much narrowed anteriorly, the surface strongly and closely punctured, especially at the sides, flavous, the middle of the disc with a broad transverse black band, the posterior margin of which is produced at each end and at the middle into a point; scutellum broadly triangular, its surface flattened; elytra with strong and regular rows of punctures, the interstices finely transversely wrinkled, flavous, all the margins very narrowly black, the shoulders with a black spot, which is more or less connected with another one near the scutellum, forming a short semi-interrupted band, another spot placed below the middle occupies about five rows of punctures in a transverse sense; the underside, pygidium, the femora, and the tarsi (partly) black; the anterior femora more or less flavous below.

Hab. Mashonaland (*G. Marshall*). In the collection of the British Museum and that of my own.

This species differs from most of its African congeners in the strongly and closely punctured thorax in connection with the transverse band of the latter; in respect to the latter, there are not many species which are similarly marked; the sculpturing of the elytra also differs from most African *Cryptocephalinæ*, so that the species will not be very difficult to recognize. In the varieties, the black colour of the thorax predominates to such an extent as to leave the margins only of the flavous ground-colour, this latter being always wider, however, at the sides in all the forms; the elytral spots are likewise often reduced to one only, and are probably entirely absent occasionally; there are, however, only these three varieties before me, amongst the six specimens obtained by Mr. Marshall.

CRYPTOCEPHALUS DECEMNOTATUS, Suffr.

Of this very variable species, an interesting variety was obtained by Mr. Marshall in Mashonaland amongst the typical form with three elytral black spots. In this variety the spots are more or less enlarged, so as to form elongate short stripes, which in one specimen form a sutural and a transverse black band below the middle; this latter band has its upper margin deeply concave between each row of punctures. This variety has not been mentioned by Suffrian. The other characters peculiar to the species, viz. the four thoracic black spots and the punctured interstices of the elytra, are all present in this variety, thus proving its identity with the type.

CRYPTOCEPHALUS NIGROSUTURALIS, n. sp.

Black; the anterior margin and sides of the thorax flavous, the disc very finely rugose; elytra strongly punctate-striate and finely wrinkled, flavous, a spot on the shoulder and a broad sutural band, narrowed behind, black.

Length 1¼–1½ line.

Head black, finely rugosely punctured and sparingly pubescent; antennæ rather short, entirely black, the third and fourth joint equal, the terminal joints slightly widened; thorax with moderately rounded sides, the posterior angles not much produced, the entire surface finely rugose or wrinkled, making the punctuation very indistinct, black, the anterior margin very narrowly and the sides broadly flavous, the yellow colour at the latter place separated from the black portion by a strongly sinuate margin; scutellum very broad, its apex pointed, minutely punctured, black; elytra with regular and deep rows of punctures, the interstices very finely transversely wrinkled, flavous, the shoulders with a black spot, the suture with a broad black band, which widens strongly at the base, so as to very nearly join the shoulder-spot, below the middle the band narrows, but again gets slightly wider near the apex, to which it does not quite extend, the extreme lateral margin from below the base and the apical one are likewise black; the pygidium, underside, and legs are entirely of that colour.

Hab. Mashonaland (*G. Marshall*); coll. Brit. Mus. and my own.

A well-distinguished species, on account of the sculpturing and pattern of its thorax and elytra.

Cryptocephalus natalensis, n. sp. (Plate XVII. fig. 8.)

Dark fulvous; thorax longitudinally strigose, its margins flavous; elytra deeply and closely punctured, the interstices longitudinally costate and with yellow short stripes.

Length 1½ line.

Head with some strong punctures and a central groove at the vertex fulvous; antennæ extending to about the middle of the elytra, black, the lower four joints fulvous, third and fourth joint equal, the fifth more elongate, the following joints slightly shorter; thorax proportionally long, the sides straight, narrowed in front, the entire surface covered with longitudinal strigæ, dark fulvous, the margins narrowly flavous, the sides more broadly so and the base with two very narrow flavous spots; scutellum broadly truncate at its apex, flavous, margined with piceous; elytra slightly narrowed posteriorly, closely impressed with large, deep, and transversely-shaped punctures, the interstices strongly costate, those near the suture of sinuate shape, fulvous; every alternate costa with two or three bright yellow stripes of various length, those at the apex and at the extreme margins nearly entirely of that colour; underside and legs entirely fulvous, the latter robust.

Hab. Natal (my collection).

Of this species I have now seen two specimens, which I formerly referred to *C. araticollis*, Chap., from Zanzibar; with this it entirely agrees in the unusual and interesting sculpturing of the thorax and the elytra: the eyes are likewise closely approached at the top of the head as in Chapuis's species; but as this author says nothing about the yellow margins of the thorax nor of the similarly-

coloured stripes of the elytra, I cannot look upon his species as identical, unless he has forgotten to mention this fact.

CRYPTOCEPHALUS LATEFASCIATUS, n. sp.

Below flavous; head and thorax rufous, the latter impunctate, with two large black spots; elytra very strongly punctate-striate, rufous, a transverse black band at the base and another before the apex.

Length 3 lines.

Of broad and robust shape; the head strongly punctured, with a broad longitudinal depression between the eyes, the latter not very deeply notched; anterior margin of the clypeus semicircularly concave, labrum fulvous; mandibles black; antennæ scarcely extending to the middle of the elytra, fuscous, the lower five joints flavous, the third, fourth, and fifth joint very elongate, nearly equal; thorax twice as broad as long, with a comparative broad lateral reflexed margin, the posterior angles prominent, furnished with some strong teeth, the surface entirely impunctate, rufous, the sides with a broad black band, which does not extend to the anterior margin; scutellum very broad, its apex truncate, the base with a fovea, fulvous, margined with black; elytra with a deep depression within the shoulders, very strongly punctate-striate, distinct to the apex, but not quite extending to the base, the rows somewhat irregular here and there, sometimes with double punctures, the interstices smooth and impunctate, rufous, shining, the base with a broad transverse black band, extending as far as the first row of punctures, leaving the sutural portion round the scutellum, as well as the lateral margin between the last row of punctures, of the ground-colour; this band occupies nearly a third portion of the length of the elytra, a second narrower band is placed below the middle, but extends to the suture, the lower edge of the basal band and the upper margin of the second band are rather strongly sinuate; pygidium, underside, and legs pale fulvous, clothed with short yellow pubescence.

Niger-Benué Exped. (*Staudinger*) (my collection).

Evidently closely allied to *C. sulcifrons*, Suffr., but that species is described with a finely punctured thorax, with the elytral interstices likewise punctured, and with a black elytral band placed at the apex. *C. tempestivus*, Suffr., also resembles the present species in colour and in the position of the elytral bands, but has a black head, a distinctly punctured thorax, very regular elytral rows of punctures with punctured interstices, and is much smaller.

CRYPTOCEPHALUS WESTWOODI, n. sp. (Plate XVII. fig. 9.)

Pale flavous; the head partly and two longitudinal thoracic bands piceous; elytra deeply punctate-striate, the punctures piceous, each with a black spot on the shoulder, two others placed transversely below the middle, and a reddish-fulvous angular band before the middle.

Length 2½ lines.

Head rugosely punctured, more or less dark brown, with the margins round the eyes and the clypeus flavous; antennæ short, not extending much beyond the base of the thorax, the lower five joints flavous, the others black, the second and third joint equal in length, the following two joints more elongate, equal, the others only about one-half longer than broad; thorax of usual shape, the sides moderately rounded, the surface very sparingly and finely punctured, flavous, the basal margin narrowly black, the others brownish, the disc with two longitudinal nearly black bands from base to apex, their margins stained with brown; scutellum flavous, the base black; elytra with the shoulders scarcely prominent, impressed with large, round, and distantly-placed piceous punctures, flavous, the sutural and lateral margins posteriorly brown, the shoulders with a black mark, followed by a transverse, short, strongly-angulate, reddish-fulvous band, which does not extend to either margin, four round black spots are placed transversely below the middle; pygidium with two large dark brownish patches; underside and legs pale fulvous, the breast darker; prosternum broad, its base bisinuate.

Hab. Natal, Estcourt (*G. Marshall*).

This is a curiously-marked species, of which two specimens are before me. I only know of one or two similar instances in which the elytral markings are of two shades amongst the African species of Cryptocephalinæ; as both the specimens are exactly similar in every respect, I have no doubt that it is the normal coloration of the species, which would find its place near *C. bifasciatus*, Fabr., or allies.

CRYPTOCEPHALUS AGGREGATUS, n. sp.

Dark blue or greenish; the tibiæ and tarsi more or less fulvous; thorax strongly rugose-punctate; elytra with deep and very close rows of punctures, the interstices also strongly and closely punctured.

Length 1½–2 lines.

Head closely rugose-punctate, the eyes rather closely approached at the top, broadly triangularly notched; antennæ black, the third and fourth joint equal, the following joints rather strongly triangularly widened; thorax with slightly rounded sides, strongly narrowed anteriorly, the posterior margin without teeth, the surface very strongly convex, deeply rugose-punctate, the punctures round, extremely closely placed, the interstices reticulate and partly confluent; scutellum broad, with a few fine punctures; elytra narrowed posteriorly, the shoulders rounded, not prominent, the surface closely and entirely covered by deep transversely-shaped punctures, which are rather indistinctly arranged in rows and divided by slightly smaller punctures; pygidium black, finely rugose; underside and the femora bluish black, finely punctured and pubescent; tibiæ and tarsi more or less fulvous; prosternum broad, its base nearly truncate.

Hab. Niger-Benué Expedition (*Staudinger*).

The sculpturing of this species is quite exceptional amongst the African representatives of the genus, but it approaches in that respect, as well as in colouring, *C. smaragdulus*, Fabr.; but the present species has entirely black antennæ, rounded shoulders, and the arrangement of the punctures in rows can only be seen in certain lights, as they are so closely approached and having the interstices nearly as strongly punctured.

CRYPTOCEPHALUS TRISULCATUS, Suffr.

Black, clypeus white; thorax and elytra fulvous, the former with two oblique black bands; elytra moderately strongly punctured, a spot on the shoulder and two others, obliquely-transverse, near the apex black; femora black and white.

Var. Thorax with four black spots, elytra without any spots.

Length 2 lines.

Head black, very finely punctured at the vertex; the clypeus and the sides below the eyes yellowish white; antennæ slender, black, the lower five joints testaceous, the third joint one-half longer than the second, the fourth shorter than the fifth joint, terminal joints elongate in the male, shorter in the other sex; thorax strongly narrowed in front, the sides evenly rounded, posterior margin bisinuate at the sides, the surface nearly impunctate, fulvous, the posterior angles flavous, all the margins narrowly black, the middle of the disc with two oblique longitudinal bands, not extending to the apex, and scarcely to the base; scutellum black; elytra rather finely punctate-striate near the suture, the punctures nearly obsolete at the base, the sides more strongly and closely punctured, with the interstices slightly convex, the lateral margins posteriorly as well as the apical ones narrowly black, a black spot is placed on the shoulder and two others near the apex, of these one is situated across the suture, the other rather larger one near the lateral margin and a little higher than the sutural spot; underside and the femora black, the anterior femora with their lower surface nearly white; tibiæ fulvous, or stained with piceous at the apex; prosternum with two small teeth at its base, yellowish white, as well as the mesosternum and the space between the posterior coxæ, the entire underside nearly impunctate.

Hab. Natal, Estcourt (*G. Marshall*).

The position of the elytral spots differs from that of any other African species except *C. erythromelas* with which I am acquainted, and the white clypeus, prosternum, and bicolored anterior femora are likewise characteristic of the present insect. The variety differs in no way from the type except in the absence of the elytral spots and in the breaking up into four spots of the thoracic bands; the former are placed quadrately, thus indicating the oblique shape of the bands in the normal form, marking their commencement and end.

I have given here a new description of Suffrian's species, with which the present insect agrees so closely that I must identify it with it, although the specimens before me are smaller than the size given by Suffrian; this author had also probably old specimens

before him in which the white colour of the clypeus &c. had become discoloured. The variety I mention has not been noticed by Suffrian, and my description of the spotted form is considered by him to represent a rare variety; that the Natal insect may, however, prove to be of another closely allied species is not impossible.

CRYPTOCEPHALUS UNICINCTUS, n. sp.

Black, the base of the antennæ and the tibiæ more or less fulvous; thorax very minutely punctured, fulvous, with more or less confluent black bands; elytra strongly punctate, the insterstices finely punctured, fulvous, the margins narrowly and a short lateral stripe black.

Length 2 lines.

Head strongly rugose and finely pubescent, black; antennæ extending beyond the middle of the elytra, black, the lower five joints fulvous, the second and third joints short, nearly equal, terminal joints rather elongate, shorter in the female as well as the entire antennæ; thorax strongly narrowed in front, the sides but slightly rounded, the disc very minutely and irregularly punctured, reddish fulvous, the sides occupied by two broad black bands of variable width, often connected with another small black spot near the margin, but as frequently separated from it and narrower; scutellum not longer than broad, black; elytra with deep rows of slightly transversely-shaped punctures, the interstices also with a single row of minute punctures, the basal, sutural, and lateral margins (the latter at the posterior portion only) black, the surface pale fulvous, with a short black band from the shoulder to below the middle placed between the seventh and ninth rows of punctures; underside and pygidium black, finely pubescent; the prosternum, mesosternum, and a spot between the posterior coxæ yellow; legs black, the tibiæ more or less fulvous at the base and apex.

Hab. Natal, Estcourt (*G. Marshall*).

The single elytral stripe at the sides and the rugose and black head, as well as the other details pointed out, will separate this species from any of its African congeners. I have seen four specimens only, varying in the amount of black on the thorax and legs.

CRYPTOCEPHALUS BIMACULICOLLIS, n. sp. (Plate XVII. fig. 12.)

Fulvous, thorax impunctate, the disc rufous, the margins flavous, the base with two black spots; elytra finely punctate-striate, yellow, a transverse band at the base and a narrower one near the apex black.

Length 2 lines.

Head with a few fine punctures, the vertex fulvous or piceous, the lower portion flavous; labrum and palpi testaceous; antennæ extending to the middle of the elytra, shorter in the female, the lower five or six joints flavous, the others fuscous, third joint but slightly longer than the second, terminal joints elongate; thorax strongly narrowed in front, the sides nearly straight, the

surface only perceptibly punctured when seen under a strong lens, the entire disc almost occupied by two broad rufous bands, which sometimes unite or are only divided by a very narrow streak of the ground-colour, the anterior margin and the sides more broadly bright yellow, the base with two small black spots, all the extreme margins likewise black; scutellum slightly longer than broad, black; elytra slightly narrowed posteriorly, the space surrounding the scutellum rather raised, the punctures fine, nearly obliterated at the base, the interstices flat, slightly wrinkled here and there, flavous, the base with a transverse black band, which is gradually narrowed towards the suture, but leaves the extreme lateral margin of the ground-colour, another narrower black band is placed near the apex, with its upper and lower margins irregularly indented; underside, legs, and pygidium fulvous, finely pubescent.

Hab. Natal, Estcourt (*G. Marshall*).

This pretty species seems very nearly to resemble in coloration *C. decoratus*, Reiche, from Abyssinia, but the position of the elytral bands and that of the spots of the thorax is different: in the latter respect I am not acquainted with any other species from Africa being similarly marked with three shades of colour, except in the case of *C. decoratus*; but in that species the black spots of the thorax are placed at the middle and not at the base, the antennæ are entirely fulvous, and the elytral bands broader. *C. bifasciatus*, Fabr., has an entirely fulvous thorax, with two central black spots and differently shaped elytral bands. There are four specimens before me.

CRYPTOCEPHALUS ATROCINCTUS, n. sp.

Head, antennæ, and the breast black; thorax fulvous with pale margins and two broad black bands, finely punctured; elytra moderately deeply punctured, flavous, with a sutural and two lateral black longitudinal bands abbreviated posteriorly.

Length 2 lines.

Head black, rather closely punctured; the clypeus and a narrow stripe in front of the eyes greyish or yellowish white; antennæ extending to about the middle of the elytra, slender, black, the lower four or five joints more or less fulvous at the base, third and fourth joint nearly equal, the following more elongate, terminal joints slightly thickened; thorax twice as broad as long, narrowed in front, the lateral margins nearly straight, the basal margin with some small teeth at the angles, the surface very finely and rather closely punctured, reddish fulvous, the margins flavous, the sides more broadly so, extreme basal margin black, the disc with two broad oblique black bands, not extending to the anterior margin and sometimes reduced to two small spots only; scutellum nearly subquadrate, black with a fulvous spot; elytra moderately strongly punctate-striate, the punctures at the sides larger and more closely placed, the surface bright yellow, with three black longitudinal bands, not extending to the apex, the sutural one narrowed at the base but widened into a slightly triangular shape at the apex and

extending to the second row of punctures, the lateral bands occupying four rows of punctures but of the same width as the sutural band, with the margins more regular and less dentate than in the last named, the lateral margin also more or less black posteriorly; underside black, more or less marked with flavous; legs flavous, the femora often partly black or fulvous; prosternum broad, flavous, impunctate; pygidium black, its apex more or less fulvous.

Hab. Natal, Estcourt (*G. Marshall*).

A pretty species allied to *C. vittiger*, Suffr., and *C. contrarius*, Chap., in coloration, but differing in the closely punctured head and the pale margins or stripes surrounding the eyes, and in the yellow clypeus: the stripes of the elytra are also differently shaped; but the amount of black at the underside and of the thorax is very variable, in one specimen the black bands of the latter are nearly united at the middle by a narrow transverse streak, leaving a fulvous patch at the base which is again divided by a central short narrow streak of piceous; the antennæ are also variable in colour. *C. vittiger* has an entirely black head, the elytral bands are differently shaped, and the underside also varies.

CRYPTOCEPHALUS ALLUAUDI, n. sp.

Black and yellow; head with two fulvous spots on the vertex; thorax impunctate, black, the sides, anterior margin, and a spot at the base yellow; elytra strongly punctate-striate, black, a narrow sutural and a broad lateral band yellow; legs flavous.

Var. Elytra black, the shoulders and the apex with a short yellow spot.

Length 1 line.

Of posteriorly slightly narrowed shape; the head rather closely punctured at the middle, black, the vertex with two obscure fulvous spots; the clypeus, a narrow space in front of the eyes, and the labrum yellow; antennæ extending slightly beyond the middle of the elytra, the lower five joints flavous, the others black, the basal joint much thickened, the third and fourth equal, the terminal joints gradually but rather strongly incrassate: thorax twice as broad as long, strongly narrowed in front, the sides straight or very nearly so, with a narrow reflexed margin, the angles not prominent, the surface nearly impunctate, a few scarcely perceptible punctures only being visible under a strong lens, black, the anterior margin narrowly, a broad band at the sides and a square-shaped spot in front of the scutellum yellow; scutellum rather broad, its apex truncate, yellow, narrowly margined with black; elytra narrowed posteriorly, with deep rows of punctures, distinct to the apex, the interstices slightly transversely wrinkled here and there, the colour black, a narrow, anteriorly widened sutural stripe, not extending to the apex, and a broad band at the sides not extending to the margins nor to the apex, but of variable width, yellow; underside finely pubescent, black; the prosternum, mesosternum, the last abdominal segment, and the legs flavous, the latter rather darker; prosternum subquadrate, its base slightly

concave, the sides with a raised margin; pygidium fulvous with a black patch at the middle.

Hab. Assinie, W. Coast of Africa (*Ch. Alluaud*).

Likewise allied in coloration to *C. vittiger*, Suffr., *C. jucundus*, Dohrn, but differing in the colour of the thorax, scutellum, &c. The amount of black and yellow is very variable, the bands of the thorax and elytra differing much in their width; in the variety there are only four yellow spots present on the elytra, indicating the bands, and it is probable that the other extreme in which the yellow predominates may be found: the small subquadrate yellow spot in front of the scutellum is a good mark of recognition in this species.

CRYPTOCEPHALUS PORICOLLIS, n. sp.

Dark brown; antennæ and legs flavous; thorax deeply punctured and longitudinally strigose, the margins and two spots flavous; elytra deeply punctate-striate, the interstices costate, flavous, an obscure transverse band before, another below the middle, and the apex dark brown.

Length 1 line.

Head with a few punctures at the vertex and round the eyes, the former brown, the latter closely approached at the top, the intermediate space and the clypeus flavous; antennæ nearly extending to the middle of the elytra, flavous, the basal joint much thickened, the second short, the third and fourth equal, slender, the terminal joints more elongate, slightly thickened; thorax twice as broad as long, the lateral margin straight, narrowed towards the apex, the surface very closely and deeply punctured, the punctures rather more widely placed near the base, the interstices everywhere longitudinally raised and obliquely directed towards the base, dark brown, the anterior and lateral margins, the former very narrowly, and two round spots near the base, flavous, extreme basal margin black; scutellum triangular, its apex raised; elytra subcylindrical, the punctured striæ deeply placed, all the interstices strongly costate, flavous, this colour interrupted by two obscure transverse brown bands before and below the middle, the second band is generally widened near the suture, the apices are likewise more less brown; the underside is sparingly punctured, dark brown; the prosternum is broad and widened towards the base, finely punctured.

Hab. Madagascar, Diego-Suarez (*Ch. Alluaud*).

A pretty little species, much distinguished by the sculpture of the thorax, and evidently closely allied to several other Madagascar species described by the late Duvivier, having the elytra similarly strongly costate; in none of these, however, is the thorax coarsely punctured and strigose.

CRYPTOCEPHALUS ARMATUS, n. sp.

Black; the clypeus, basal joints of the antennæ, and the legs flavous; thorax finely and closely punctured, flavous with two large black spots; elytra strongly punctate-striate, the interstices

closely punctured, flavous, a sutural band and two large spots at the sides black.

Length 1¼ line.

Head very broad, finely and closely punctured, black; the clypeus separated from the face by the perfectly straight lower edge of the latter and placed at a deeper level, flavous, bounded at each side by a long triangular projection of the head, mandibles large and broad; antennæ short, black, the lower five joints flavous, third, fourth, and fifth joints equal, short, terminal joints transversely widened; thorax strongly transverse, but slightly widened at the middle, the lateral margins nearly straight, the surface closely and finely but distinctly punctured, flavous, the extreme margins dark, the disc with two large transversely-shaped black spots, occupying the greater part of the sides; scutellum broad, its apex truncate, black; elytra with regular rows of strong punctures which get finer towards the apex, the interstices also very distinctly and closely punctured, flavous, the suture with a narrow black band which below the middle widens into a lancet-shaped spot, the sides with two large black spots, one on the shoulder and the other immediately below it, both large and of irregular shape, the lower spot ending at some distance from the apex; below black, the apex of the abdomen and the pygidium flavous, the latter with a small black spot at the apex; legs fulvous.

Hab. Niger-Benué Exped. (*Staudinger*).

Of this little species, which is much distinguished by the shape and structure of the head, I received a single example from Dr. Staudinger.

CRYPTOCEPHALUS MARSHALLI, n. sp. (Plate XVII. fig. 10.)

Head yellow, spotted with black; thorax flavous, finely punctured, with a transverse band at the middle and the base black; scutellum black; elytra moderately strongly punctate-striate, flavous, the margins narrowly, four spots placed quadrately at the base, and another Λ-shaped spot below the middle at the sides, black; underside and legs fulvous, spotted with black.

Length 2½ lines.

Head closely and strongly punctured; the vertex black, with two small flavous spots; the lower portion flavous, with a black spot at the base of the antennæ, the latter scarcely extending to the middle of the elytra, fulvous; the terminal four or five joints more or less black, the third joint twice as long as the second, fourth slightly longer than the third, the following joints rather strongly widened; thorax strongly transverse, rather short, the sides rounded, strongly narrowed in front, the surface closely and finely punctured, flavous, the middle of the disc occupied by a narrow transverse black band, not extending to the sides but connected with another narrower band of irregular shape at the base by a narrow central streak of black and also sometimes at each end; scutellum not longer than broad, black; elytra not very strongly punctured, the interstices flat and impunctate, the

sutural, basal, and the lateral margin posteriorly black, below the base four black spots of irregular shape are placed in an oblique quadrate position, of these, one is situated on the shoulder, the other directly below it, the other two between the lateral spots and the suture, also below each other, occupying the third and fourth and the fifth, sixth, and seventh interstices respectively, the Λ-shaped marked is placed below the middle near the lateral margin and is sometimes divided into two irregular spots; pygidium fulvous, finely pubescent; underside and legs of the same colour; the sides of the breast and a spot on the upper portion of the femora blackish.

Hab. Natal, Estcourt (*G. Marshall*).

In the markings of the thorax this species resembles *C. denticulatus*, Suffr., of which it may possibly be an extreme variety; I have, however, two specimens before me which almost entirely agree with each other, and in these the elytral markings are quite different from the above-named species, especially in the very narrow black sutural and lateral margin (the last of which commences at the middle only). Suffrian also speaks of finely wrinkled and punctured elytral interstices, of which there is no trace in the present insect.

CŒNOBIUS FLAVITARSIS, n. sp.

Black, shining, the basal joints of the antennæ, the apex of the tibiæ, and the tarsi flavous; thorax strongly punctured; elytra very strongly punctate-striate, the interstices longitudinally costate at the sides.

Length $\frac{3}{4}$ line.

Head black; the entire vertex and the sides occupied by the eyes, which meet at the top; antennæ extending a little beyond the base of the thorax, black, the basal five joints flavous, third and fourth joint very small, terminal joints distinctly widened; thorax about one-half broader than long, the sides nearly straight and much narrowed anteriorly, the surface with a deep transverse oblique groove at each side, strongly and rather closely punctured, the punctures somewhat oblong in shape, the basal margin with a row of deep and closely placed punctures; scutellum narrowly elongate; elytra with very deep and close rows of punctures, the shoulders very prominent, the basal margin in shape of a ridge, the interstices longitudinally costate, more strongly so at the sides than at the disc; the underside, pygidium, and the legs black, the extreme apex of the tibiæ and the tarsi flavous.

Hab. Mashonaland (*G. Marshall*). A single specimen in the British Museum collection.

Allied to *C. nigritellus*, Suffr., but at once distinguished by the flavous tarsi and the sculpturing of the thorax &c. *C. suffriani*, Jac., has the head strigose at the vertex, the antennæ scarcely widened, the thorax without lateral depressions, and the tarsi black.

CHLAMYS NATALENSIS, n. sp.

Obscure fulvous or piceous; the antennæ and the tibiæ fulvous;

thorax with a central sulcate elevation, finely rugose; elytra with eight or nine strong tubercles, the disc with a fulvous or flavous oblique ridge, the interstices finely rugosely punctured; pygidium foveolate-punctate.

Length 1 line.

Of posteriorly slightly narrowed shape, varying in colour from fulvous mixed with piceous or nearly entirely of the latter colour, but the raised tubercles generally of paler coloration; the head entirely finely rugose or closely covered with round punctures, which are more or less of whitish corrugated appearance at the vertex; eyes transversely and narrowly notched; antennæ very short, fulvous, the second and following joints very short, the terminal five transversely shaped; thorax with the middle portion raised into a high bump, the centre of which is longitudinally sulcate, from this elevation three or four oblique ridges run downwards at the sides towards the margin, all the interspaces between these ridges are closely rugose like the head, and assume the same whitish appearance at the sides and in front of the elevation, the other portions remaining partly nearly black or fulvous, the lateral margins are nearly straight, the basal one is deeply sinuate at the sides; scutellum strongly transverse; elytra sculptured like the thorax; with a strongly raised oblique ridge of flavous or fulvous colour at the middle of the disc, at the commencement and at the apex of this ridge, two or three tubercles, placed obliquely, are situated, which are partly joined; of the other tubercles, a very highly raised one is placed at the base, one near the suture at the apex, and one near the lateral margin at the same place, as well as one at the sides close to the ridge near the middle of the elytra, the entire suture of the latter is finely serrate; underside and pygidium sculptured as the upper surface, the pygidium with several deeper dark-coloured foveæ; legs fulvous, stained with piceous; tarsi entirely dark.

Hab. Natal, Estcourt (*G. Marshall*).

Three African species of *Chlamys* have up to the present been described, from all of which *C. natalensis* differs in its coloration and peculiar sculpturing; in all specimens the curious whitish or mouldy appearance of part of the thorax and other portions is present, although variable like the coloration.

EXPLANATION OF PLATE XVII.

Fig. 1. *Lema tarsata*, p. 241.
2. „ *marshalli*, p. 239.
3. *Hemydacne maculicollis*, p. 244.
4. *Lachnæa marshalli*, p. 251.
5. *Miopristis natalensis*, p. 245.
6. „ *atrofasciata*, p. 246.
7. „ *subrugosa*, p. 246.
8. *Cryptocephalus natalensis*, p. 255.
9. „ *westwoodi*, p. 256.
10. „ *marshalli*, p. 263.
11. „ *livingstoni*, p. 253.
12. „ *bimaculicollis*, p. 259.

February 16, 1897.

Prof. GEORGE B. HOWES, F.Z.S., in the Chair.

Dr. E. C. Stirling, F.R.S., C.M.Z.S., exhibited some bones, casts, and photographs of the large extinct struthious bird from the *Diprotodon*-beds at Lake Callabonna, South Australia, which had been recently discovered and named by him *Genyornis newtoni*, and gave a history of the principal facts connected with its discovery [1].

Mr. G. E. H. Barrett-Hamilton, F.Z.S., exhibited a pair of tusks of the Pacific Walrus (*Trichechus obesus*), which he had purchased at Petropaulowsk, in Kamschatka. He regretted that he was unable to exhibit the skull, which he had also purchased, but which had not yet reached England. The present tusks were the largest of a good many which he had seen at Petropaulowsk; and it was a peculiarity of that place that the hunters there seemed to bring in the complete skulls of those which they kill, whereas the tusks for sale on the Alaskan side of the Pacific were, usually, removed from the skulls. This, however, was not a matter of surprise, considering the weight of the heads when complete.

The Pacific Walrus was not well known to English naturalists; and Mr. Barrett-Hamilton stated that he could find no tusks of this species either in the British Museum or in the Museum of the Royal College of Surgeons.

He considered that the Pacific Walrus was a good species or at least subspecies, and that the characters pointed out by Mr. J. A. Allen, in his Monograph of North American Pinnipeds, to distinguish it from the Atlantic form were correct. He regretted, however, that he himself had not had the good fortune to see the Walrus of the Pacific in life, as they were now exterminated in the parts of the North Pacific in which he had travelled. The tusks of the Pacific Walrus were very much larger than those of the Atlantic species, and Mr. Barrett-Hamilton stated that he had seen nothing in London which at all approached the size of the tusks now exhibited. In the Pacific, however, he had heard of the occurrence of larger specimens. The animal itself was also larger than the Atlantic form, and, according to Mr. Allen, had a very different facial outline. Besides some differences in the skulls by which the two species might be distinguished, the tusks in the Pacific form were usually more or less convergent, and Mr. Barrett-Hamilton had seen tusks which actually overlapped. "In the Atlantic species the tusks were, as a rule, divergent; while

[1] On this subject see 'Nature', vol. l. pp. 184, 206 (1894).

in the Pacific species the tusks descended almost vertically, in the Atlantic species they were quite uniformly strongly incurved" (Allen, *op. cit.* p. 168).

In reply to enquiries of Mr. Sclater as to what Cetaceans and Seals besides *Otariæ* he had met with in the Pacific, Mr. Barrett-Hamilton stated that he had not observed many Seals.

Seals of the genus *Phoca* (probably *P. vitulina*) were common in Tareinski Harbour, near Petropaulowsk, and there were Seals at St. Paul Island (Pribiloff group) which seemed to be very much larger than the common *P. vitulina* of the Atlantic. Mr. F. A. Lucas, of Washington, had procured a specimen of the latter, and it was possible that the species would be described as a new one, but there was no doubt that it was very closely allied to *P. vitulina*.

The form of *P. vitulina* met with on the coast of California had been described as a species in 1866 by Gill, under the name of *P. pealei*, but this separation had not been accepted by later writers.

Of Cetaceans he had seen the common Porpoise, which is abundant at San Francisco. Another species, *Phocæna dalli*, was found on the Alaskan coast.

Dolphins he had seen frequently, but all were probably of the widely-distributed and pelagic species, *Delphinus delphis*.

Killers (*Orca gladiator*) were common in the autumn in the neighbourhood of the Seal Islands, and probably eat large numbers of the Fur-Seals. They usually swam in small companies very close together, and Mr. Barrett-Hamilton stated that at the Kommandorski Islands he had been within a few yards of a pair in a boat. The dorsal fin of some specimens hangs downwards in a very curious way as if it had been broken near the tip.

Captain Garforth, of H.M.S. 'Pheasant,' had informed Mr. Barrett-Hamilton that on the 13th of September (1896) Killer Whales were so numerous off Unimak Pass in the Eastern Aleutian Isles, that he had to stop the ship several times to avoid running into them. He thought it was no exaggeration to say that they were there in thousands.

The only other Whale which Mr. Barrett-Hamilton had met with was a Humpbacked Whale (*Megaptera* sp. inc.), which was very numerous about Unalaska. It was supposed to be of a different species from that found in the Atlantic, as was also the Black-fish (*Globiocephalus*) of the Pacific, but there had been nothing positively settled on the subject.

He had not met with *Rhachianectes glaucus*, but had seen a few Fin-backed Whales (*Balænoptera* sp. inc.) near Unalaska.

Some of the whalers had made good catches of the North Pacific Right-Whale (*Balæna japonica*) this year, and Sperm Whales (*Physeter*) also occurred in the North Pacific.

The following papers were read :—

1. On *Echidnocephalus*, a Halosauroid Fish from the Upper Cretaceous Formation of Westphalia. By A. SMITH WOODWARD, F.Z.S., of the British Museum (Natural History).

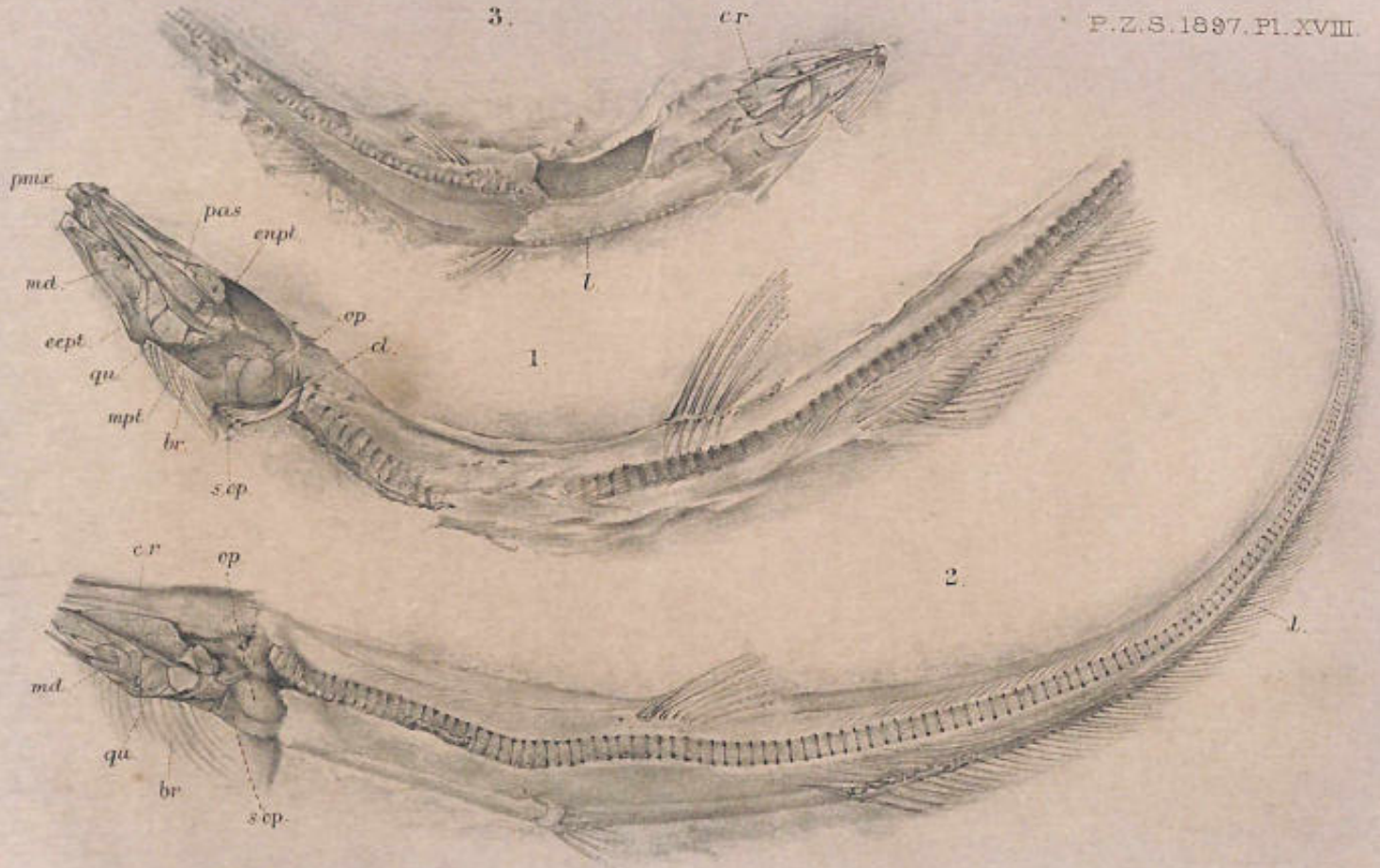
[Received January 19, 1897.]

(Plate XVIII.)

In 1858 Dr. W. von der Marck [1] described a curious eel-shaped fish with well-developed pelvic fins and a separate short dorsal, from the Upper Cretaceous formation of Westphalia. He gave it the generic name of *Echidnocephalus*, and in 1863 [2] he added to his description some rather sketchy figures of four specimens. In the last-mentioned year Mr. J. Y. Johnson presented to this Society [3] a description of an existing fish from the seas off Madeira, remarkably similar in general aspect to the extinct form; and for this he proposed the generic name of *Halosaurus*, noting the aberrant characters which later induced Dr. Günther [4] to make it the type of a distinct family, the Halosauridæ. The striking resemblance between these two fishes does not appear to have been hitherto observed; but, thanks to Dr. Günther's anatomical investigation of new specimens of *Halosaurus* obtained by the 'Challenger' Expedition [5], it is now possible to demonstrate that the correspondence between the Cretaceous and Recent forms in question is exact even to some of the most specialized osteological features. I have not yet had the privilege of studying the original fossils referred to by Dr. von der Marck, but there are four very fine specimens from the same formation and locality in the British Museum. These form the subject of the following descriptions, and suffice to show very clearly how the strange Halosauroid type was already completely developed before the end of the Cretaceous period.

The finest specimen showing the head (Plate XVIII. fig. 1) is a little distorted in the anterior part of the abdominal region, and wants the hinder half of the tail. The head is exhibited in direct side-view, but its structure is very difficult to interpret, most of the bones being shown only in impression, while the opercular apparatus is crushed upon the hyoid and branchial arches, and the pterygo-quadrate arcade upon the more external bones. The cranium is long and narrow and much depressed, as indicated by a fragment of the parasphenoid (*pas.*) preserved in the orbital region. An impression of the parieto-frontal region suggests that the cranial roof was smooth and gently arched from side to side, without any occipital crest. Below the anterior three-quarters of the skull there is an impression of the pterygo-

[1] Zeitschr. deutsch. geol. Gesell. vol. x. (1858), p. 247.
[2] Palæontographica, vol. xi. (1863), p. 55, pl. viii. figs. 1–3, pl. xiv. fig. 1.
[3] Proc. Zool. Soc. 1863, p. 406, pl. xxxvi. fig. 2.
[4] Catal. Fishes Brit. Mus. vol. vii. (1868), p. 482.
[5] A. Günther, "Report on the Deep Sea Fishes," 'Challenger' Reports, vol. xxii. (1887), p. 232, pl. lx. figs 1–8.



J. Green del. et lith.

ECHIDNOCEPHALUS TROSCHELI.

Mintern Bros. imp.

quadrate arcade, very slender in front and reaching forwards almost as far as the symphysis of the mandible. The suspensorium is obviously much inclined forwards. The quadrate (*qu.*) is observed to be small and wedged between the ectopterygoid (*ecpt.*), entopterygoid (*enpt.*), and metapterygoid (*mpt.*). The mandible (*md.*) is long, elevated in the middle, and truncated at the symphysis; but although it articulates with the quadrate just behind the middle point of the head, the gape of the mouth seems to have been small, scarcely half the extent of the ramus entering the oral border. A stout marginal bone of the upper jaw is imperfectly shown sloping downwards and backwards from the end of the rostrum to a point just behind the mandibular symphysis, and this may be interpreted as premaxilla (*pmx.*). The mouth must have been distinctly inferior, the rostrum a little prominent. Behind the skull there is the smooth impression of a relatively small trapezoidal plate, which may be regarded as the operculum (*op.*); but its antero-superior border is not clearly defined. Adjoining this plate at its antero-inferior margin is another larger plate ornamented with fine, radiating striæ, which are evidently directed almost at right angles to its curved posterior and inferior border. This bone exhibits no connection with the mandibular suspensorium, which is considerably further forwards, and its precise shape cannot be determined owing to a crush upon the hyoid arch; it is evidently the suboperculum (*s.op.*). Impressions of nine slender and gently curved branchiostegal rays (*br.*) are shown, and are attached to a remnant probably of the ceratohyal. The vertebræ are merely shown in impression, but they are extremely numerous, while the centra are short and deep, each marked by fine longitudinal ridges. The vertebral arches are too delicate to be clearly observed. A delicate, curved, clavicular bone (*cl.*) occurs behind the opercular apparatus, but there are no traces of the pectoral fins. The remains of the pelvic fins are also too imperfect for description; but the anterior rays of the short dorsal, slightly further back, are beautifully shown. The foremost ray seems to have been undivided, and is two-thirds as long as the second. This also is not forked, but appears to have been articulated at moderately wide intervals in the distal portion. The third, fourth, and fifth rays not only exhibit distant articulations, but also bifurcate twice in the distal portion. The hinder rays are imperfect, the bases only of three being preserved. The anal fin-supports are very short in proportion to the length of the rays, and do not interdigitate with the more slender hæmal arches, which are inclined to the axis of the body at a much more acute angle than they. The foremost anal fin-ray is undivided and somewhat shorter than the next. The fifth ray exhibits one bifurcation, but the impressions of the others, so far as distinguishable, are simple. No scales can be seen.

Another specimen (Plate XVIII. fig. 2) displays the trunk especially well in impression, with fragmentary remains of the head. The articular end of the mandible (*md.*) is shown, with straight inferior border, very low articulation, and the ramus rapidly rising

to the coronoid region. The quadrate bone (*qu.*) is clearly thrust between the pterygoids as in the last specimen, and its thickened hinder border is preserved. An imperfect impression of the cranial roof (*c.r.*) seems to indicate a narrowing between the orbits. The characteristic operculum (*op.*), suboperculum (*s.op.*), and 12 branchiostegal rays (*br.*) are also imperfectly shown in impression. Of the vertebral centra only fragments are preserved in the abdominal region—nearly all are indicated in impression. The centra are very short and deep in the abdominal region and the anterior half of the tail, but relatively longer more posteriorly. Their sides are marked by fine longitudinal ridges, and the few centra preserved immediately behind the head are much laterally compressed by crushing, as if they were not well ossified. Eighty centra can be counted before they become as long as deep, and the impression of the hinder half of the tail is not quite clear. The neural and hæmal arches are extremely delicate, and much inclined backwards. There are no traces of the pectoral fins; but there are fragmentary remains of the pelvic pair and their supports entirely in advance of the dorsal fin. The latter arises about opposite the thirty-fifth vertebra and shows seven rays, with uncertain evidence of an additional one in front and behind. The distal bifurcations of the middle rays are preserved. The anal fin, extending about half the total length of the fish, arises nearly opposite the forty-ninth vertebra. Its rays are extremely numerous, but are not sufficiently distinct in the hinder part to be counted; the foremost rays are apparently thickened by the sliding apart of their right and left halves. Along the ventral border of the trunk there is a narrow streak in which a chain of scutes or abnormally developed scales can be recognized on parts of the caudal region (*l.*).

A third specimen in counterpart (Plate XVIII. fig. 3) exhibits the head and the greater portion of the trunk, with an especially conspicuous display of the ventro-lateral row of enlarged scales just mentioned. On one side of the fossil an impression of the cranial roof is distinct (*c.r.*) showing the truncated occiput, the nearly parallel sides of the otic region, and the slender rostral region, but none of the sutures. There is also some indication of an interorbital constriction, but this may possibly be a false appearance due to the crushing of the parasphenoid upon the roof. Traces of the striated suboperculum are distinguishable; and several branchiostegal rays occur on the opposite side of the specimen. The crushed, short, and delicate vertebral centra are distinguishable; and in the caudal region the almost filamentous neural and hæmal arches are observable, all much inclined backwards, and those at the hinder end of the fossil clearly inclined to the axis of the fish at a much more acute angle than the short supports of the anal fin. The remains of only six rays are shown in the dorsal fin. The pelvic pair are crushed together and imperfectly seen from above or below; about twelve rays can be counted in the patch they form. The precise characters of the enlarged scales of the conspicuous ventro-lateral series (*l.*) cannot be determined, but some appear to

exhibit traces of a longitudinal ridge or angulation. No other scales are preserved.

The fourth and last specimen in the British Museum (no. P. 2114) is preserved on a slab with remains of other fishes. Part of its soft tissues are shown in places as a blackened film, but, like the other specimens, it exhibits no clear indication of scales. The low cranium is observable in broken longitudinal section, while there are imperfect impressions of the characteristic pterygo-quadrate arcade and opercular apparatus. There are also impressions of ten very slender and widely-spaced branchiostegal rays. Immediately behind these occurs the clavicle, but no pectoral fin. The vertebræ are well shown, of the form and character already described. The delicate ribs are very short, apparently not reaching more than halfway to the ventral border; and there seem to be long and slender intermuscular bones crushed across the neural arches both in the abdominal and caudal regions. One of the pelvic fins exhibits six rays, all except the foremost divided in the distal half; its support is longer than broad and tapers to a point in front; it is shown in the impression. Six rays are well preserved in the dorsal fin, and there may have been one or two more beyond. The first of these rays is simple and a little shorter than the others; the second is also simple, but slightly longer and with distant articulations; the third is the longest ray, while this and the other three are once bifurcated distally. The anal fin is imperfect at its free border, and the end of the tail is wanting.

So far as the characters of *Echidnocephalus* are shown by these specimens, the Cretaceous fish only appears to differ from the Recent *Halosaurus* in three particulars: no scales are observable in the British Museum fossils except along the sensory canal of the "lateral line"; no pectoral fin is distinguishable; and the number of rays in the dorsal and pelvic fins is less than is usual in the existing genus. The first two of these differences, however, may be due to imperfections in preservation; and Dr. von der Marck has indeed mentioned [1] that some specimens exhibit very delicate scales, covering the whole of the trunk. The third point is comparatively insignificant. Other differences may still be discovered in the characters of the facial bones and dentition, which remain unknown; but, in any case, it will be realized that in all essential features the Halosauroid type of fish is one of great antiquity.

EXPLANATION OF PLATE XVIII.

Figs. 1–3. *Echidnocephalus troscheli*, W. von der Marck.—Upper Cretaceous (Senonian); Sendenhorst, Westphalia. *br.*, branchiostegal rays; *c.r.*, cranial roof; *cl.*, clavicle; *ecpt.*, ectopterygoid; *enpt.*, entopterygoid; *l.*, enlarged scales of "lateral line"; *md.*, mandible; *mpt.*, metapterygoid; *op.*, operculum; *pas.*, parasphenoid; *pmx.*, premaxilla; *qu.*, quadrate; *s.op.*, suboperculum.

[The figures are of the natural size, and the original specimens in the British Museum are numbered respectively P. 2111, P. 4481, P. 5949.]

[1] Palæontographica, vol. xv. (1868), p. 288; *ibid.* vol. xxii. (1873), p. 62; and *ibid.* vol. xxxi. (1885), p. 260.

2. On a Specimen of *Acanthocybium solandri* from the Arabian Sea. By G. A. Boulenger, F.R.S.

[Received January 30, 1897.]

The Trustees of the British Museum have recently received from their enthusiastic and generous correspondent at Muscat, Surgeon-Lieut.-Col. Jayakar, C.M.Z.S., a specimen of a pelagic[1] Scombroid (*Acanthocybium solandri*), of which half a dozen specimens at the outside are known to be preserved in museums, and of which nothing but a dried head from the Atlantic, presented by Prof. Lütken, was until now in the National Collection.

The specimen is further of interest as affording the first record of this fish in the Indian Ocean.

The species was originally described by Cuvier and Valenciennes as *Cybium solandri*, from a MS. description and figure by Solander, taken from a specimen observed in 1769 about the Pomotu Archipelago, South Pacific Ocean, which figure has since been reproduced by Günther in his 'Fische der Südsee.' The specimen was 4 ft. long, and the radial formula is given as: D. 26+11+IX; A. 12+X; C. 33; P. 22; V. 1/5.

Shortly after, in 1839, the same fish was redescribed, under the name of *Cybium sara*, by Bennett, from notes and a sketch taken by Surgeon Collie of a specimen about 4½ ft. long observed at the Loo Choo Islands. Radial formula: D. 25+?+IX; A. ?+IX. This *C. sara* became, in 1862, the type of Gill's genus *Acanthocybium*, a genus which, as Lütken has shown, is fully entitled to recognition. Dr. Günther has since referred the species to the synonymy of *C. solandri*, a fact which Vaillant appears to have overlooked when redescribing it in 1885, from a specimen of unknown origin preserved in the Paris Museum (D. 25+11+VIII; A. 12+IX).

A very similar fish was described by Poey in 1860 as *Cybium petus*. This was said to be not uncommon off Cuba, growing to a length of 5 ft., but, owing to its large size, specimens were not preserved, and it was described from notes and sketches made on a fresh specimen. D. 23+12+VIII; A. 12+IX. *C. petus* is referred by Lütken to the synonymy of *C. solandri*.

The same species appears once more under a new name in 1872, when Doderlein gives a detailed description of it, accompanied by an excellent figure, as *Cybium veranyi*, from off the coast of Sicily. D. 26+12+VIII–IX; A. 12+IX–X; P. 24; C. 1/5. This is also regarded as a synonym of *C. solandri* by Lütken, who states that specimens up to 7 ft. long are occasionally captured in the Atlantic, north and south of the Equator, heads and tails only being preserved. Jordan mentions it as "not very common" about the Florida Keys; a single specimen was taken at Key West. D. 25 +12+IX; A. 13+IX.

In the work quoted above Günther has also reproduced a figure,

[1] Rightly regarded as such by Lütken, although not included in Goode and Bean's 'Pelagic Ichthyology.'

made by Garrett from a specimen 3 ft. long, obtained in the South Pacific, 300 miles north of the Hervey Islands. The differences observable on comparing this figure with that of Solander are probably due to the imperfection of the drawing. D. 25+10+VIII; A. 11+VIII.

The synonymy of *Acanthocybium solandri* would therefore be as follows:—

1831. *Cybium solandri*, Cuv. & Val. Hist. Poiss. viii. p. 192.
1839. *Cybium sara*, Benn. in Beechey, Voy. 'Blossom,' Zool. p. 63, pl. xx. fig. 2.
1860. *Cybium petus*, Poey, Mem. Cuba, ii. p. 234, pl. xvi. fig. 1.
1868. *Acanthocybium petus*, Poey, Repert. fis. Cuba, ii. p. 363.
1872. *Cybium verany*, Doderl. Giorn. Sc. Palermo, viii. p. 125, pl. iv. fig. 2.
1876. *Cybium solandri*, Günth. Fische d. Südsee, p. 153, pl. xciv.
1879. *Acanthocybium peto*, Poey, Proc. U.S. Nat. Mus. i. p. 5.
1880. *Acanthocybium solandri*, Lütk. Spol. Atlant. i. pp. 71 & 189.
1884. *Acanthocybium solandri*, Jordan, Proc. U.S. Nat. Mus. vii. p. 119.
1885. *Cybium sara*, Vaill. Bull. Soc. Philom. (7) ix. p. 21.

I append a short description of the specimen, preserved as a skin $3\frac{1}{3}$ ft. long, obtained at Muscat by Mr. Jayakar.

D. 25+13+IX; A. 11+IX; P. 25; V. 6.

Depth of body 7 times in total length, length of head $4\frac{2}{5}$ times. Eye 8 times in length of head, 4 times in length of snout, twice in interorbital width; præmaxillary extending to below anterior border of eye, with about 50 teeth on each side, its beak-like anterior portion equalling its distance from the eye; chin pointed, slightly projecting. First dorsal a little longer than second, originating above base of pectoral; spines subequal, $\frac{1}{4}$ length of head, a little longer than longest rays of second dorsal, from which it is separated by a space equal to $\frac{1}{5}$ length of head; second dorsal a little in advance of anal. Pectoral not quite half length of head; ventral $\frac{2}{3}$ length of pectoral. Lateral line descending in a curve below the second third of the anterior dorsal, terminating on the tail in a strong keel which is as long as the postorbital part of the head. Uniform dark olive above, pale golden on the sides and below.

3. Remarks on the Existing Forms of Giraffe.

By W. E. de Winton, F.Z.S.

[Received January 30, 1897.]

There seems to be some doubt among naturalists in regard to the specific relations of the Giraffes of Nubia and the adjacent countries to those of Africa south of the Equator; the almost total absence of wild-killed specimens of the northern form during the last half-century until within the last year or two is no doubt

the reason for the nomenclature of the two species being left in a very unsettled state.

The exhibition of the skin of a Somaliland animal by Mr. Oldfield Thomas, on behalf of Messrs. Rowland Ward & Co., at a meeting of the Society on Feb. 20th, 1894, made me look into the literature on the subject. Since then the British Museum has been fortunate in augmenting the older material by heads of both species received from the actual collectors—Mr. H. A. Bryden having presented a head of the Southern form brought home by Kama, killed in the North Kalahari; and Mr. Arthur H. Neumann a head of the Northern form, killed a little to the east of the Loroghi Mountains and north of the Guaso Nyiro (about 1° N. lat.); besides which others have been acquired by purchase.

I must express my thanks to the authorities of the Museum for giving me every facility in examining the material in the National Collection. I have also had access to several specimens contained in private collections, and to the valuable collection of skulls in the Royal College of Surgeons, kindly placed at my disposal by Professor Stewart. That so few specimens of this extraordinary animal find their way to this country is no doubt due to the value set upon the hides in the countries where they are obtained, by the natives for making shields, and by the settlers for "sjamboks," or whips, the skin of the neck of a bull Giraffe standing second only to Hippopotamus hide in value. Besides, the absence of attractive horns does not commend the head in the eyes of sportsmen as a trophy of sufficient value to repay them for the trouble and expense of transporting such bulky material to the coast, so that all the more credit is due to those generous and patriotic hunters who have presented specimens to the National Collection.

At the meeting of the Society when the above-mentioned Somaliland specimen was exhibited, Mr. Oldfield Thomas pointed out the differences in the markings characteristic of the two forms; and in order to show that the Somaliland animal did not need description, as had been suggested, mentioned that Sundevall's name would apply to the specimen under notice, but, pending the arrival of a fresh wild-killed southern specimen to compare with it, purposely ignored the obvious fact that Linnæus's name applied solely to the northern form.

Etienne Geoffroy St.-Hilaire (Ann. Sci. Nat. 1827, p. 222) was the first to mention any distinction between the Northern and Southern Giraffes, but seems never to have fulfilled his promise to describe the two forms further and to give them specific names, though he gives a plate of the skull of the "Giraffe du Cap."

Fischer (Syn. Mamm. 1829, p. 456) mentions this fact thus: "*Camelopardalin Sennaarensem a Capensi specie differere Geoffroy aliique recentiores, notis tamen, quibus utraque distinguatur, nondum indicatis.*" This sentence may have been considered sufficient to constitute a naming of the two species, or perhaps, what is more probable, specimens of the two forms were labelled *sennaarensis*

and *capensis* in the Paris Museum, as these names have been attributed to Geoffroy, but no published diagnoses of them can be discovered.

Swainson (1835, Geogr. Class. Anim. part i. p. 95) calls the Northern Giraffe *Camelopardalis antiquorum*, and refers to the characters given by Rüppell as a foundation for this name. The Giraffe of Southern Africa is referred to as *C. australis*, but no description is given, nor is there any reference to the published plates, so that the name is a *nomen nudum*. A. Smith in his 'Report on the Expedition into the Interior of Africa 1834,' published in 1836, refers to the Giraffe of South Africa between the River Ka Gariep (Orange R.) and the Tropic of Capricorn as *Camelopardalis australis*, Sw.; but this cannot be called a diagnosis, so this name also falls as a *nomen nudum*.

Ogilby, in his paper on the "Genera of Ruminantia" (P. Z. S. 1836, p. 134), under *Camelopardalis*, says "*Duo species sunt C. æthiopicus et C. capensis.*" Whence the former of these two names was derived I am unable to make out, but there was ample excuse for the author finding it necessary to provide fresh specific names for both species, as almost all authors since Gmelin had used Linnæus's specific name as the generic name, and *Giraffa*, which was given in the first place to the genus by Brisson (Regn. Anim., Dist. Quad. et Cetac. 1762, p. 37), could not be used specifically. Unfortunately Ogilby gives no diagnosis, and mentions no types for his species, so his names again must fall as *nomina nuda*. In the Transactions of this Society, 1838, Owen points out certain characters in the cranium of the "Cape Giraffe" as distinguishing it from the "Nubian Giraffe," and, although he had only young specimens of the latter form, seems thoroughly to have recognized the validity of the two species, but introduces no Latin names. Lesson (Nouv. Tabl. Règne Animal, 1842, p. 168) gives "1278, *Camelopardalis giraffa*, Gmel., Nubie et Sennaar"; and "1279. *Camelopardalis capensis*, Cap de Bonne Ésperance, la Giraffe Levaill. Voy. pl. 8 & 9"; and so, in thus referring to a figure, must take the credit of having first proposed a tenable name for the Cape form.

Gray, in the 'List of the Specimens of Mammalia in the Collection of the British Museum,' 1843, p. 170, acknowledging but one species, under *Camelopardalis giraffa*, Gmel., gives as synonyms *C. sennaarensis* and *C. capensis*, Geoffr.; but, as shown above, these names had never been published or the forms described by Geoffroy.

Sundevall in 1844, K. Vet.-Akad. Handl. Stockh. p. 174, gives:—"*Camelopardalis giraffa*, Schreb., *unica species. α. in Africa meridionali, extra tropicum, colore paulo obscurior.—β. Æthiopica, e Sennaar, alba, fulvo-maculata, pilis brevissimis.*"

Gray, 1852, Cat. Mamm. Brit. Mus. p. 180, gives one species, "*Giraffa camelopardalis*, L., with one variety ('paler'), *C. giraffa β. æthiopica*, Sundevall." It will be noticed that Gray here revives the original generic name and also uses the proper specific name given by Linnæus; and it seems quite unaccountable how

he could have overlooked the fact that the locality for the type species was given as Sennaar, and that the name applied primarily to the Northern form.

Thus the names have been accepted until quite lately, and though I have been well aware that they could not stand as they were, still I have put off publishing any remarks on this animal, hoping that it would be my good fortune to come across a specimen in some collection which might some day be entrusted to me for working out; but the necessity for the present communication is shown by the receipt of Mr. S. Rhoads's paper (Proc. Acad. Philad. 1896, p. 518), on the mammals collected by Dr. Donaldson Smith during his recent expedition to Lake Rudolf, in which a Giraffe is included.

Mr. Rhoads seems to have read the short notice of Mr. Thomas's remarks (P. Z. S. 1894, p. 135), and then, after having looked up Linnæus's description and found that Æthiopia was the locality given for the typical specimen, without reference to any of the authors above quoted, to have jumped to the conclusion that the Southern form must require a new name, and so proposed that of *Giraffa australis*. I have, however, shown that this name was not needed and that it will thus fall as a synonym. Mr. Thomas's description, having been based on the large male of the Cape form set up in the British Museum (collected by Mr. Burke for Lord Derby, by whom it was presented to the National Collection), designated the type of Mr. Rhoads's *G. australis*, in founding which the description was quoted—a quotation which, like Lesson's quotation of Levaillant's figures, alone saves the name from being a *nomen nudum*.

I will now give a short description of the two forms and point out as far as can be ascertained the distribution of each: it will be noticed that the range of the two species is entirely confined to the "Steppe Country" of Sir Harry Johnston's map of Sportsman's Africa.

I do not admit Mungo Park's brown species without spots, of the Western Sudan, or the equally mythical "white-spotted slender form 23 feet high" of Farini, reported from Lake Ngami; for thoroughly misleading facts on natural history, I think the latter writer is hard to beat.

Giraffa, Briss.

Giraffa, Briss. Regnum Animale, Quadr. et Cetac. p. 37 (1762).
Camelopardalis, Gmel. Syst. Nat. i. p. 181 (1788).

The Nubian or Three-horned Giraffe.

Giraffa camelopardalis (Linn.). (Figs. 1, 2, p. 280.)

Cervus camelopardalis, Linn. Syst. Nat. (10) i. p. 66 (1758); Linn. Syst. Nat. (12) i. p. 92 (1766).
Giraffa camelopardalis, Zimm. Geogr. Gesch. ii. p. 125 (1780) (in

part); Less. Man. Mamm. p. 369 (1827) (in part); Flow. & Lyd. Mamm. p. 331 (1891) (in part) &c.

G. camelopardalis, var., Gray, Cat. Ung. B. M. p. 181 (1852).

Camelopardalis giraffa, Gmel. Syst. Nat. i. p. 181 (1788); Illig. Prodr. Syst. Mamm. p. 104 (1811); G. Fischer, Zoogn. Tab. Synopt. iii. p. 473 (1814); Desm. Nouv. Dict. H. N. p. 164 (1817) (in part); Is. Geoffr. Dict. Class. H. N. p. 355 (1825) (in part); Cretzschm. Zool. (Atl.) Rüpp. Reise nördl. Afr. p. 23, pls. 8, 9 (1826) (in part); Et. Geoffr. Ann. Sci. Nat. xi. p. 222 (1827) (in part); J. B. Fischer, Syn. Mamm. p. 455 (1830) (in part); Smuts, En. Mamm. Cap. p. 67 (1832) (in part); A. Smith, S. Afr. Quart. Journ. 1834, p. 184 (in part); F. Cuv. H. N. Mamm. (fol.) iv. pl. 332 (1842); Less. Nouv. Tabl. Règ. Anim. p. 168 (1842); Sundev. K. Vetensk.-Ak. Handl. Stockh. 1842, p. 243 (in part); Gray, List Mamm. Brit. Mus. p. 170 (1843) (in part); Fitzing. Abh. k. Ak. Wiss. Wien, 1867, p. 589; &c.

C. sennaarensis, Geoffr. (*fide* Gray)?

C. antiquorum, Swainson, Geogr. & Classif. Anim. p. 134 (1835), ex Cretzschm.

C. æthiopicus, Ogilby, P. Z. S. 1836, p. 134 (*nomen nudum*).

Nubian Giraffe, Owen, Tr. Z. S. ii. p. 217 (1838).

C. biturigum, Duv. Ann. Sci. Nat. (3) t. i. p. 47, pl. 2 (1844) (*vide* Forsyth Major, P. Z. S. 1891, p. 316).

C. giraffa, var. *æthiopica*, Sundev. K. Vet.-Ak. Handl. Stockh. 1844, p. 174.

"Northern form," Thomas, P. Z. S. 1894, p. 135; Matschie, Säug. Deutsch-Ost-Afr. p. 103 (1895).

The ground-colour varies from white to fawn; the dark polygonal markings vary from orange-red to red-chocolate, the edges being even and sharply defined; the spaces between the dark patches are generally narrower and always far more clearly defined in aged animals than in those of a similar age in the Southern species. The legs below the knees and hocks are white. The males have a third horn in the centre of the forehead just above the eyes, cylindrical, from 3 to 5 inches long; in the young animal this position is occupied by a prominent tuft of black hairs.

Inhabits Gallaland from the Tana River northward, Somaliland, Abyssinia, Kordofan, and probably ranges right across Africa to Senegambia, in suitable localities, from the Equator to about 15° N.

The Southern or Two-horned Giraffe.

Giraffa capensis, Less. (Figs. 3, 4, p. 281.)

Giraffa camelopardalis, Zimmermann (in part); Lesson (1827) (in part); Gray (1852) (in part); Flower & Lydekker (in part); &c.

Camelopardalis giraffa, Desmarest (in part); Is. Geoffroy (in part); F. Cuvier (in part); Et. Geoffroy (in part); J. B. Fischer (in part); Smuts; A. Smith (1834); Harris, Ill. S. Afr. pl. xi. 1840); Gray (1843); &c.

Camelopardalis australis, Swainson, Geogr. & Classif. Anim. p. 95 (1835) (*nomen nudum*); A. Smith, Rep. Exped. Int. Afr. p. 40 (1836) (*nomen nudum*).

Camelopardalis capensis, Geoffr. (*fide* Gray)?; Ogilby, P. Z. S. 1836, p. 134 (*nomen nudum*); Lesson, Nouv. Tabl. Règ. An. p. 168 (1842); ex Levaillant, Voy. pls. 8 et 9.

Cape Giraffe, Owen, Tr. Z. S. ii. p. 217, pl. xl. (1838).

Giraffa australis, Rhoads, P. Ac. Philad. 1896, p. 518; ex "S. African form," Thomas, P. Z. S. 1894, p. 135.

The ground-colour varies from white to dull fawn, the dark blotches vary from dun to dark coffee-colour, always darker in the middle, the edges being broken and not sharply defined. The legs are spotted down to the hoofs. On the forehead there is a bump of flattened pyramidal form, larger in the males but never forming anything like a horn.

The young animal has very narrow clearly-defined white lines between the darker markings, forming a network of lines over the entire body, the dark patches receding with age.

Within the last half-century this species has ranged from the Orange to the Zambesi Rivers. Northward of this latter river on the eastern half of the continent, at least, no Giraffe is found for about 12 degrees; but north of the Rufigi River it again appears and continues through German East Africa, reaching westward to the shores of Lake Tanganyika, and occurring east of the Mau Escarpment and south of the Tana River in British East Africa.

There is no appreciable difference in size between the Northern and Southern forms of Giraffe: both species vary much in the shades of colouring; the very old males or "Stink Bulls" (a name given to them from their exceedingly rank and powerful smell) of both species are described by all hunters as being always unmistakably darker than any others of a herd.

Mr. Arthur Neumann has kindly lent me the skin of a fœtus taken from a female killed in South Africa, and this shows that the young animal very closely resembles the typical colouring of the adult of the northern species. Mr. F. C. Selous tells me that the calf is always a light brown, with a network of narrow clearly defined white lines separating the dark markings. This is the description I noted down of the young female captured on the Sabi River, when it first arrived at the Zoological Gardens; a very accurate figure of this animal will be found in 'The Field' of March 9, 1895. This animal is still alive and has not yet lost these characters, though the white markings are rather broader and the dark markings less evenly cut. The colour of the dark markings of this 3-year-old animal is coffee-brown, with a still darker irregular pattern in the centre of each patch, thus not at all light-coloured as would be supposed. This quite backs up Mr. F. V. Kirby's opinion; 'In Haunts of Wild Game,' he says that he feels confident that the animals vary individually and do not darken with age as generally supposed, for one sometimes sees young animals dark-coloured, and unquestionably old animals of a very pale colour.

Therefore it will be seen that with the material I have been able to collect, some dozen skins[1] and 13 skulls of both species of all ages, I cannot give more than a general outline of colouring. The adult Southern Giraffe has the general effect of a dirty white animal covered with brown blotches, with wider light spaces between them, the lower legs mottled, and upper face grizzled. The adult Northern Giraffe has clearly defined polygonal patches, the light intervening spaces narrower, the lower legs white and upper face roan.

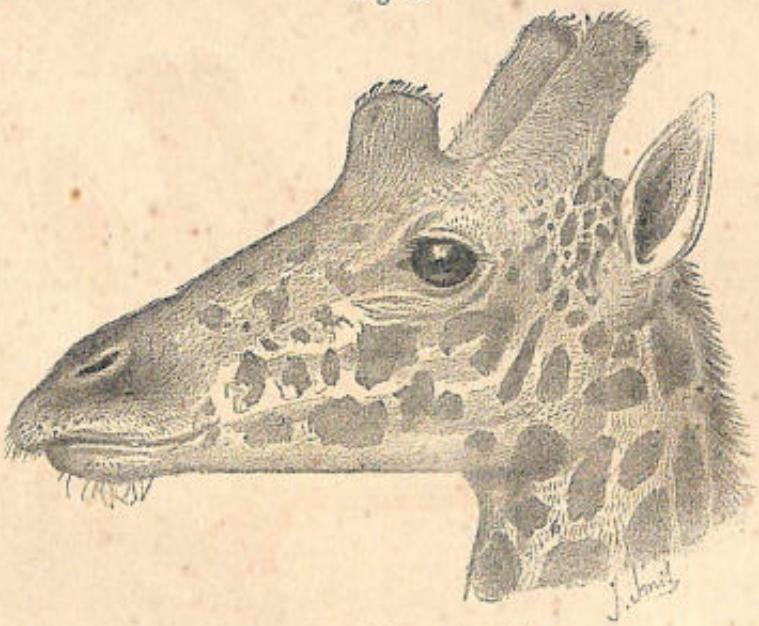
The figures of the heads (pp. 280, 281) are faithfully drawn from specimens presented to and now in the British Museum—that of the Three-horned Giraffe from a young bull obtained by Mr. Arthur Neumann a little to the east of the Loroghi Mountains, and that of the Two-horned Giraffe from an animal of about the same age obtained by Mr. H. A. Bryden in the North Kalahari district. It will be seen that the horns of the northern species are longer, more massive, and slope backwards more than those of the southern species. I have never seen the two horns of equal length in either species.

I need hardly mention the fact that both species of Giraffe have six molariform teeth in each jaw, in common with all the Pecora (excepting the Spring Buck, *Gazella euchore*) of South Africa. Dr. Matschie in his recent work on German E. Africa says that there are only five molars in each jaw. This might lead to the idea that the German E. African Giraffe was of a different species, whereas I have shown that it is *G. capensis*, as Dr. Matschie, indeed, has quite clearly stated is his opinion also; but I think it well to mention this obvious misprint in the only book on the Mammalian fauna of East Africa yet published.

The skull of the male *G. camelopardalis* can of course be at once distinguished by the prominent third horn, and the skull of the female of the same species has no unossified space on the side of the face in front of the orbit, while there is a vacant space of considerable extent in the skull of the female of *G. capensis*; there is no vacant space in the skulls of old males of either species, and, so far as I can discover, no "outer protrusion of the superior spongy bone," as Owen says, but the true outer bones of the face meet and are joined by sutures. The palate of the southern species ends posteriorly in a projecting point in the middle line, while that of the northern form is rather narrower and rounded; the space between the pterygoid and the back of the upper jaw or last molar is also wider in the southern form, and the skull generally rather broader in proportion to its length; the distance from the back of the palate to the foramen magnum is slightly greater and the base of the brain-case is not so much bent down: thus in the northern form the angle formed by the basifacial and basicranial portions of the skull is more acute; this character is more marked in comparing skulls of moderately young animals.

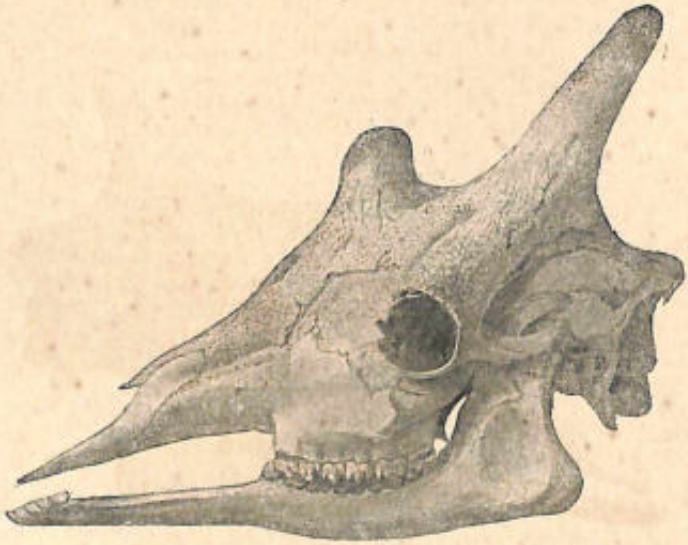
[1] Since writing the above Messrs. Rowland Ward & Co. have shown me about a dozen scalps and neck-skins of the southern form, and they all show the same characters, though the light intervening spaces vary in width.

Fig. 1.



Head of *Giraffa camelopardalis*.

Fig. 2.



Skull of *Giraffa camelopardalis* (side view).

Fig. 3.



Head of *Giraffa capensis*.

Fig. 4.



Skull of *Giraffa capensis* (side view).

The figures of the skulls (pp. 280, 281) are taken from those of old wild-killed bulls now in the British Museum, the one from Abyssinia and the other from S. Africa.

Mr. Selous tells me that he has never seen a bull Giraffe with a third horn in South Africa, and Mr. Neumann says the same.

Noticing the great difference in the weight of the skulls of the two sexes, I was curious to put them on the scales: taking the dried skulls of two wild-killed Abyssinian animals, I found that of the male weighed 19 lb. 8 oz., while that of the female only weighed 7 lb. 6 oz. The bones of the skull of the female are very smooth and thin; the whole of the upperside of the skull of the male is covered with a rough superficial osseous growth, which has its centre in the three horns, gradually enveloping the whole of the upper parts of the skull, forming lumps on the supraoccipital and supraorbital bones, and covering the face to the end of the nasals and the cheeks, so that all the true bones are completely hidden.

Mr. Arthur H. Neumann—to whom I am much indebted for loan of specimens and help in working out the distribution, being well acquainted with the two forms, is perhaps the only hunter who has killed the Two-horned Giraffe both in South and East Africa, and also the Three-horned species, having formerly killed Giraffes in South Africa when they were much more plentiful than they now are and extended farther southward—tells me that on a journey from Mombasa as far as Usoga, on the route to Uganda, none were noticed but the southern or blotched kind, and that no Giraffes were seen west of the Naivasha Valley, the route taken from Naivasha to Kavirondo being more southerly than that at present followed by caravans. And writing to me on his recent successful hunting expedition to the northern shores of Lake Rudolf, Mr. Neumann says:—"I only observed the southern variety in the neighbourhood of Athi or Sabaki River; I had a good view of one a little south of that river. The northern species I found from the Tana River northward as far as I went, namely, to the north end of Bassu (Lake Rudolf); I mean, of course, the kind with the defined polygonal pattern. Whether or not there are any of this kind south of the Tana I do not know; but I feel sure that in the direction I went it is the only sort to the north of that river. In some parts, particularly about the Guaso Nyiro, it is very plentiful, far more so than I have ever seen the southern type anywhere. From a little north of the Loroghi Mountains, I met with no more Giraffes until near the north end of the lake, where I noticed a few in one locality."

Now Mr. Neumann has thus proved that the two forms are not separated by any impassable mountain district or any great river, but that they approach one another on ground much less geographically or climatically distinct than parts within the ranges of either. This proves that there is no intermediate form, and therefore that to both must be given full specific rank. I must leave it to geologists to give a reason for this abrupt breaking off of the species; it is the more interesting as it marks the southern limit to the range of Grevy's Zebra (*Equus grevyi*), while it does not prevent

the smaller Grant's Zebra (*E. granti*) [which I described (Ann. Mag. N. H. ser. 6, vol. xvii. p. 319, 1896) and named in honour of Colonel Grant, who always persisted in its being specifically distinct from the S. African Chapman's Zebra (*E. chapmani*)] from ranging northward and herding with its larger cousin.

Unfortunately one gets no help from the pictures of the Giraffes in books of travel, for, excepting a photograph of a dead bull in Mr. J. G. Millais's 'Breath from the Veldt,' I know of no authentic pictures of wild animals, and this is only of one specimen and cannot show the general colouring of a herd. In the same way pictures in other books are taken from some single specimen, maybe living in the Zoological Gardens. One animal that the hunter is paying his particular addresses to may be coloured darker than the rest to represent the old bull, according to instructions given to the artist, but the whole herd has the unmistakable stamp of being drawn from a single specimen. I do not in any way speak disparagingly, but only regret that it must needs be so.

The fact that the young of the southern species resembles the adult of the northern animal, seems to point to the presumption that the former is descended from the latter; but how are we to account for the third horn in the older form, for this appendage is not found in any of the known fossil *Giraffidæ*? It seems, therefore, to have been acquired in recent times, but is hardly likely to have been established since the southern form got separated; and, if not, the alternative is that the latter form has since its separation entirely lost this apparently useless ornament. I cannot believe that the third horn of the northern Giraffe is so modern an acquisition, and I would much rather look upon it as the remains of a former development, for we may yet find an extinct form with this appendage equally or even more developed, and thus the superficial osseous incrustation of the skull of the males above referred to, formed by a superabundance of matter in the horn-core, may be all that is left of a much greater horn-development in some prior form. It is quite possible to imagine a very slight modification which would cause this matter to develop into external horns or antlers.

With regard to the possible use of this massive head, I was anxious to find out whether the horns are used in fighting. Mr. Neumann says of the Three-horned species the nearest thing to fighting he has seen was two young males playfully butting one another with their heads; he has seen Giraffes pressed by dogs keeping off their pursuers by kicking with their *hind feet* in rather a cowish fashion. Mr. Selous, on the other hand, says he once witnessed the following very pathetic incident:—a newly-born calf lying in the grass was seized by two Leopards, the mother Giraffe at once coming to the rescue fought with such effect with her *fore feet* that she succeeded in driving off the Leopards, but, unfortunately, one blow aimed at the Leopard struck the calf in the back, breaking it. On seeing this the hunter went up and put the poor little beast out of its misery. All hunters agree that the Giraffe never uses its head in self-defence.

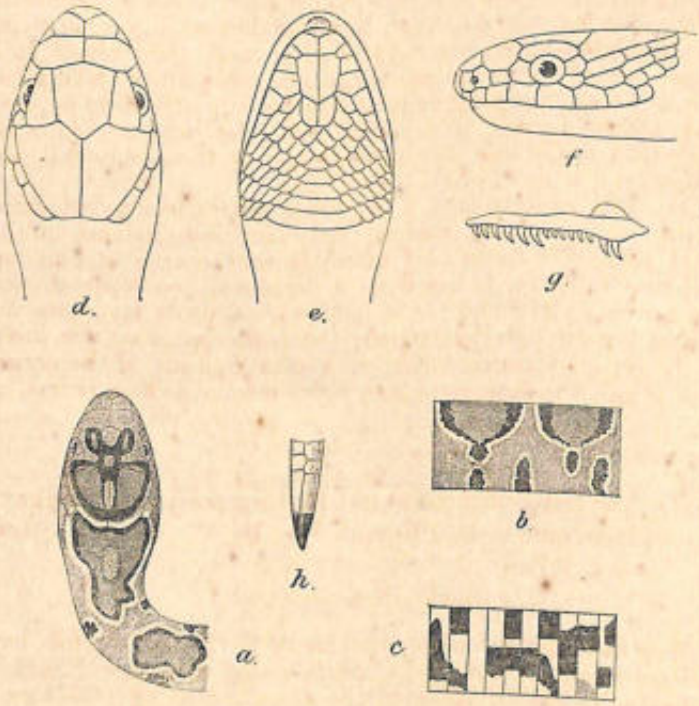
4. Description d'un Ophidien nouveau du Mexique (*Oreophis boulengeri*, g. et sp. nn.). Par ALFRED DUGÈS, M.D.

[Received January 29, 1897.]

Ce petit serpent est très rare à Guanajuato ; après plus de 40 ans d'existence dans cette ville, c'est le premier exemplaire que je vois. Il provient des montagnes voisines, à plus de 2000^{m} d'altitude, où les hivèrs sont très froids (Sierra de Santa Rosa).

L'alcool avait déjà décoloré en partie cet ophidien, mais pas assez pour qu'on ne put voir encore des traces des couleurs fraiches.

Dimensions. Tête, 0^{m},017 ; tronc, 0^{m},31 ; queue, 0^{m},06 ; total, 0^{m},387.



Oreophis boulengeri.

a. Tête et cou, vus en dessus. *b*. Tronçon du corps, vu de côté. *c*. Le même, vu en dessous. *d, e, f*. Tête, vue en dessus, en dessous, et de côté, grossie. *g*. Maxillaire, grossi. *h*. Bout de la queue, grossi.

22 rangs d'écailles lisses, rhomboïdales, avec un pore apical. Gastrostèges 185. Urostèges doubles 44. Anale indivise. Supralabiales 8. Sous-labiales 9, dont 4 sont en contact avec les inframaxillaires. Les deux prégénéiales (inframax. antérieures) sont presque doubles de grandeur des postérieures. Nasale divisée. Une petite frénale plus longue que haute. Une préoculaire et

deux postoculaires. Temporales 2+3. La préoculaire ne touche pas la frontale.

Le corps est en dessus gris très finement pointillé; en dessous il conserve une teinte rougeâtre sans doute plus vive à l'état de vie. Le ventre porte de nombreuses taches noires, quadrilatères, irrégulièrement distribuées. Une fourche brune naît sur la frontale et étend ses branches un peu sur les suroculaires et les préfrontales postérieures. Un croissant rouge bordé de noir couvre en grande partie les pariétales et l'extrémité postérieure des suroculaires; au milieu il est divisé par une bandelette longitudinale noire, au centre de laquelle on voit un point blanc. Sur l'occiput et le cou s'étend un triangle (dont la base, qui est antérieure comme la partie concave du croissant, est excavée) rouge bordé de noir, portant au centre un ovale plus clair, bordé et tiqueté de noir. Sur le reste du corps, la queue incluse, il y a 40 taches rouges dilatées en travers et bordées de noir. L'extrémité de la queue est noire, et constituée par un étui corné sillonné en dessous. Sur les flancs on observe de petites taches noires, souvent opposées aux taches du dos, et des raies verticales noires. Toutes ces taches du dos et des flancs, ainsi que le triangle nuchal, sont entourées d'un liseré blanc.

14 dents au maxillaire. Les dents antérieures de cet exemplaire sont en partie cassées, mais leur base indique qu'elles sont grandes et fortes; les suivantes sont courtes et plus rapprochées entr'elles, et les 2 ou 3 dernières, non séparées, sont de nouveau plus grandes. La petitesse des dents moyennes distingue le genre *Oreophis* du genre *Coronella*, dont il est très voisin.

Je dédie cet élégant ophidien à mon collègue M. Boulenger, que je prie d'accepter cette bien légère marque de mon estime.

5. On the Dates of the Natural History portion of Savigny's 'Description de l'Égypte.' By C. Davies Sherborn, F.Z.S.

[Received February 4, 1897.]

The dates of the various portions of Savigny's 'Égypte' have always been very obscure. The following notes are offered as affording an approximation to the dates, and as an assistance to those who may attempt in future to solve the mystery of them.

The various portions will be taken seriatim:—

Vol. I., part 1, "*Poissons du Nil*" by Geoffroy, pp. 1–52: was reviewed in the *Gött. gelehr. Anz.* (1811), p. 1234. It formed part of Livr. 1, which was published in **1809**. See also Férussac, *Bull. Sci. Nat.* 1830, p. 319. There is a copy in the Gray Tracts, Brit. Mus. (Nat. Hist.), which bears an imprint of 1810.

Vol. I., part 1, "*Oiseaux de l'Égypte et de la Syrie*" by J. C. Savigny, pp. 63–114: was reviewed in the *G. g. A.* (1811),

p. 1234. A separate copy in the Tweeddale Library, Brit. Mus. (Nat. Hist.), has on the title 1810, and includes "Observations sur le système des Oiseaux de l'Égypte," dated 5 Dec., 1810, and "à Paris de l'imprimerie impériale, 1811." There is also a footnote on A 2 "Le premier ordre de ce système a paru en 1809, dans la première livraison de l'ouvrage général." There is no doubt that Livr. 1 appeared in 1809 and that the "Oiseaux" formed a part of it: therefore the date is **1809**.

Vol. I., part 1, "*Reptiles*" by Geoffroy, pp. 115–120: by Isidore Geoffroy, pp. 121–160: explication des planches des Reptiles, by V. Audouin, pp. 161–184.

"*Crocodiles*" by Geoffroy, pp. 185–264.

"*Suite des Poissons du Nil*" by Isidore Geoffroy, pp. 265–310.

"*Poissons de la Mer Rouge*" by Isidore Geoffroy, pp. 311–343.

I take these parts all together. The *Reptiles* of Etienne Geoffroy was completed by his son Isidore, and an explanation of the plates was given by Audouin. The *Suite des Poissons* and the *Poissons de la Mer Rouge* were reviewed in Férussac's *Bulletin* (xx., 1830, p. 319) as having recently appeared. Isidore Geoffroy, writing in Du Petit Thouars's 'Voyage de la Vénus' (Mamm. p. 2, f.n.), says: "Dans les parties erpétologique et ichthyologique du grand ouvrage sur l'Egypte, 1827." In the 8vo edition of Savigny, the Reptiles, Fishes, and Crocodiles occupy vol. xxiv., which was published in 1829; while it is certain that many of the *explications des planches* of Audouin were published in 1826.

In Férussac, *Bull. Sci. Nat.* xix., 1829, p. 336, and xx., 1830, pp. 147 and 319, the two volumes of Natural History of Egypt are reviewed. Georges Cuvier dated his preface to the 2nd edition of 'Le Règne Animal,' Octobre 1828, at which date we may with safety assume that his work was finished. He was the most likely person to see the 'Histoire Naturelle de l'Égypte'; and an examination of his volumes shows that, though he was familiar with the *plates*, he had not seen the whole of the text by the date he wrote his preface. Unfortunately Cuvier frequently omitted to quote more than the plate in his references, and this makes our enquiry more difficult. So far as Mammals are concerned, Cuvier quotes thrice only (pp. 115, 119, and 120), but these quotations do not settle anything. In Vol. ii. of 'Règne Animal,' dealing with Reptiles and Fishes, he quotes the work many times, and notably the *text* of the "Crocodiles" on p. 22. Now as the "Crocodiles" formed pp. 185–264 of Vol. I. of 'Hist. Nat. de l'Egypte,' we may conclude that pp. 115–264 of that volume, which included the Reptiles, were published before October 1828; and, accepting Isidore Geoffroy's statement in the Voyage of the Venus (*supra*) as correct, definitely fix the date as **1827**. The Fishes also, which form pp. 265–343 of the Vol. II. of the 'Hist. Nat. de l'Égypte,' are quoted only as plates by Cuvier in his 'Règne Animal.' In Cuvier and Valenciennes's Hist. Nat. Poissons, i., 1828, pp. 198, 199, Cuvier refers to the work as follows:—

"M. Isidore Geoffroy, son fils, vient de donner de ces descriptions une rédaction générale qui le présente avec ordre et clarté." It seems, therefore, that **1827** also is the correct date for this part of the Fishes.

Vol. I., part 2, *Ascidiens* by J. C. Savigny, pp. 1–58.

The date of this part is of no consequence, as all the specific names were issued by Savigny in 1816.

Vol. I., part 3, *Annelids* by J. C. Savigny, pp. 1–128. This was reviewed in the *Gött. gelehr. Anz.* (1827, p. 695). Engelmann, *Bibl. Hist. Nat.* p. 550, gives the date as 1820, but the review quoted above leaves little doubt that **1822** is the correct date.

Vol. I., part 4, *Explication des Planches* by V. Audouin. These consist of *Mollusca* (pp. 7–56), *Annelids* (57–76), *Crustacea* (77–98), *Arachnids* (99–186), *Insects* (187–202), *Echinoderms* (203–212), *Zoophytes* (213–214), *Ascidians* (215–224), *Polypes* (225–244), *Oiseaux* (251–318). Engelmann, *Bibl. Hist. Nat.* p. 340, says that the Moll., Ann., Crust., Arach., Ins., Echin., and Ascid. were issued as fo. *Paris*, 1826. On p. 550 he says the descriptions of the Arachnida appeared fo. *Paris*, 1812; a statement quite inexplicable to me and considered by me as a mistake. F. S. Leuckart, 'Breves Anim. quorumdam,' 1828, p. 15, refers to the plates of the Gasteropoda as 1812; and it may be that Engelmann's reference refers to the plates, and not the descriptions, of the Arachnida.

At the beginning of part 4 of Vol. I. there is a letter dated 19 Mars 1825, stating that the work of finishing had been entrusted to V. Audouin on account of the ill-health of Savigny. This is conclusive. See also *Ann. Soc. Entom. France*, xi., 1842, p. 99, where it is definitely stated that in 1826 the Government selected Audouin to give the descriptions to the plates of Mollusca and articulated animals. Dr. John Anderson tells me that he has ascertained that Savigny's sight failed him[1], and that no manuscripts of any kind were handed over to Audouin, so that Audouin had to begin *de novo*.

In the Reprint of the *Oiseaux* by the Willughby Society, the editor comes to the conclusion that it was published "not earlier than 1826."

In the 8vo edition of Savigny's 'Égypte,' the portion of the Natural History under consideration occupies vols. xxii. 1827, and xxiii. 1828.

Férussac, *Bull. Sci. Nat.* xix., 1829, p. 336, and xx., 1830, pp. 147 & 319, may be consulted with advantage.

I have no doubt myself that all the parts enumerated above may be safely regarded as dated **1826**.

Vol. II. *Mammifères* by Geoffroy, pp. 99–144. This is reviewed

[1] F. Caillaud, Voy. à Meroë, iv. 1827, p. 271.

in the *G. g. A.* (31 July 1819, p. 1203). *Mus cahirinus* is quoted, without page, in *Nouv. Dict. Hist. Nat.* xxix., 1819, p. 70, and *Rhinolophus tridens* on p. 253 (but in the latter instance the *page* of the text of Geoffroy's 'Égypte' is quoted). *Ichneumon edwardsii*, *I. gersius*, and others are also referred to by pages, on pp. 212 etc. of the same work. I regard this part as issued in **1818**. There is a very interesting proof of pp. 99–144 preserved in the Gray Tracts, Brit. Mus. (Nat. Hist.). It is paged 1–46 and has for signature 7 *H. N.*, and is dated 'l'Imprimerie impériale, Mars 1813." This was sent by Geoffroy to Dr. J. E. Gray, and in a letter which accompanies it, *without date*, Geoffroy says:—"Je lui fais part dans cette livraison d'un imprimé tiré dans cette forme à deux exemplaires, et c'est la seule considération que je sais faire valoir pour rendre moins indigne de lui ce faible don de ma reconnoissance." Engelmann, *Bibl. Hist. Nat.* 1846, p. 373, quotes 1813.

Vol. II., *Mammifères* by Geoffroy and V. Audouin, pp. 733–743, and *Mammifères carnassiers* by V. Audouin, pp. 744–750. In Férussac, *Bull. Sci. Nat.* xix., 1829, p. 337, there is a footnote which states "La partie de l'ouvrage qui contient ce mémoire et le suivant [*i. e.* 'Mammifères' and 'Mammifères carnassiers'] vient seulement de paraître." This seems to be conclusive, and the date of these two parts may be accepted as **1829**.

Vol. I., part 1, pp. 53–62; Vol. I., part 4, pp. 245–250, and Vol. II., pp. 1–98, deal with Botany and Mineralogy, and do not come under this enquiry.

I am indebted to Mr. Boulenger, Dr. Anderson, and Mr. B. B. Woodward for many valuable suggestions during the progress of this enquiry, which has extended over several years.

6. Notes upon the Anatomy of *Phaethon*. By Frank E. Beddard, M.A., F.R.S., Prosector to the Society.

As the genus *Phaethon* is one of the least known among the Steganopodes, and as it is regarded by Fürbringer as the most primitive form of that group, I am particularly grateful to Mr. J. J. Lister, of St. John's College, Cambridge, for allowing me to dissect a specimen.

I identify the specimen (a ♀) with *Phaethon flavirostris* of Brandt [1], as described by Mr. Lister in a paper upon the fauna of Christmas Island [2].

As to external characters, the oil-gland, as in other species of *Phaethon*, is densely tufted; the skin is very emphysematous; I

[1] "Tentamen Monogr. zool. generis *Phaethon*," Mém. Acad. Sci. St. Pétersb. (6) iii. 1840, p. 263.

[2] "On the Natural History of Christmas Island, in the Indian Ocean," P. Z. S. 1888, p. 528.

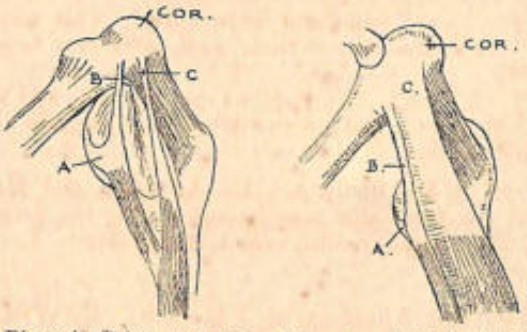
could find no aftershaft; there are 12 rectrices; the pollex is clawed. The bird is aquincubital.

The anatomy of the soft parts of this bird has been briefly touched upon by Brandt in the memoir already cited, where the tongue, palate, and larynx are figured. The presence of two carotid arteries, the muscular formula of the leg, and one or two other muscles have been referred to by Garrod [1]. I am not aware, however, to what species these notes refer, and, as will be seen presently, specific differences are apparently marked in the internal organs.

The specimen of the bird which I dissected had had the intestines removed. I find, however, from a MS. note of Garrod that the intestines of an individual dissected by him were $3\frac{1}{2}$ feet long, the large intestine only $\frac{3}{4}$ inch, and the cæca "buttons." The left lobe of the liver is the smaller, and there is a gall-bladder.

The *Pectoralis primus* was not very markedly two-layered. Mr. Forbes found a specimen dissected by himself (? species) to have a single-layered pectoralis. It has the second insertion on to the flat common Biceps tendon found in so many Steganopodes. I found no *Pectoralis abdominalis*.

Fig. 1.



Origin of Biceps in *Pelecanus* (left-hand figure) and *Phalacrocorax* (right-hand figure). (After Fürbringer.)

Cor., Coracoid; C, coracoidal head of Biceps; A, attachment of humeral head to Humerus; B, its prolongation to Coracoid.

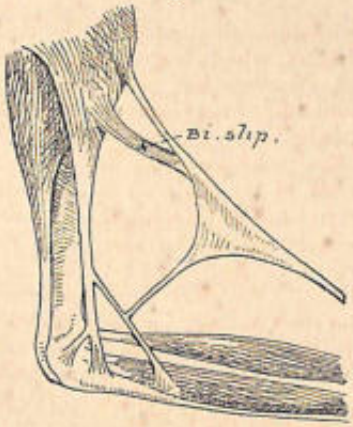
The *Biceps* (fig. 1) is fashioned like that of *Phalacrocorax*, not like that of *Pelecanus* and still less like the Biceps of *Sula* and *Fregata*; the humeral head in fact is a narrowish tendon attached to but still distinct from (by reason of its greater thickness) the wide thin tendon which is the coracoidal head of the muscle; the former has also, as shown in the drawing (fig. 1, A), a short special tendinous attachment to the head of the humerus. The muscular slip to the patagium (Biceps slip) arises from the humeral head of the Biceps.

The *Patagialis* muscle in part performs the function of a deltoid;

[1] "On certain Muscles in the Thigh of Birds &c.," P. Z. S. 1873, p. 628 &c. "Notes on the Anatomy of *Plotus anhinga*," P. Z. S. 1876, p. 335 &c.

for some of its fibres, instead of ending in the patagial tendons, are inserted on to the deltoid crest. The patagialis brevis tendon (fig. 2) is somewhat wide and diffuse; it gives off a wristward slip near to its insertion on the forearm, from which arises a patagial fan joining the tensor longus tendon. The Biceps slip has already been referred to; it joins the tensor longus tendon.

Fig. 2.



Muscles and tendons of Patagian of *Phaethon*.

Bi. slip, Biceps slip.

The *Anconæus*, as in other Steganopodes, has besides its scapular origin a tendinous connection with the scapula and with the humerus.

I could not find an *Expansor secundariorum*.

The *Latissimus dorsi anterior* is less than half the size of the *posterior*. The most posterior portion of the latter arises as a special slip below (covered by) the sartorius. The tendon of insertion of the *posterior* division is, as usual, inserted on to the humerus in common with the humeral attachment of Anconæus.

There appears to be no *Lat. dorsi metapatagialis*.

The two *Rhomboidei* are about equisized. The profundus springs aponeurotically.

The *Serratus superficialis* is as usual made up of an anterior and posterior portion. The anterior portion is composed of two slips arising respectively from the last cervical and the first dorsal rib; its tendon of insertion is connected with the *subscapularis externus*. The posterior division arises tendinously from dorsal ribs 2, 3, and 4.

The *Serratus profundus* arises from the last cervical and the first two dorsal ribs; the several slips decrease in size from before backwards.

The *Serratus metapatagialis* is a large muscle arising from the four ribs in front of the last.

The *Sartorius*, as already mentioned, just overlaps the latissimus dorsi posterior.

The *Glutæus primus* is not a large muscle; its origin does not extend back behind the acetabulum.

The *Biceps* is continuous at its origin with the semimembranosus. As Garrod has pointed out, it is remarkable for the absence of a Biceps sling—a peculiarity which it shares with certain Swifts.

As Garrod has also pointed out, the muscular formula of the leg is AXY—[1].

The *deep Flexors* blend at the middle of the metatarsus; no slip is given off to the hallux, which has a short flexor of its own.

The osteology of *Phaethon* has been described and figured as concerns the skull and a few other bones by Brandt [2]. Two species, *P. candidus* and *P. rubricauda*, are dealt with by Milne-Edwards [3]. Some notes upon the axial skeleton are contained in Mivart's [4] account of that portion of the skeleton of the Pelecanidæ.

Gadow [5] has referred to the less modified condition of the palate in *Phaethon*. This is certainly the case, but *Fregata* is not far removed from *Phaethon*.

In *Phaethon* (fig. 3, p. 292) the palatines are narrowed posteriorly and come into contact for a short space in the middle line, where, however, they are not fused. The vomer is knife-blade shaped and ends in a point anteriorly between the maxillo-palatines; it splits into two posterior limbs just behind the maxillo-palatines.

In *Fregata* (fig. 4, p. 293) the two palatines not only come into contact, but are actually fused for about the same distance posteriorly; but the internal laminæ of the palatines remain distinct and are not melted into a median ridge as is the case with the remaining genera of Steganopodes, where, moreover, the palatines are, as is well known, much more largely fused.

In both *Phaethon* and *Fregata* the maxillo-palatines do not meet across the middle line posteriorly, the appearance of this part of the skull being very Accipitrine. I have already referred to the vomer of *Phaethon*; in *Fregata* this bone lies more deeply (when the skull is viewed from below), but does not bifurcate posteriorly where it is ankylosed, as in *Phaethon*, with the palatines. In *Phalacrocorax*, *Plotus*, and *Sula* the backwardly projecting, horizontal and separated laminæ of the maxillo-palatines are absent and it seems to be doubtful whether there is any vomer.

Pelecanus comes nearest in this particular to *Fregata* and *Phaethon*, but the regions of the maxillo-palatines in question are united across the middle line by help of a distinct septum, which may be at least partly the anterior portion of the vomer.

[1] Fürbringer in the table of characters marks the ambiens of *Phaethon* as present. I take it that this is merely a misprint.

[2] "Beiträge zur Kenntniss der Naturg. der Vögel," Mém. Ac. Sci. St. Pétersbourg, (6) iii. p. 81.

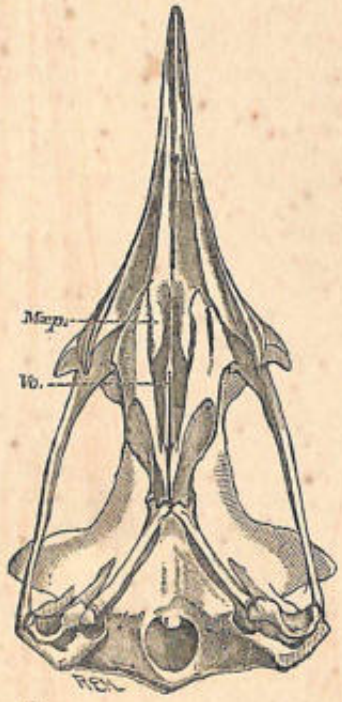
[3] Histoire Naturelle de Madagascar.

[4] "On the Axial Skeleton of the Pelecanidæ," Trans. Zool. Soc. x. p. 315.

[5] Aves, in Bronn's 'Thierreich,' Syst. Th. p. 101.

Brandt has pointed out that *Fregata*[1], unlike other Steganopodes but like certain Petrels &c., has an "ossiculum lacrymo-palatinum." In the lacrymal of one side of my specimen of *Phaethon* I found a minute separate ossification at the end of that bone, which may be regarded as the homologue of the os uncinatum as it is termed by several authors.

Fig. 3.



Phaethon: palatal aspect of skull.
Vo., vomer; *Mxp.*, maxillo-palatines.

The lacrymal of *Phaethon* is more like that of *Fregata* than of any other Steganopode, in that it is not ankylosed above with the frontal. The skull of *Phaethon*, however, differs from that of *Fregata* as of all Steganopodes in the pervious nostrils, in the absence of a groove running from the nostril towards the end of the beak, and in the presence of a considerable foramen towards the middle of each ramus of the lower jaw, as in *Otis*, *Eudromias*, *Œdicnemus*, &c.

So different are the skull characters of *Phaethon* from those of the typical Steganopodes, that, were it not for *Fregata*, the bird

[1] It may be mentioned (in a footnote, as not germane to the general argument) that *Fregata* possesses rudiments, ankylosed to the jugal, of the ossiculum supra-jugale of the Cormorant and perhaps of *Sula*, noted in those Birds by Brandt.

Fig. 5. Fig. 4.

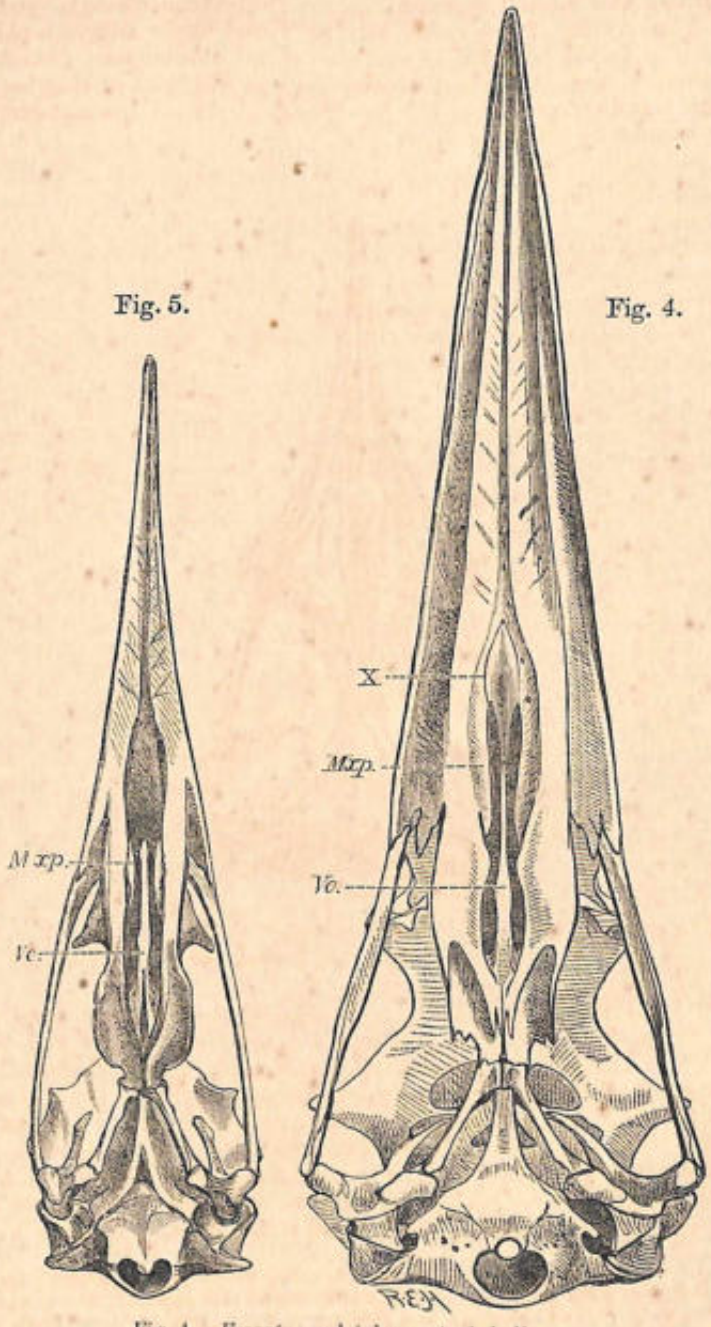


Fig. 4.—*Fregata*: palatal aspect of skull.
X, upwardly directed part of maxillo-palatines. Other lettering as in fig. 3.

Fig. 5.—*Æchmophorus*: palatal aspect of skull.
(Lettering as in fig. 3.)

would have to be ignominiously expelled from the Order. This catastrophe is averted by *Fregata*, the skull of which, as will have been gathered from the foregoing remarks, serves to link *Phaethon* with the Cormorants, Gannets, and Pelicans.

The Steganopodes are always spoken of as Desmognathous birds. But can *Phaethon*, be accurately termed a desmognathous bird? This altogether depends upon the definition of the term desmognathous. Huxley, its inventor, defined[1] the condition of Desmognathism as follows:—"In these birds the vomer is often either abortive, or so small that it disappears from the skeleton. When it exists it is always slender and tapers to a point anteriorly. The maxillo-palatines are united across the middle line, either directly or by the intermediation of ossifications in the nasal septum."

As to the vomer of *Phaethon*, it is pointed in front, as is that of most Schizognathous birds; this character does not distinguish the Schizognathæ. But, as already mentioned, it diverges behind into its two component halves, in a way that is unusual among Desmognathous birds. It occurs, however, in the Herons (not in *Scopus*), which are admittedly allies of the Steganopodes. In Schizognathous birds, on the other hand, this bone is commonly divided behind. This part of the palate in *Phaethon* is in fact remarkably like that of a Grebe (*cf.* figs. 3 and 5). Nor does the resemblance cease here. *Phaethon* is really no more desmognathous than is *Æchmophorus*, if we apply the term as Huxley applied it; for the maxillo-palatines in both are widely apart, the vomer lying between them. In front of the maxillo-palatines, however, in *Phaethon* the bony palate forms a continuous platform. If this constitutes desmognathism (which it does not, be it observed, according to the definition of Huxley), then *Coracias*, *Eurystomus*, *Jacamerops*, &c., in which birds there is a considerable vacuity in front of the conjoined maxillo-palatines, are not desmognathous; while the skulls of *Gecinus viridis* and *Dendrocopus major* (at most only just separable generically) must in that event be referred to different categories; since in the former there is a palatal platform, and in the latter not.

In *Pelecanus* and *Phalacrocorax*, Huxley has figured fused maxillo-palatines. These consist in the latter genus, in *Plotus*, and in *Sula* of a thick mass of bone running upwards towards the roof of the skull. Their direction is quite different from the horizontally disposed maxillo-palatines of *Phaethon*. The conditions observable in the base of the skull of *Fregata* appear to me to clear up this somewhat puzzling discrepancy. In *Fregata* (see fig. 4, p. 293), we have *both the horizontal maxillo-palatines* of *Phaethon*, separated from each other in the middle line as in that genus, *and the obliquely running "maxillo-palatines"* of *Phalacrocorax*. As co-existence undoubtedly disproves homology, it seems to follow that true maxillo-palatines, comparable to those of other birds, are wanting in *Sula* and *Phalacrocorax*: and if we are to

[1] "On the Classification of Birds &c.," P. Z. S. 1867, p. 435.

apply the term desmognathous to those birds, it must be on the understanding that it is a different kind of thing from the desmognathism of—say—the Anseres.

March 2, 1897.

Dr. W. T. Blanford, F.R.S., V.P., in the Chair.

The Secretary exhibited two examples of a new Viper, recently discovered by Capt. A. H. McMahon during the Survey of the Indo-Persian frontier, and named *Eristicophis macmahoni*, gen. et sp. nov., by Dr. Alcock. The following notes on its habits, sent to the Society by the discoverer along with the specimens, were read:—

"We found this snake in the sandy portions only of the desert lying between Nushki and Persia. While lying still on the sand it is almost impossible, even in the brightest light, to distinguish it from the sand on which it lies. During the daytime it appeared to be fond of burying its body in the soft sand, leaving its head only exposed on the surface. We never noticed it to make any sound in the daytime, but at night whenever we approached one of them, even at a distance of many yards off, it used to make a loud deep hissing sound—an angry deep sound, unlike the crisp hiss of *Echis carinata*, the hiss of the cobra, or any other snake I have ever heard. It evidently hisses from deep down in the throat, for I have failed ever to detect any muscular movement such as the *Echis* makes when it rustles its scales together to produce a hissing sound.

"It apparently never attempts to escape, and lies still, hissing away, if at night, until killed, or until the intruder passes by, or is out of sight or hearing, as the case may be. In the daytime these snakes are consequently hard to find, and even at night, loud as they hiss, it is difficult to detect them on the sand. The larger of the two specimens I gave you (the largest, in fact, of all those we found) very nearly bit my horse one night, when, trusting to the bright moonlight to enable me to distinguish its outline, I had ridden too close to where the hissing sound proceeded from. These snakes are very difficult to secure without injuring them as specimens. Even light blows with a thin stick will cut the skin and disfigure the specimen. The smaller but more perfect of the two specimens I sent you was captured alive, and thus escaped injury.

"Their fragile skins and soft bodies are, I presume, due to their living always in very soft sand."

A series of specimens of various Insects reared in the Insect-house in the Society's Gardens in 1896 was exhibited, and the following report on the subject drawn up by Mr. Arthur Thomson, the Society's Head Keeper, was read:—

Report on the Insect-house for 1896.

Examples of the following species of Insects have been exhibited in the Insect-house during the past season:—

Silk-producing Bombyces and their Allies.

Asiatic.

Attacus atlas.
—— *cynthia.*
—— *ricini.*
—— *pernyi.*
Antheræa mylitta.
Actias selene.
Cricula trifenestrata.

American.

Attacus lebeaui.
Samia cecropia.
—— *ceanothi.*
Actias luna.
Telea polyphemus.
—— *promethea.*
Hyperchiria io.

African.

Attacus mythimna.
Actias mimosæ.
Antheræa menippe.
**(Saturnia) terpsichore.*
Eudæmonia brachyura.

Diurnal Lepidoptera.

European.

Papilio podalirius.
—— *machaon.*
Thais cerisyi.
Doritis apollinus.
Limenitis sibylla.
Vanessa polychloros.
—— *antiopa.*

American.

**Papilio zolicaon.*
—— *cresphontes.*
—— *asterias.*
—— *troilus.*
Papilio ajax.
—— *ilioneus.*
—— *philenor.*
Limenitis disippus.

African.

Papilio corinneus.

Nocturnal Lepidoptera.

Acherontia atropos.
Sphinx ligustri.
—— *pinastri.*
**Deilephila syriaca.*
—— *alecto.*
—— *euphorbiæ.*
Philampelus achemon.
Darapsa myron.
Smerinthus excæcatus.
Ceratomia undulosa.
**Eudryas unio.*
Lagoa crispata.
Eacles imperialis.
—— *regalis.*
Anisota stigma.
Thyatira batis.
Chelonia villica.
Liparis dispar.
Pericallia syringaria.
**Cerura* sp. inc.
Saturnia pyri.
—— *carpini.*

* Exhibited for the first time.

Of the Lepidopterous insects which I have the honour to place before the meeting, *Deilephila syriaca* and *Cerura* sp. inc. from Syria, *Papilio zolicaon* and *Eudryas unio* from South America, and (*Saturnia*) *terpsichore* from Mozambique are now exhibited for the first time.

The specimen of *Cerura* from Syria is closely allied to *Cerura interrupta*, but belongs, I think, to a new species. *Papilio zolicaon* is the representative in America of the well-known *Papilio machaon* of Europe. Although we have had examples of many species of N. American Papilios, this is the first occasion on which I have been able to exhibit specimens of this species.

The six specimens of (*Saturnia*) *terpsichore* belong to the Hon. Walter Rothschild, F.Z.S. This species is very rare, and up to the present time, I believe, is not represented in the Natural History Museum.

Of Orthoptera, Mr. W. L. Sclater, F.Z.S., has sent us an example of a species of *Blepharis*, in the larval stage, from South Africa. I am sorry to say that this curious Mantis, which seems to differ from all specimens in the Museum, died before passing into the perfect form.

Mr. J. E. Matcham, C.M.Z.S., brought us home 7 African Locusts (*Phymateus leprosus*). These insects fed voraciously upon almost any kind of green food, particularly lettuce.

Mr. W. B. Tegetmeier, F.Z.S., exhibited and made remarks upon a specimen of a Starling (*Sturnus vulgaris*) with both mandibles enormously elongated.

Mr. Gambier Bolton, F.Z.S., gave an account (illustrated by photographs shown by the oxy-hydrogen light) of a recent visit that he had made to the Bird Islands in Saldanha Bay, South Africa. The photographs illustrated the life of the Black-footed Penguin (*Spheniscus demersus*) on these islands, showing them in groups, nest-building, sitting on their eggs, and moulting. Mr. Bolton also gave an account of the guano and egg industry carried on by the Cape Government in the Bird Islands and other adjacent islands.

The following paper was read:—

On the Growth of Hair upon the Human Ear, and its Testimony to the Shape, Size, and Position of the Ancestral Organ[1]. By H. M. Wallis.

[Received January 23, 1897.]

(Plates XIX.–XXII.)

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i. *Literature of the Subject.*

In 1871, Darwin called attention to the cusp sometimes seen upon the folded edge of the human ear and suggested that this feature was a survival of the pointed tip which terminated the ear of our remote ancestor[2] (see figure, p. 299).

The hypothesis was ingenious, but less convincing than many of the bold and splendid deductions of our great philosopher. Support from corroborative phenomena was needed, but none was forthcoming. Indeed, had this identification stood alone, it would hardly have commanded acceptance; but making its appearance in good company amidst a phalanx of marshalled facts, which there was no gainsaying, it obtained an amount of credence which was scarcely deserved.

In Germany, Ludwig Meyer[3] and, more recently, C. Langer[4] have thrown doubt upon Darwin's interpretation of the cusp in question. But although this cusp is sometimes triple, frequently double, and still more frequently absent altogether—variations which, to say the least, do not uphold Darwin's view—the current of intellectual opinion has borne the Theory of Natural Selection into favour and this item has travelled with the rest.

Although for nearly a generation no fresh light has been thrown upon this particular question, yet for years past the cusp has been labelled "Darwin's Point" upon diagrams and museum preparations; the correctness of his identification has been generally assumed and the matter treated as settled.

This, however, was not Darwin's opinion, as will presently appear.

In July 1879 my attention was drawn to the ears of a new-

[1] Communicated by Prof. E. B. Poulton, F.R.S.

[2] 'Descent of Man,' 1871, i. p. 22.

[3] Ludwig Meyer, 'Ueber das Darwin'sche Spitzohr,' Berlin, 1871.

[4] C. Langer, "Ueber Form und Lageverhältnisse des Ohres," Mit. d. anthropol. Gesellsch. in Wien, xii. 1882.



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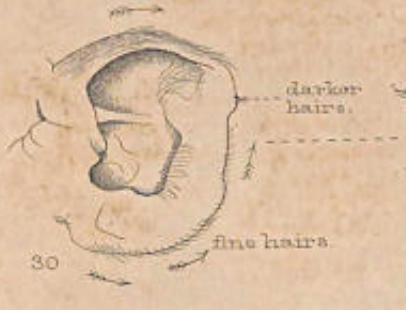
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H.M.Wallis del.



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37

West, Newman sc.

Ears of Monkeys and Lemurs.



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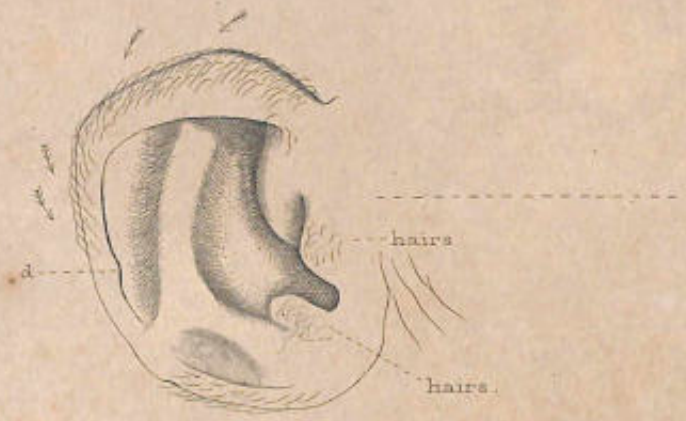
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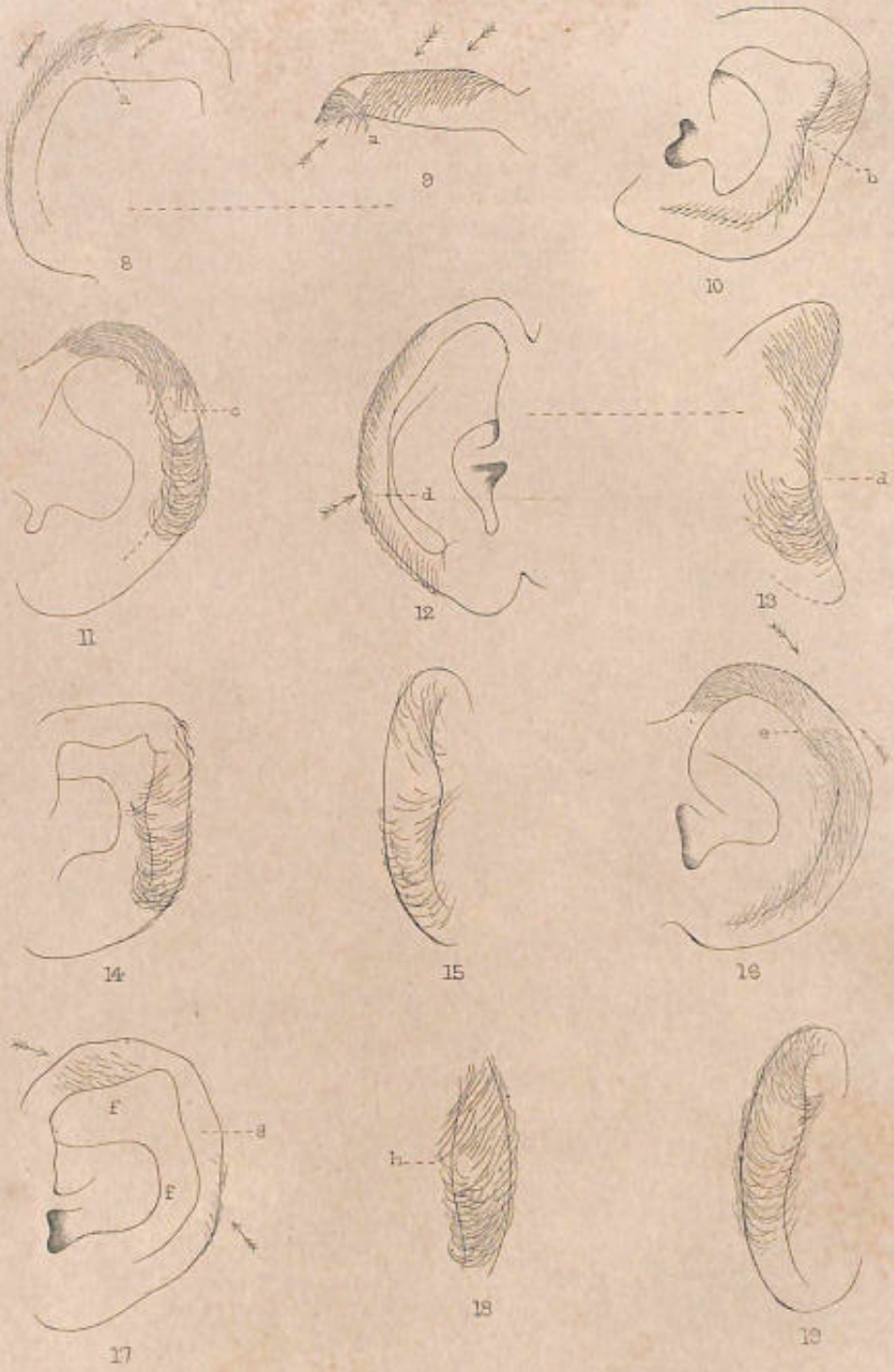


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H.M. Wallis del.

West, Newman sc.

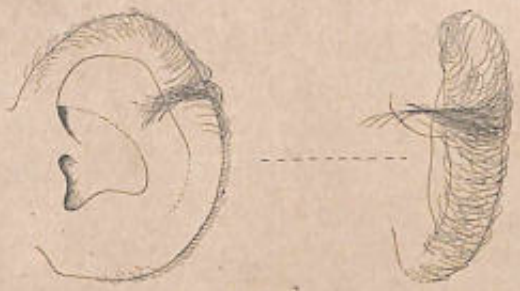
Ears of Anthropoid Apes.



H.M.Wallis del.

West Newman sc.

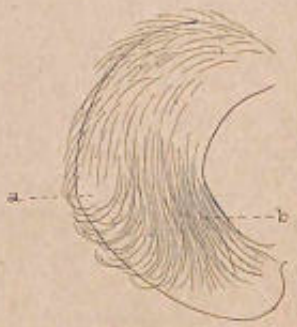
Ears of Man, Infants



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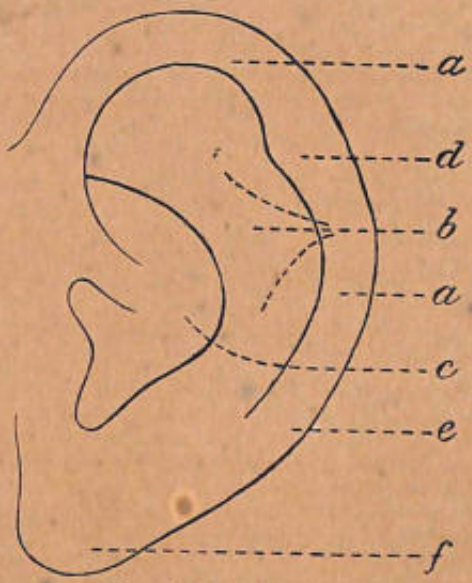
H.M. Wallis del.

West, Newman sc.

Ears of Man, adults and infants.

born child. He was of a dark complexion and hirsute; the edges of his little ears were fringed with black hairs showing conspicuously upon the delicate skin of infancy.

The direction, or set, of these hairs surprised me. Instead of radiating from the margin of the ear like the cogs of a wheel, or overlapping one another around its edge like the teeth of a ratchet, two streams of hairs approached each other from almost opposite directions until their points crossed and interlaced (see Plate XX. figs. 9, 10, 18, &c.).



Normal Human Ear.

a a, helix; *b*, anti-helix; *c*, concha; *d*, Darwin's point, *e*, spina helicis; *f*, lobe.

The part of the *helix* at which the points of the hairs met was that part of the infolded outer rim which is normally somewhat thickened and where a little white nodule is frequently present, the nodule which in later life commonly develops into Darwin's Point. I communicated my discovery to Mr. Darwin and received from him the following letters, now, by permission of his son Mr. Francis Darwin, published for the first time:—

I.

March 22nd, 1881. Down,
Beckenham, Kent.

Mr. H. M. Wallis.

Dear Sir,

I am very much obliged for your courteous and kind note. The fact which you communicate is quite new to me, and as I was

laughed at about the tips to human ears, I should like to publish in *Nature* some time your fact. But I must first consult Eschricht[1] and see whether he notices this fact in his curious paper on the *lanugo* on human embryos; and, secondly, I ought to look to Monkeys and other animals which have tufted ears and observe how the hair grows. This I shall not be able to do for some months, as I shall not be in London until the autumn, so as to go to the Zoological Gardens. But in order that I may not hereafter throw away time, will you be so kind as as to inform me whether I may publish your observation, if on further search it seems desirable. If you give your permission, may I say that "Mr. Wallis, on carefully examining the ears of *an* infant, observed that the hairs were directed, &c. &c. &c."

Or, would you prefer my saying that "a *gentleman*, on carefully examining, &c. &c." Will you be so good as to send me a line in answer, and I remain,

Dear Sir,

Yours faithfully,

CHARLES DARWIN.

II.

March 31st, 1881.

Down,
Beckenham, Kent.

Mr. H. M. Wallis.

DEAR SIR,

I am much obliged for your interesting letter. I am glad to hear you are looking to other ears, and will visit the Zoological Gardens. Under these circumstances it would be *incomparably* better (as more authentic) if you would publish a notice of your observations in *Nature* or some scientific journal. Would it not be well to confine your attention to infants, as more likely to retain any primordial characters, and offering less difficulty in observing?

I think though it would be worth while to observe whether there is any relation (though probably none) between much hairiness on the ears of an infant and the presence of the "tip" on the folded margin.

Could you not get an *accurate* sketch of the direction of the hair of the tip of an ear?

The fact which you communicate about the Goatsucker is very curious. About the difference in the power of flight in Dorkings, &c., may it not be due merely to greater weight of body in the adults?

I am so old that I am not likely ever again to write on general and difficult points in the theory of evolution.

I shall use what little strength is left me for more confined and easy subjects.

Pray believe me with all good wishes, Dear Sir,

Yours very faithfully,

CHARLES DARWIN.

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[1] Eschricht, D. F., Om Haarenes Retning paa det Menneskelige Legeme (8vo, Kiobenhavn, 1838), is probably the work referred to.

From the terms of the foregoing it may be assumed that Mr. Darwin recognized the significance of this discovery and was conscious of the hiatus in the structure of his theory into which this little fragment of corroborative fact could be fitted.

Beyond their scientific interest these letters have an ethical value of their own, revealing the generous courtesy to a stranger and the plastic receptivity of mind in extreme old age that we must ever associate with the greatest intellect among the moderns.

Thus encouraged by Mr. Darwin I have for the past sixteen years observed the ears of infants and induced others to do so.

My attention was drawn to an interesting paper, published by an Italian, G. Chiarugi[1], about ten years ago (catalogued in England in 1889), but which has received so little attention, either here or on the Continent, that Wiedersheim[2] does not allude to the subject.

Signor Chiarugi's paper is a three-page pamphlet of which only the concluding forty-five lines relate to the subject under discussion.

The following is a free translation :—

"It is not then because good reasons are wanting [*to support Darwin's view of the origin of the "point."—H. M. W.*] that I have decided to indicate a new character which attests the significance attributed by Darwin to the tubercle of the *helix*, but because the fact is such that it might by itself indeed cut short all discussion.

"The external ear (*padiglione*) is provided with rudimentary hairs, which in the adult are very fine and pale and which creep sometimes into the hollow of the auditory cavity, which claim no attention at all; but in the fœtus and in the baby at birth, and for a certain time after, they are fairly long, numerous, and frequently pigmented.

"Their direction differs in different parts of the external ear. On the outer surface they have in general an ascending direction, somewhat varied here and there by the varying curvatures of the ear.

"They preserve such a direction near the outside margin, upon which along the first third [*of its length.—H. M. W.*] starting from the front (upper margin) they turn their points downwards; along the other two-thirds (hinder margin) they turn their points directly upwards.

"Upon the internal surface[3] of the outer ear (*padiglione*) the hairs (*peli*), continuing the direction of the hairs (*capelli*) growing upon the adjacent hairy scalp, incline downwards. You

[1] "Il Tubercolo di Darwin e la Direzione dei Peli nel Padiglione dell' Orecchio umano." Estratto dal Bollettino della Sezione dei Cultori delle Scienze mediche nella R. Università dei Fisiocritici di Siena: Anno vi. fasc. ii. (1889?).

[2] 'Structure of Man,' Wiedersheim. Macmillan, 1895.

[3] The context shows that Signor Chiarugi means the *back* of the ear, *i. e.*, the surface next the head.—H. M. W.

see them projecting in this direction on all parts of the ear which adjoin the line of insertion [*to the head.—H. M. W.*] and upon the outside answering to the convexity of the *concha*; but away from there, if you set aside the upper part of this internal [*sic*] surface, where the hairs come from the front [*sic*] to the back, we see on the remaining [*portion*] the hairs turn obliquely little by little from a downward direction to the outside, so that in the turn inwards [*sic*] to the posterior tract of the free margin, they become pointed upwards, as we have seen already.

"From what we have said it will be easily understood that the free margin of the outer ear is traversed by two currents of hairs—one which follows the upper tract (or first third) bending downwards; the other which follows the hinder tract, or remaining two-thirds of its free margin, bending upwards.

"At the junction of the upper tract with the lower the two currents meet, and together with hairs coming straight from the hinder surface, sometimes form a true little tuft (*ciufetto*), the spiral twist upon its convexity being plainly to be observed.

"Well, now, what seems worthy of note is, that when Darwin's Tubercle is present, this meeting of the two currents of hairs is placed in correspondence with it. And since in the ears of animals that have hairy ears it is towards the point that the hairs are turned, it seems definitely resolved that Darwin's Tubercle is, as Darwin put it, the rudiment or trace of originally pointed ears."

ii. *Ears of Infants.*

Leaving now the historical *résumé*, I proceed to describe some observations which prove that the hairs upon an infant's ear are arranged upon a definite plan and have different directions in different parts of the organ.

To begin with, the back of the ear at birth is frequently clothed with a regular growth of hair. The possible significance of this will be dealt with later. For the moment, however, I merely draw attention to the peculiarities of the growth, its constant adherence to certain lines—both on the back of the *concha*, where the hairs are directed backwards and downwards (as may be seen by reference to Plate XIX. figs. 2 and 3); and upon the back of the *helix* and *anti-helix*, where the lines of growth followed by the hair, though in my experience constant (when hair is present at all), are apparently capricious, a question to be dealt with presently.

Fig. 3 shows the back of an infant's ear enlarged. The tract immediately around Darwin's Point, or where Darwin's Point is to be expected (for it is not always present), is bare. Those parts of the *helix* which are above the bare tract are clothed back and front with hairs directed towards Darwin's Point, whilst the hairs upon the back of the *anti-helix* separate themselves from those upon the back of the *concha*, which are directed downwards towards the lobe, and executing a countermarch, as one might say, come

curving round the infolded rim of the *helix* below Darwin's Point, directing their growth towards it until their tips meet and touch those of the hairs approaching from above (see Plates XIX. & XX. figs. 2, 3, 11, 13, and 19).

The significance of this countermarch or reversal of direction it is proposed to discuss later in this paper.

The opposing growths of hairs do not approach one another from directly opposite directions; they cross one another's paths diagonally, as though seeking something which was once there, but which no longer exists.

Figs. 1, 2, and 3 are well-marked cases. On many infant ears Darwin's Point is not sufficiently pronounced to enable its precise locality to be determined. Its position varies much in my experience, and the tract around it, or its presumed site, is very frequently bare, as already remarked. In short, the external infant ear is a very variable organ, but whenever hair is present it seems to follow the above-described lines, although it may be almost invisible and need a dark card to be placed between the ear and head and the use of a lens to discover the hairs.

I have observed a case where an infant's ear showed Darwin's Point well and the small white tubercle beneath the skin was marked by a minute tuft of down.

The ear drawn in fig. 1 was so noticeable that the child's mother, a woman in humble circumstances, was struck by its appearance and sent for me to see it. Where the two streams of hairs met the hairs were longest, a distinct tuft of hairs twisted upon one another came partly from behind the ear and partly from the fold of the *helix* and projected laterally at right angles to the median line of the body from one-eighth to one-quarter of an inch. The *spina helicis* was thickly clothed with hairs pointing towards this tuft. The child was a fair-skinned infant with very dark brown hair.

In but one case have I examined an ear completely at variance with this rule. It is upon a fœtal head in spirit in the Oxford University Museum. No Darwin's Point is discernible and the growth of hair follows an unbroken sequence round the *helix*. This head however is abnormal in other respects, one cranium growing out of another, so that it is difficult to say what importance should be attached to it. My observations of fœtal ears have so far been inconclusive. Of some the epidermis seems imperfectly developed and is hairless. In no case are very small hairs easily observed whilst the subject is immersed, and when removed from the spirit the *lanugo* clings to moist skin and it is difficult to determine the direction of its natural growth.

The Darwin's Point was not well marked, or indeed determinable, upon most of the fœtal ears which I have examined; but no stress need be laid upon this, as this feature is very variable and frequently absent, as is well known. One fœtal ear was remarkable for having Darwin's Point directed backwards (the *helix* being unfolded as in Monkeys), and this point was tufted with small pale

yellow hairs. This is a specimen in spirit in the Oxford University Museum.

iii. *Ears of Adults.*

In life this infantile growth is soon shed, but in later middle age a hairy covering sometimes reappears and may be noticed in black-haired men of coarse skin and hirsute habit of body more frequently than in others, although I have recently observed the ears of a man of about forty, fresh complexioned, dark red moustache, pale red hair, which exhibited almost all the phenomena I have described. The hairs, which were straw-coloured and very numerous, grew thickly upon the backs of the ears, fringed the edges of the *helix*, and had well-marked lines of growth.

I transcribe from my notes the following particulars of a case (see Plate XIX. figs. 4, 5):—"T. F., *ætat. circa* 44. Dark, hirsute, bilious temperament. Hair of face, head, hands, and wrists black. That upon the *helix* is soft, pale, and fine; it converges from both sides (above and below) upon a well-marked Darwin's Point, but does not cross tips at that point, nor is there a tuft there. Thicker hairs clothe the lower part of the *anti-helix*, and, pointing downwards at first, follow one another round the edge of the *spina helicis*, and changing their direction point upwards towards Darwin's Point. The phenomenon was better defined upon the left than upon the right ear. The subject was restive and difficult to examine. The sketch was completed at some personal risk."

Another instance (Plate XIX. figs. 6 & 7) is the ear of a dark-skinned black-haired man of about fifty, of a similar type, remarkable as having eyebrows of unusual fullness, each down-curving in a tuft of bristles, the longer of which are fully two inches in length. The moustache full and black, inclining to grey. The ears were large and well-shaped, Darwin's Point easily located. The back of the ear covered with pale down made up of minute hairs, the whole edge fringed with small pale hairs with distinct direction, the two growths meeting and crossing tips on the outer edge of the *helix* close to Darwin's Point. Besides these almost colourless hairs there was a strong growth of pale brown hair, one inch in length, upon the *spina helicis* directed upward and backward in the main, and a more characteristic growth upon the upper edge of the *helix* of dark half-inch bristles curving strongly and regularly around its edges towards Darwin's Point. In this, as in the case of figs. 4, 5, and the case of the red-haired person, the hairs upon the ears were all paler than those upon the head.

This phenomenon is not rare; any good observer will meet with instances among his acquaintance; but though well-marked examples are not uncommon, they are usually disinclined to lend themselves to research.

The majority of ears, whether of adults or of children other than infants, show no hairs, or where a weak and straggling growth has persisted in spite of constant friction and depilatory influences, there is seldom any visible direction or "set" traceable.

iv. *Ears of Quadrumana.*

In the hope of discovering the law of growth followed by these hairs the ears of various Apes and Monkeys have been examined.

The drawings for figs. 20–37 (Plates XXI. & XXII.) were made at different times and in most cases under circumstances which made a common scale impossible, for specimens sealed up in bottles cannot readily be measured, nor will some Monkeys endure handling. Fig. 32 was drawn from a Monkey upon an organ in the street, and I have no idea of its scientific name. The ear of the Aye-Aye (*Cheiromys*), fig. 37, was drawn from a skin. As a rule I have not trusted to skins, the ears upon which are apt to contract in drying; their true shapes and positions must then be matters of conjecture and the original direction of the hairs upon them is not preserved.

The ear of *Hylobates hoolock* (fig. 20) is imbedded in deep black fur and hardly visible to casual observation. It is as nearly naked as can be, having few, if any, traces of hair or down upon the smooth black skin of the back of the *concha* and *helix*. Upon the folded margin of the upper edge of the ear are a very few fine hairs of no describable colour directed towards the region where the point of the ear presumbly once was, for no trace of a point, cusp, or nodule remains. This ear is sessile, fitting closely to the head.

Orang.—The ears of a young male specimen dried and salted in the collection of the Zoological Society were hairless. The head, trunk, and limbs were covered with long red hair.

Troglodytes calvus ("Sally").—As figured by Mr. F. E. Beddard in his monograph, the ears of this species are hairless and show little or no indication of a point.

Troglodytes niger (fig. 21, 22, 23).—The ears of young Chimpanzees in the Zoological Gardens, 21 and 22, have no indications of any point, a very few small hairs upon the upper fold and a few more upon the lower edge directed towards one another as is usual. Backs almost hairless.

Fig. 23.—An ear in spirit in the Oxford University Museum showed no rudimentary point and bore a few fine hairs upon the upper fold only; direction as usual. I could not examine the back.

The ears of a Gorilla in the same museum (figs. 24, 25) showed some faint indication of a point towards which the small hairs were directed. In the immediate neighbourhood of what I took to be the rudimentary point the hairs were fewest and their direction most indefinite. The hairs upon the folded margin of the *helix* curled inwards as in the human ear and the few stronger and darker hairs upon the back of the upper ear pointed towards the edge.

Cynocephalus (fig. 26).—This has a distinct though blunt point which is bare. The hairs upon the folded upper *helix* are directed strongly to this point, those which fringe the lower *helix* are less noticeably directed.

Almost the same remarks apply to the ear of *Cercopithecus cynosurus* (fig. 27).

C. albigularis.—Is bluntly pointed and plentifully fringed; the hairs cross tips at the point. Back of ear nude (fig. 28).

C. petaurista.—Distinct, sharp, nude point; fringe of hairs directed to it. Short curving hairs upon the back, such as one finds upon the back of a baby's ear (fig. 29).

C. lalandii, Juv.—Less hairy, same general characters. Tiny tuft of darker hairs at the tip, and a few on back of ear point towards the tip (figs. 30, 31).

Monkey, sp.?—Ear fringed with converging growths. Point definite and tufted with slightly longer hair (fig. 32).

Macacus maurus (fig. 33).—A very bestial ear; upper *helix* folded and hairy; strong dark hairs from all parts of the ear converge towards a definite point and crossing there form a noticeable tuft.

Lemur, sp.? (fig. 34).—Drawn from a specimen in spirit in the Oxford University Museum. A distinctly infolded *helix* with hairy back; no point or tuft.

Ringed-tailed Lemur (fig. 35).—In same collection. A simple discoidal ear, margin fringed near junction with head; back hairy, no trace of point.

Loris (*Nycticebus tardigradus*), fig. 36.—Is so abundantly and softly furred as to be difficult to draw; back of ear furry, with but little definite "set." No indication of infolding, no point or terminal tuft.

Aye-Aye (*Cheiromys*), fig. 37.—A simple bestial ear, not quadrumanous in character, almost naked, sparsely clothed inside with fine black hair directed to the tip, outside coarser and fewer black hairs tipped with white are similarly directed. No fringe or tuft; no point. Root of ear (*concha*?) thickly clothed with divergent hairs pointing fanwise towards the circumference of the ear.

Whilst contemplating a series of forms such as these it is possible to follow in imagination the progressive degradation of the external ear from a condition in which it was mobile and of the utmost importance to its possessor to a state in which it ceases to be functional.

The presumably conspicuous leaf-shaped organ of some common ancestor of the Aye-Aye, the Lemurs, and ourselves has dwindled to a mere crumpled excrescence in the Gibbon, sans lobe, sans point, sans hair, sans everything!

An ordinary human ear occupies an intermediate position, although variations in the direction of a simian type may be found in which the *helix*, or lobe, or both are wanting, whilst others show a pithecine cusp directed laterally or even backwards.

The testimony of the convergent hairs to the origin of this cusp is so confirmatory of the view enunciated by Darwin that from henceforth the fact of our ancestors having had pointed ears may be regarded as established.

v. *Shape, Position, and Movements of the Ancestral Ear.*

Is it possible from the phenomena under discussion to deduce

anything as to the shape, position, and movements of the ancestral ear?

As to shape, it seems unlikely that the ear was obtusely pointed as in *Loris* and *Cynocephalus*, for had not the point been originally at least as sharp as it is in *Macacus* it would hardly have persisted until now.

As to position and mobility: was the ear pressed as closely to the head as in most living Apes, and had it as little mobility as theirs?

Darwin ascertained [1] that neither the Orang nor the Chimpanzee ever erects or moves its ears. I have seen *Macacus maurus* move its ear slightly, and some men retain this power, although it is questionable whether this movement is due to the extrinsic muscles of the organ, as Darwin appears to have believed [2], or to the contraction of the scalp. It is certain that beyond the power possessed by many persons of moving their ears simultaneously with their eyebrows and the skin of the nape, some few can move the whole ear quite independently of the scalp; and I have observed a case in which the upper half of the ear could be vibrated at will, either rapidly or slowly, whilst the lobe and lower half of the same organ, the eyebrows, and scalp remained motionless.

Whether these movements are due to the muscles of the ear or no, such muscles exist in Man, and their existence argues past use in our ancestral form. As a matter of fact the external ear in both Man and the Quadrumana is an atrophied organ in several respects, mobility for one. But evidence of mobility is foreign to the present enquiry except as affording concurrent testimony as to the conditions of the ancestral ear, which almost certainly moved freely. A freely moving ear must needs project, and a projecting ear is exposed and seems to require (and usually possesses) a special hairy covering of its own. To-day the normal human ear is almost hairless, frequently indeed quite nude. It is practically sessile. Whether at one time it projected laterally seems a fair subject for investigation, and to this question the existence of hairs upon its back affords a clue.

Where the ear is pressed closely to the head as in most of the Quadrumana, its back is almost naked: it was quite bare in the Gibbon which I examined. An ear thus placed is obviously protected from weather either by the fur in which it is embedded, as in the Gibbon, or by the long tresses which fall over it from the sides of the head in the Orang and Chimpanzee [3]. Even the thick short bristly hair of the Gorilla affords an efficient protection, and it is not easy to get sight of the back of its ears, even when the ear is handled. A special hairy covering for an ear so placed is needless, a tuft in the orifice to exclude rain being all that is needed and usually all that exists. Except a very few weak hairs in Gorilla, the Anthropoids have lost the hair upon the back of the ear so far as my observations extend, which is not far, for Anthropoid Apes

[1] 'Descent of Man,' 1871, i. p. 21.
[2] *Ibid.* p. 20.
[3] *Troglodytes calvus*, as its name implies is bald.

are neither abundant nor easy to examine. Their ears seem subject to much variation.

Man alone exhibits in infancy and reproduces in later life the ancestral hairy coat of the ear—a fact from which we may perhaps infer that at one time his ears had sufficient lateral projection to need other and more constant protection from the weather than the hair of the scalp afforded.

The shape of the head of our ancestor who had pointed ears is not known, but it is highly improbable that his skull was of the lofty, domed, Caucasian type. If it were long and low, somewhat after the style of the Eocene *Adapis*, the ears would be set much higher in the head than ours, and would get no protection from any hair growing upon the scalp.

Several contributary pieces of evidence suggest that the external ear is an organ diminished by disuse. Thus, it is no longer functional; it varies extremely and constantly in shape and size and in other particulars. It is by its position exposed to sunburn, frost-bite, and injuries of all kinds, yet it is ill-supplied with nerves of sensation and has a poor supply of blood. Consequently it heals slowly when cut. One might compare our external ear to an outpost once important, but now no longer essential, from which the garrison is withdrawing.

My friend Dr. Hurry, of Reading, points out that the hairs on the ears of both dark-haired and red-haired persons, already referred to, are lighter than the general tone of the hair of the head and cheeks. He suggests that this may result from some deficiency of colouring-matter, which is in itself one process of degeneration. I have, however, too little evidence on this point to warrant my doing more than indicating a line worthy of further enquiry.

But evidences of degeneration are, for the purposes of this enquiry, negative testimony; let us seek for something positive as a clue to ancestral shape and size.

The most puzzling feature seems to be the abrupt countermarch of the hairs upon the back of the *helix*. No anthropoid or other quadrumanous animal, so far as my limited observations extend, shows anything analogous. The arrangement is useless, is not ornamental, but is so persistent that one is driven to believe that its history, if decipherable, would throw light upon the condition of the organ in past times.

The theory which I propound upon this growth is submitted with extreme diffidence.

This countermarch is in its incipience simply a divergence or radiation of the lines of growth of the hair, such as is found upon all funnel-shaped hairy ears where the diameter increases outwards from a short tubular *concha* to a larger expansion. This radiation is found among the hairs on the back of the human ear, the growth starting spirally at the junction of the head and *concha*, and diverging outwards, some to the one side of Darwin's Point, some to the other (see Plate XIX. figs. 2 & 3).

The divergence is easily explained, but the subsequent convergence requires consideration. The convergence of the hairs, as the curl in the *helix* is reached, suggests (as other phenomena have already suggested) that this infolded rim is an atrophied feature, the most degenerate part of a degenerate organ. It would seem that this fold is all that survives of a subdiscoidal or funnel-shaped organ of considerable size and projection.

As in the course of ages this extension contracted and became folded back upon itself into the *helix* which we now know, the once divergent lines of growth upon its back would be crowded together as the lines of longitude upon a globe draw together after passing the equator. Or, taking the wrist to represent the *concha* and the extended thumb and fingers the lines of growth of the hairs upon the ancestral ear, partial closure of the hand bringing the five finger-tips into proximity will roughly illustrate the supposed phenomena of distortion.

That the distortion is greatest below Darwin's Point suggests that the ear has sustained its greatest loss of surface on that side; and this interpretation is in some sort supported by the fact that all, or most, Monkeys which have pointed ears show the point higher than we show our rudiment.

The great size of the ancestral ear may be inferred from the still considerable dimensions of its atrophied successor; and if the above explanation of the countermarching hairs is correct, the amount of their convergence argues a very considerable extent of ear at one time protruding beyond the present limits of the *helix*.

It has, I believe, been generally suspected that the line of human descent runs somewhat wide of any living anthropoid, and in this view the phenomena of the ear agree.

vi. *Summary.*

The human external ear is more ancestral than that of any known Ape; more bestial than the almost naked ears of the Anthropoids, which show little or no trace of any point; more bestial even than the bare bluntly-angled ear of the Dog-faced Baboon. There are characters apparently peculiar to itself which need reference to such early forms as *Nycticebus* and *Cheiromys* before their significance can be appreciated.

A large and somewhat funnel-shaped ear, sharply pointed and projecting widely from the head, and with sufficient powers of motion to permit of its being pricked, shaken, and laid at will, seems within the vista of possibilities opened up by the phenomena just described.

We may perhaps go one step further and reasonably infer the back of this ear to have been thickly clothed with hair, longer upon the *concha*, shorter upon the *anti-helix* and *helix*, and that it was fringed with stronger and darker hairs which united at the point in a conspicuous spirally-twisted tuft.

EXPLANATION OF THE PLATES.

Plate XIX.

Ears of Man, adults and infants.

Fig. 1. Left ear of girl at 36th day after birth, front and back views; enlarged.
2. Right ear of infant girl, back view; enlarged. *a*, base; *b*, thick growth.
3. Left ear of same child, back view; enlarged. *a*, base; *b*, thick growth.
4. Left ear of adult, front view.
5. Left ear of adult, back view.
6, 7. Right ears of adult, front views.

Plate XX.

Ears of Man, infants.

Fig. 8. Ear of infant 4 days old; hairs meet at *a*.
9. Same seen from above showing hairs crossing and small tuft.
10. 6 days old; hairs cross at *b*.
11. Nodule at *c*, hairs meet there.
12, 13. Under 1 month, hairs converge on *d*, and cross.
14, 15. 10 days old.
16. 2 days old, much fine white hair, longest upon back of ear and on edge of helix; hairs meet at *e*; no cusp.
17. 5 months old; hairs converge from *f*, *f*, Darwin's Point bare, *g*.
18. Hairs cross on inner edge of helix, *h*.
19. 10 days old.

Plate XXI.

Ears of Anthropoid Apes.

Fig. 20. Ear of Hoolock Gibbon showing a few hairs (*a*); no hairs on the back of the ear.
21. Ear of Chimpanzee, ♂ jr.
22. Ear of do. *b*, *c*, hairs converging; no cusp.
23. Ear of do. *e*, hairs.
24, 25. Ear of Gorilla, jr.; *d*, Darwin's Point? Hairs on margin numerous and definitely directed towards *a*.

Plate XXII.

Ears of Monkeys and Lemurs.

Fig. 26. Ear of *Cynocephalus*.
27. Ear of *Cercopithecus cynosurus*.
28. Ear of *C. albigularis*.
29. Ear of *C. petaurista*.
30, 31. Ear of *C. lalandii*, jr.; front and back views.
32. Ear of Monkey, sp. inc.
33. Ear of *Macacus maurus*, hairs from both back and front converge upon *a*, and cross points there.
34. Ear of Lemur, sp. inc.
35. Ear of Ring-tailed Lemur.
36. Ear of Loris.
37. Back of left ear of Aye-Aye.

March 16, 1897.

Dr. W. T. Blanford, F.R.S., V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of February 1897 :—

The total number of registered additions to the Society's Menagerie during the month of February was 87, of which 32 were acquired by presentation, 5 by birth, 40 by purchase, 8 were received on deposit, and 2 in exchange. The total number of departures during the same period, by death and removals, was 74.

Amongst the additions, attention may be called to a young female African Monkey of the genus *Cercopithecus*, from the Upper Benué River, obtained by purchase on Feb. 2nd, which seems to be referable to *C. tantalus*, Ogilby, described in the Society's 'Proceedings' for 1841 (p. 33): also to

Two Uvæan Parrakeets (*Nymphicus uvæensis*), from the Island of Uvea, Loyalty Group, obtained by purchase Feb. 16th (see P. Z. S. 1882, p. 408, pl. xxvi.): and to

A second female hybrid Antelope, bred between *Tragelaphus gratus* ♂ and *T. spekii* ♀, born Feb. 28th. The former hybrid between the same animals was born Feb. 12th, 1896 (see P. Z. S. 1896, p. 304). The period of gestation of the Antelope was ascertained to be eight calendar months.

I take this opportunity of calling the attention of the Meeting to two Otters received by the Society on the 27th August last year (having been purchased of Mr. James Silcock, of Drummatticonnor Mills, Listdoor, Co. Down, Ireland), and now thriving and very tame in our Gardens. The Irish Otter was separated specifically from the English Otter (*Lutra vulgaris*) by Ogilby as long ago as 1834 (see P. Z. S. 1834, p. 111) under the title of *Lutra roensis*, and I am not aware that the subject has been alluded to since except in reference to his observations (see Bell's 'British Quadrupeds,' p. 138, 1837). But it must be allowed that the Irish Otters which we now have seem to be rather different from the ordinary form, having the tail more flattened, a longer head, a more distinctly white under-lip, and a generally darker colour of the fur. It appears to me, therefore, that the matter is worthy of further investigation. If the Irish Weasel is specifically different from the British species, as believed by Mr. Thomas and other good authorities, why should not the Irish Otter be also distinct? It would be well, therefore, that a series of the two forms should be carefully compared together.

Mr. A. Smith Woodward, F.Z.S., gave an account of his recent visit to South America for the purpose of examining the Fossil Vertebrata of that country, and exhibited a series of photographs and fish-remains. His main object was to see the Museums and collections in the Argentine Republic, but on the way he was also

able to make brief visits to Rio de Janeiro in Brazil and to Montevideo in Uruguay.

In Brazil at present three features of interest claimed attention. The Cretaceous Formations in the provinces of Ceara and Bahia had yielded a large number of remains of marine fishes closely similar to those from deposits of the same age in other parts of the world; and from the neighbourhood of Bahia, within the last few years, Mr. Joseph Mawson had obtained numerous reptilian bones, referable to Mesozoic crocodiles, pterodactyles, plesiosaurs, and probably dinosaurs. Certain lignites occupying isolated basins among the old rocks in the province of São Paulo were crowded with the skeletons of Teleostean fishes evidently of a comparatively modern Tertiary period. These were being collected by Dr. von Jhering for the São Paulo Museum, and by Mr. John Gordon for the British Museum; and when examined in detail, it seemed likely they would afford much information concerning the immediate ancestors of the existing Brazilian freshwater fish-fauna. A third geological formation of special importance was a series of limestones extensively developed in the province of São Paulo, whence Dr. Orville A. Derby some years ago had obtained the remarkable primitive aquatic reptile, *Stereosternum tumidum*. As originally recognized by Prof. E. D. Cope, who had described this animal, it was extraordinarily similar to *Mesosaurus* of the Karoo Formation of South Africa—a series of early Mesozoic deposits specially characterized by extinct reptiles which had often been regarded as the possible immediate ancestors of the Mammalia. Dr. Derby had recently found a new specimen of *Stereosternum* exhibiting almost its complete skeleton, including the remarkably long tail; he had also lately met with an undoubted Labyrinthodont tooth, and there was every indication that before long the important Karoo fauna would be discovered in the South American area.

The Uruguayan National Museum in Montevideo contained nothing of much palæontological interest; and the collection of bones of extinct Mammalia from Uruguay, made by Dr. Conrad Moeller, had been presented by that gentleman a few years ago to the University of Christiania, Norway.

The National Museum of Argentina at Buenos Aires, under the direction of our Corresponding Member, Dr. Carlos Berg, contained the fine collection of Pleistocene Mammalia described by the late Dr. Burmeister, all well preserved and beautifully mounted. There was also a large collection of late Tertiary fish-remains from the neighbourhood of the city of Paraná. The study of these would supplement in an interesting manner the results obtained from the lignite fishes of São Paulo.

Modern progress, however, in the discovery of the extinct vertebrate fauna of the Argentine Republic was best illustrated not in the National Museum, but in the Buenos Aires State Museum, founded by our Corresponding Member, Dr. F. P. Moreno, at La Plata in 1885. The more important specimens had already been briefly described and well figured in the publications of the Museum;

but new collections were continually being obtained by the officers of the Museum, who were periodically despatched on exploring expeditions. Among the more interesting acquisitions of 1896 were some crocodilian and ophidian skeletons from the red sandstones of the Territory of Neuquen, which were supposed to be of Cretaceous age, and had already yielded the Dinosaurian remains lately described by Mr. Lydekker. The Crocodiles (described by Mr. Woodward in the 'Anal. Mus. La Plata, Paleont. Argent.,' pt. iv. 1896) were of special interest as being of a Mesozoic type, with a short and broad head and a terminal narial opening. Their teeth were few and well differentiated into incisors, canines, and molars, apparently without any successional teeth. The Ophidian was in a wonderful state of preservation, but was still undescribed. The red sandstones in which these reptilian remains occurred were believed to be of the same age as the earliest deposits containing mammalian remains in Southern Argentina. Hence the latter were usually considered to date back to the Cretaceous period.

The succession of the mammaliferous deposits of Patagonia and the adjoining territories had hitherto been most thoroughly investigated by Señor Carlos Ameghino, who had conducted an exploring expedition each year since 1887, and had amassed an enormous private collection which his brother, Dr. Florentino Ameghino, had studied with results so important and so well known as not to need detailed recapitulation here. Above the red sandstones of Neuquen, and below the superficial pampean deposits, the brothers Ameghino now recognized two distinct mammalian faunas—the older of the Pyrotherium Formation, and the later of the Santa Cruz Formation, both particularly remarkable for the abundance of highly specialized Ungulata. Near the coast the marine Patagonian Formation fortunately separated these two freshwater or terrestrial horizons, and thus afforded a means of determining their age. The Cetacean remains found in the marine intercalation (as had been noted by Mr. Lydekker) seemed to correspond with those termed Miocene in the northern hemisphere; the Selachian teeth from the same formation presented by the brothers Ameghino to the British Museum were also of a Miocene or even early Pliocene facies. Mr. Woodward was therefore inclined to believe that the Santa Cruz fauna was not earlier than the Miocene, and might even be homotaxial with the Lower Pliocene of the northern hemisphere. There was no decisive evidence of any of the Patagonian mammals hitherto discovered dating back to the Cretaceous period.

Dr. R. H. Traquair, F.R.S., exhibited and made remarks upon a new specimen of the supposed fossil Lamprey (*Palæospondylus gunni*) from the Old Red Sandstone of Caithness, and read a note on its affinities (see below p. 314).

Mr. E. T. Newton agreed with Dr. Traquair that the slight markings seen on the stone near the fish-remains, which had been

thought to represent fin-rays, were not organic and had nothing whatever to do with the fish. Similar ridges were to be seen on a specimen with *Palæospondylus* in the Museum of Practical Geology, but had no relation to the fossil.

The following papers were read :—

1. Note on the Affinities of *Palæospondylus gunni*, Traq. In reply to Dr. Bashford Dean, of New York. By R. H. Traquair, M.D., LL.D., F.R.S.[1]

[Received March 16, 1897.]

Those who are acquainted with my papers on *Palæospondylus gunni* will remember that my principal reason, in my last contribution to the subject, for assigning a Marsipobranch affinity to this singular little Devonian organism was the presence of a cirrated opening, presumably nasal, situated in the front of the cranium. My words were :—

"What is the nature of this aperture with its strange fringe of cirri? It cannot be a sucker like that of the larval *Lepidosteus*. . . . . The more obvious comparison—and that which is in harmony with the rest of the structure of our fossil—is that with the single nasal opening of *Myxine* or *Petromyzon*. And if this view be the right one, then *Palæospondylus* is monorhinal, and *is* a Marsipobranch."[2]

I was therefore not a little surprised to find the following statement by Dr. Bashford Dean at p. 70 of his recent work on 'Fishes Living and Fossil,' published after he had received and read the paper from which the above extract is quoted:—"There can be no doubt that *Palæospondylus* possessed a ring-like mouth surrounded by barbels like those of a Myxinoid, and that it lacked paired fins."

Not that Dr. Dean seems to *dispute* my reference of the cirrated opening to a nasal category—on the contrary he reproduces my restoration of *Palæospondylus* without raising any question of the kind. So I can only conclude that he did not read my description with that amount of care which would have prevented so serious a misunderstanding of my words, which surely could not have been plainer.

In this work, however, the author looks favourably on the idea of the Marsipobranch affinities of *Palæospondylus*, even to the extent of speaking of it as "the fossil remains of what seems undoubtedly a Lamprey" (p. 65).

More recently, however, Dr. Dean has seen reason to change this opinion after examining a specimen of *Palæospondylus* which

[1] Communicated by A. Smith Woodward, Esq., F.Z.S.
[2] Proc. Roy. Phys. Soc. Edinb. vol. xii. 1894, p. 314.

had been sent to him by Mr. W. T. Kinnear, of Forss near Thurso. His interpretation of this specimen, along with a magnified figure, will be found in a paper entitled "Is *Palæospondylus* a Cyclostome?" published in the 'Transactions of the New York Academy of Sciences' for 1896 (vol. xv.).

Here (pp. 101, 102) Dr. Dean states that in this specimen "a dusky band may, on either side, be traced tailward from the region of the 'auditory capsules.' These bands when examined with a glass are found to resolve themselves into a series of ray-like structures arranged transversely to the axis of the body, but slightly inclined backward . . . . . They cannot be said to definitely take their origin from post-occipital plates, although they certainly appear to, and there is a suggestion that the right occipital plate has been formed of metameral elements. The band of ray-like structures continues, however, caudad of the pectoral region, traceable backwards to the region of about one-half the length of the vertebral axis. . . . . Negative as well as positive evidence, accordingly, indicates that these fin-like rays were concerned with the presence of paired fins. If this be true, is *Palæospondylus* to be regarded as a Marsipobranch?" The paper finishes with an arrangement in tabular form of the evidence for and against the marsipobranch affinities of *Palæospondylus*, from which it would appear that he still looks upon the cirrated opening as a "mouth," and that he thought the post-occipital plates may "well represent basalia of pectoral fins." After all, the only conclusion to which the author comes is that "the position of the fossil, if not to be regarded as marsipobranchian, is certainly undefinable."

As Dr. Dean has been so extremely kind as to send his specimen over to this country that we may examine it for ourselves, I am enabled by this act of courtesy on his part to offer a few words as to *my* interpretation of the appearances presented by it.

It belongs to the class of specimens which may be designated as moderately good. The black substance of the skull and vertebræ is fairly well preserved, but the surface is gone. The post-occipital plates are not well preserved, so that the "suggestion" as to one of them being formed of "metameral elements" is absolutely without value. The vertebral centra are in pretty good condition, some of them in front being so turned up as to show their ring-like conformation with great distinctness. These are the parts seen on the specimen; if there were anything more we should expect it to be preserved in the same way.

On examining the specimen with a low power, taking care *to turn the head towards the light*, we see the dusky band clearly enough on the right[1] side, though it is scarcely perceptible on the opposite one; and we also see the appearance of this band being divided into transversely directed ray-like bodies. Then if we turn round the fossil so that the light may strike on the vertebral column from the convex side, then the dusky band with its ray-like markings at once disappears—but not so the black substance of

[1] In reality the *left* side, as the specimen, as usual, lies on its back.

the rest of the fossil. Then if we examine the specimen further with a higher power, we should find that these striated markings contain not a particle of organic tissue—they are mere *shadows*; so that Dr. Dean's expression "a series of ray-like *structures*" is surely inapplicable to them, and the figure of them which he gives in his paper is quite misleading.

There is no doubt that the outer margin of the "dusky band," lettered "marginal body-wall" in Dr. Dean's figure, represents a slightly elevated ridge on the stone, and that the "ray-like structures" are slight furrows brought into relief only when the specimen is so held that the light brings out their *shadows*.

The next thing to be observed is that these ray-like shadows are not limited to a position internal to the line B.W. in Dr. Dean's figure, but extend beyond it towards a second longitudinal line parallel with the first, and there is even an indication of a third one. Furthermore, if we examine the whole surface of the stone, carefully turning it so that the light may fall on it from various directions, we shall be surprised to find indications of similar striated markings cropping up here and there quite apart from the fossil.

Consequently my belief has come to be, that these markings, considered by Dr. Bashford Dean to be rays of a pectoral fin, are petrological and not palæontological in their nature—that they are, in fact, inorganic and have nothing to do with the fossil itself, which stands clearly out from them in its deep black contour of calcified cartilage.

But even if these markings were organic and belonged to the specimen of *Palæospondylus* with which they are associated, Dr. Dean's interpretation of them is still inconsistent. For if the outer edge of his "dusky band," marked B.W. in his figure, be really the "marginal body-wall," then his supposed "radial-like supports (of paired fins)," which pass inwards from this line, must, according to his own theory of the paired fins, be "basals" and *not* "radials." Nevertheless he also says of the post-occipital plates that they "might well represent basalia of pectoral fins."

Apparently still under the conviction that the cirrated ring which I have interpreted as nasal is oral in its nature (how a mouth could go directly into the front of the cranium I fail to see), he leaves the nose, upon which I have naturally placed the principal weight, altogether out of consideration in his summary of characters for and against the marsipobranch affinities of *Palæospondylus*. And note his remark: "Moreover it is possible that the ventral 'cirrhi' are displaced structures from the cranial region, as one of the specimens examined by the present writer seems to indicate." Of course these "ventral cirrhi," namely the cirri on the ventral half of the nasal ring, are cranial structures, and I certainly did not describe them as anything else! It is really a matter for regret that Dr. Dean did not, as it would seem, read my paper with a little more care. Although Dr. Dean admits that the caudal fin of *Palæospondylus* is "essentially marsipobranchian,"



J.Smit del.et lith.

Mintern Bros. imp.

PSEUDOCHIRUS DAHLI.

he adds that "its diphycercal (or perhaps heterocercal) condition" is also common to many groups. Well, I have never seen a "heterocercal" *Palæospondylus* in spite of the many specimens with well-preserved tails which have come under my observation. Nor have I, although I must have examined nearly two hundred examples of the little creature in question, many of them in a much better state of preservation than the one which is the special subject of this paper, ever seen anything like the shadowy furrows interpreted by Dr. Dean as pectoral fin-rays.

Therefore I must, in conclusion, state my belief that the examination of this specimen leaves the question of the affinities of *Palæospondylus* precisely where it was after I had written my last paper on the subject.

My warmest thanks are, however, due to Dr. Bashford Dean for his kindness and generosity in sending his specimen again across the Atlantic for re-examination by British palæichthyologists.

2. On a Collection of Mammals from North and North-west Australia. By R. Collett.

[Received February 10, 1897.]

(Plate XXIII.)

Mr. Knut Dahl, a young naturalist, returned to Norway in May 1896, after spending three years, from 1893 to 1896, in South Africa and Australia for the purpose of collecting zoological specimens for the University of Christiania.

In June 1894 he arrived at Port Darwin, in North Australia, and at once commenced his researches in the inner districts of Arnhem Land. He subsequently visited Victoria River (south of Arnhem Land), and finally remained at Roebuck Bay, North-west Australia, from October 1895 to February 1896, where he likewise obtained interesting collections. He collected altogether examples of 34 species of Mammals, 31 of which may be identified. Besides this, several others were observed without being procured. Two of the species of which specimens were brought home I consider new to science (*Pseudochirus dahlii* and *Sminthopsis nitela*), and several of the others are rare and seldom met with in collections.

I shall therefore append a short account of the Mammals which have been brought home and which are all preserved in the Zoological Museum at Christiania, and add to it a short description of the most important of the places visited, together with their peculiarities, from the reports I have received of them from Mr. Dahl.

I owe my thanks to my friend Mr. Oldfield Thomas for having assisted me in determining some of the more doubtful specimens.

Characteristic of the whole of Arnhem Land is a mighty forest, which more or less covers the entire country.

Port Darwin, the first locality visited, is characterized by flat,

open forest-land, extending to the very banks of the Adelaide River. The forests are mainly composed of various sorts of *Eucalyptus*, and are denser than any seen elsewhere in Arnhem Land. Numerous small watercourses intersect the plains, and are surrounded by jungles of bamboo-cane, large trees of *Ficus*, and, finally, a species of palm closely allied to *Areca*.

In the next district, *Daly River*, one again meets with the same forest-land, and, on the whole, the same kind of trees; but the forests are more open, changing here and there into large plains, which in some places are covered with swamps and lagoons, surrounded by *Melaleuca*-trees, and in others assume a sandy desert-like appearance. *Hermit Hill* lies a little to the southward of Daly River, and on the whole possesses the same natural features.

About 100 miles inland from the mouth of the Daly River the country consists of broken tableland; *Mt. Showbridge* lies to the eastward of this and is of considerable height.

Glencoe (or Fountain Head) has low woods and large open plains.

Mary River, which flows to the northward, rises partly in a peculiar granite formation, which extends up to the railway at *Union Town*, and partly from permanent springs in the great central tableland, whence *Alligator River* also flows northward, and whence *Katherine River* flows towards the south and west, subsequently joining the Daly River, and bounding Arnhem Land in the south. The great tableland is covered with large forests and permanent water-springs.

In the neighbourhood of *Victoria River* the district consists of broken sandstone ranges, covered with *Spinifex* grass and gum-trees.

Roebuck Bay, North-west Australia (18° S. lat.), is desert-like country, covered with scrub and lakes.

Fam. Pteropodidæ.

1. Pteropus scapulatus, Peters, 1862.

Pteropus scapulatus, Dobs. Cat. Chir. Brit. Mus. p. 41 (1878); Ogilby, Cat. Austral. Mamm. p. 80 (1892).

N. Australia: Daly River, Aug. 17th, 1894 (one specimen).

Skin. The coloration of the fur is as described in the immature specimens (*P. elseyi*, Gray, 1866); a paler reddish-brown collar round the neck, and no traces of white shoulder-tufts.

The woolly hairs covering the lower surface of the forearm and adjacent parts of the wing-membrane are of a pale greyish-yellow colour.

Length of forearm 138 mm.

Skull.—

Length of the skull (about)	59 mm.
Breadth across zygomatic arches.....	35 „
Length of dental series	23 „

Dentition normal. Upper m^2 is in this specimen considerably larger than i^2.

Hab. Common on the River Daly (Arnhem Land). Several specimens were shot, but only one preserved.

2. PTEROPUS GOULDI, Peters, 1867.

Pteropus gouldii, Dobs. Cat. Chir. Brit. Mus. p. 60 (1878); Ogilby, Cat. Austral. Mamm. p. 79 (1892).

N. Australia: Port Darwin, June 17th, 1894 (two specimens). Daly River, Aug. 17th, 1894 (one specimen).

Skin. The specimens belong to the typical form, with the back of the head and neck ferruginous brown.

Skull. All the specimens are young, and have no traces of parietal crests; but, in spite of their youth, all the teeth are worn. Length of dental series 29 mm.

Hab. Very numerous in Arnhem Land, especially close to the big rivers. At Roebuck Bay (N.W. Australia) Flying-Foxes were rarely seen and none were procured.

Fam. VESPERTILIONIDÆ.

3. SCOTOPHILUS GREYI, Gray, 1843 (Dobs. 1877).

Scotophilus greyii, Dobs. Cat. Chir. Brit. Mus. p. 263 (1878); Ogilby, Cat. Austral. Mamm. p. 92 (1892).

W. Australia: Roebuck Bay, Nov. 13th, 1895 (two specimens).

Skin. One is a young male, the other a full-grown female (length of forearm 33 mm.), containing an embryo of the size of a large pea.

Hab. The commonest species at Roebuck Bay, but no Bat was plentiful there.

4. NYCTOPHILUS TIMORIENSIS (Geoffr.), 1806.

Nyctophilus timoriensis, Dobs. Cat. Chir. Brit. Mus. p. 172 (1878); Ogilby, Cat. Austral. Mamm. p. 87 (1892).

N. Australia: Daly River, July 1894 (four specimens).

N.W. Australia: Roebuck Bay, Nov. 1895 (one specimen).

Skin. Two specimens are males, length of forearm 41–42 mm.; and three females with the forearm 38, 38, and 40 mm. One of the specimens (from Daly River) shows the peculiarity that the ears are not joined, there being no trace of the connecting-membrane on the forehead.

Hab. Very numerous on Daly River, rarer at Roebuck Bay. Generally seen shortly before sunset close to the houses.

5. CHALINOLOBUS NIGROGRISEUS (Gould), 1856.

Chalinolobus nigrogriseus, Dobs. Cat. Chir. Brit. Mus. p. 251 (1878); Ogilby, Cat. Austral. Mamm. p. 91 (1892).

N.W. Australia: Roebuck Bay, Nov. 30th, 1895 (one specimen).

Skin. The single specimen is a male; length of forearm 35 mm.

Skull. The minute first upper premolar is absent on the left side.

Hab. Rare at Roebuck Bay, not seen in Arnhem Land.

6. VESPERUGO TENUIS (Temm.), 1835–41.

Vesperugo tenuis, Dobs. Cat. Chir. Brit. Mus. p. 226 (1878) (Sumatra, Java, Borneo).

N.W. Australia: Roebuck Bay, Nov. 1895 (one specimen).

Skin. The specimen agrees in all details with Dobson's description. Length of cubitus 30 mm. Colour greyish brown, scarcely darker at the base of the hairs; beneath more ashy.

The muzzle (with the glandular prominences) covered with short hairs, interspersed with a few longer hairs; only the nostrils are perfectly naked.

Skull. Outer cusp of first upper incisor shorter than inner cusp; upper i^2 a little shorter than outer cusp of i^1.

Hab. V. tenuis has been recorded from Sumatra, Java, and Borneo, but had not previously, so far as is known, been found in Australia.

At Roebuck Bay (N.W. Australia) it was rare, like the other species.

Fam. RHINOLOPHIDÆ.

7. HIPPOSIDERUS MUSCINUS (Thos. et Doria), 1886.

Phyllorhina muscina, Thos. et Doria, Ann. Mus. Civ. Stor. Nat. Genova, ser. 2, vol. iv. p. 201 (1886).

N. Australia: Mary River, May 7th, 1895 (two specimens).

Skin. Both specimens are females (like those obtained by d'Albertis in New Guinea). Length of forearm 43 mm. and 44 mm. The nose-leaf is alike in both, and perfectly agrees with the figure in Thomas and Doria's description of the typical specimens.

Hab. This species is new to the Australian fauna. It had hitherto only been found on the Fly River, in New Guinea, by d'Albertis.

In Arnhem Land it was not uncommon on the Mary River, and several specimens were found resting in the caves, some few hanging close together.

Fam. EMBALLONURIDÆ.

8. TAPHOZOUS AUSTRALIS, Gould, 1854.

Taphozous australis, Dobs. Cat. Chir. Brit. Mus. p. 382 (1878) Ogilby, Cat. Austral. Mamm. p. 96 (1892).

N. Australia: Mary River, May 10th, 1895 (four specimens).

Skin. One specimen is a male, the rest females; no air-sac is developed on the throat of the male.

Length of forearm 67–69 mm.

Hab. Numerous on the Mary River, found in the caves in company with *Hipposiderus muscinus*.

Fam. Canidæ.

9. Canis dingo, Blumenb., 1790.

Canis dingo, Ogilby, Cat. Austral. Mamm. p. 123 (1892).

N. Australia: Hermit Hill, Aug. 12th, 1894 (one specimen and one skull). Daly River, Aug. 1894 (one specimen). S. Alligator River, June 15th, 1895 (one specimen).

Skin. The three specimens belong to the red variety. The size seems to be inferior to those from Queensland which are preserved in the Christiania Museum; length of four skulls 183–190 mm.

Hab. Only the red variety was seen in Arnhem Land; but black specimens were known by the natives.

Fam. Muridæ.

10. Conilurus penicillatus (Gould), 1842.

Conilurus penicillatus, Ogilby, Cat. Austral. Mamm. p. 117 (1892).

N. Australia: Hermit Hill, Aug. 15th, 20th, 1894 (five specimens). Daly River, Oct. 1894 (three specimens). Adelaide River, Dec. 12th, 1894 (one specimen). Mary River, May 15th, 1895 (one specimen).

Skin. There are ten specimens in all: two of the skins (Hermit Hill, Aug. 1894) have the tail white-tipped (length of white tip 26 mm.); in all the other specimens the tail is black throughout. In the single autumn specimen (Mary River, May 1895) the hairs on the tail are very short and adpressed.

Skull. In a full-grown specimen, with worn teeth, the length of the skull is 44 mm., the breadth 23 mm.

Foramen palatinum reaching to or a little beyond the first molar. The anterior border of the *os interparietale* forms a straight line, the posterior one a rounded one.

Hab. Numerous all over Arnhem Land, and in great numbers on the rivers on the lowlands. Most of the specimens procured were taken from holes in the trees, but they were also seen close to and within the houses.

Native name: Pelke.

11. Conilurus boweri (Ramsay), 1886.

? *Hapalotis macrura*, Peters, Monatsb. Akad. Wissensch. Berlin, 1876, p. 355, pl. i. (1876).

Hapalotis boweri, Ramsay, Proc. Linn. Soc. New South Wales, 2nd ser. vol. i. p. 1153 (1886).

Conilurus boweri, Ogilby, Cat. Austral. Mamm. p. 116 (1892).

N.W. Australia: Roebuck Bay, Dec. 8th, 1895 (one specimen, a female). Roebuck Bay, Dec. 16th, 1895 (two half-grown young ones, in spirit).

Skin. The specimen (a female) is not perfectly adult, the teeth being unworn and the posterior molars not yet fully developed.

Length of the body, with head, about 150 mm., length of tail 250 mm. Consequently the proportions of the body to the tail is as three to five, thus considerably longer than in the typical *C. boweri*, and agreeing in that respect with *C. macrurus*, Peters.

The colour is exactly as in Ramsay's description of *C. boweri*. From a little in front of the ears, down the back of the head, and the central portion of the back and on the root of the tail is a broad distinct band of golden yellow, rufescent on the nape. The tail is brown for one-seventh of its base, the remainder white; towards the tip the hairs are somewhat longer than on its inner parts, but no distinct brush is present.

This specimen from Roebuck Bay thus has the proportions of the body in accordance with *C. macrurus*, and the colour with *C. boweri*; there is therefore much reason to believe that the two species are identical.

The two half-grown young ones have both a length of 96 mm. (head and body); the tail was 103 and 110 mm. Thus the tail was proportionally much shorter than in the larger specimen, and perfectly in accordance with Ramsay's description of his *C. boweri*. The colour, too, was as in the type specimen; the hairs of the tail evenly short to the tip, and no trace of a brush was developed.

Mammæ four.

Skull. Hardly distinguishable from that of *C. penicillatus*.

Hab. Rare in the neighbourhood of Roebuck Bay, not found in Arnhem Land. Several were seen within the houses.

Native name: Katkomba.

12. Conilurus hirsutus (Gould), 1842.

Conilurus hirsutus, Ogilby, Cat. Austral. Mamm. p. 117 (1892).

N. Australia: Hermit Hill, Aug. 8th–15th, 1894 (eleven specimens and two fœtuses). Daly River, Oct. 7th, 1894 (one specimen). Mount Showbridge, March 15th, 1895 (two specimens). Katherine River, July 13th, 1895 (one specimen).

Fœtus. Besides the 15 specimens, mostly full-grown, there are two fœtuses (taken from a female at Hermit Hill, Aug. 15, 1894) of the size of a nearly full-grown mouse. Vibrissæ already well-developed.

In one the placenta was still adherent; it is very large and thick, rather oblong, its diameters being 23 mm. and 27 mm.

The number of *fœtuses* is never more than two.

Skin. Size very large. Measured on the skins of full-grown specimens the length of body and head is about 315 mm., the tail about 340–360 mm.

Occiput and neck in all tinged with rusty yellow; belly yellowish white. The feet are varied above with black and rusty yellow; the hands are black, but in most specimens the long hairs which cover the claws are whitish.

Skull. Length 67 mm.; breadth 32 mm. *Foramen palatinum* not reaching the anterior border of the teeth series. Anterior

border of *os interparietale* strongly convex; posterior also convex, its lateral angles pointed.

Teeth remarkably like those of *C. penicillatus*.

Hab. Common all over Arnhem Land, very numerous on the plains around the Daly River. Generally it was found hidden in holes of the trees, and numbers were taken by hand by the natives.

Number of young only two.

Native name: Nunjala.

13. Mus rattus rufescens, Gray, 1837.

N. Australia: Glencoe, Jan. 1894 (one specimen).

Skin (in spirit). Length of head and body 160 mm., tail 198 mm. Number of rings on the tail 205.

Of the different varieties of *M. rattus* described by Thomas [1] and Blanford [2], the present specimen comes nearest to *Mus rufescens*, Gray, the colour being rufous brown, with a yellowish tint along the sides; the belly and lower parts of head are whitish, hands and feet more reddish grey. The fur is mixed with fine spines [3].

Hab. Not rare in the storehouses of the colonists in Arnhem Land.

14. Hydromys chrysogaster fulvo-lavatus, Gould, 1863.

Hydromys fulvolavatus, Ogilby, Cat. Austral. Mamm. p. 102 (1892).

N. Australia: [illegible] River, Aug. 4th, 1894 (one specimen). Daly River, Au[illegible]4th, 1894 (four young ones in spirit). Daly River, Aug. 13th, 1894 (one young one in spirit).

Skin. The full-grown specimen, a female, belongs to the western variety (*H. fulvolavatus*, Gould, 1863). Whiskers mixed black and white; extreme tip (one inch) of tail white.

Hab. Found nearly everywhere in the watercourses in Arnhem Land.

Fam. Macropodidæ.

15. Macropus antilopinus (Gould), 1841.

Macropus antilopinus, Thos. Cat. Mars. Monotr. Brit. Mus. p. 21 (1888); Ogilby, Cat. Austral. Mamm. p. 59 (1892).

N. Australia: Hermit Hill, Aug. 9th, 1894 (one specimen, female). Glencoe, Jan. 1895 (skull, male). Victoria River, April 13th, 1895 (one specimen, young).

Skin. The specimen from Victoria River is a young one, the second a female, scarcely full-grown. Through an accident the

[1] Proc. Zool. Soc. 1881, p. 533 (*Mus alexandrinus*).

[2] 'Fauna of British India,' Mammalia, p. 403 (1888–91).

[3] Besides the specimen of *M. rattus* there are in the collection three specimens (skins or in spirit) of two or three species of *Mus* from North Australia. But without larger series from the different localities it is hardly possible at present to work them out satisfactorily; and as the description of isolated specimens of this genus only causes further confusion, I prefer to omit them altogether.

skin of a nearly adult male (from Glencoe) was destroyed, and its skull only preserved.

The coloration of the young and the female agree in most details with Thomas's description. The fingers and toes are, however, yellowish white to the claws, and the tail, too, is rufous white throughout, not becoming darker towards the tip.

Skull. In the male the length is 174 mm., the breadth 103 mm. The greatest breadth across the inflated nasal chamber is 49 mm. The specimen is not perfectly adult; the line between the zygomatic processes will touch the anterior part of m^4. The skull of the young female has a length of 147 mm., breadth 87 mm.

Male.—*Teeth.* Persistent set not yet developed, the milk p^4 being still present. It is short, with a weak root; its length scarcely exceeding the breadth of m^1.

In the lower jaw m_1 is almost aborted on both sides, its premolar-like crown being pressed obliquely in the space between (the normal) m_2 and the milk p_4.

Female.—*Teeth* as in the male, but m_1 in lower jaw is normal. The milk p^4 in both jaws very small and directed obliquely forwards.

Hab. Common in Arnhem Land in the neighbourhood of hills, generally seen in herds. Also found on Victoria River. It was very wary and difficult to approach.

Native name: Koppo (male); Kondaltburu (female).

16. Macropus agilis (Gould), 1841.

Macropus agilis, Thos. Cat. Mars. Monotr. Brit. Mus. p. 42 (1888); Ogilby, Cat. Austral. Mamm. p. 54 (1892).

N. Australia: Port Darwin, June 1894 (four specimens). Daly River, July–Aug. 1894 (four specimens and one embryo). Victoria River, April 1895 (one specimen). Katherine River, July 1895 (three specimens).

N.W. Australia: Roebuck Bay, Nov. 1895 (five specimens and three embryos).

Skin. There are in the collection 17 skins (mostly with skulls), four embryos or young ones from pouch, and several skulls extra.

Young from pouch. Length from snout to anus about 150 mm., tail 97 mm.

Eyes still closed. Naked; hairs on snout just traceable. No teeth visible. (Roebuck Bay, Nov. 1895.)

Another young one, length from snout to anus about 200 mm., tail 148 mm. (size of a squirrel). Still almost perfectly naked, the eyelids and vibrissæ developed. Lower incisors visible. (Roebuck Bay, Nov. 1895.)

Skull. 20 skulls, in different stages of development, are in the collection (length between 68 mm. and 152 mm.).

Teeth. I give some remarks on the teeth in a few of these stages.

Young stage (a specimen from the pouch). Length of the skull

68 mm. P^3 and the milk p^4 are fully developed; m^1 is just emerging from the alveolus.

Middle stage. Two skulls, length 121 mm. and 126 mm., are just in the stage when p^3 and the milk p^4 are at the point of being changed. In both specimens the persistent p^4 is already developed in one of the upper jaws; in the other jaw p^3 and the milk p^4 are still present, but the persistent p^4 is (in the largest specimen) visible above their roots through a hole in the maxillary. In the lower jaw on one side, too, the persistent p^4 is developed, on the other side not.

Adult stage. Two full-grown specimens, having the following sizes:—

Male: length 152, breadth 80 mm.
Female: „ 140, „ 74 „

Two other skulls belong, too, to old specimens [1], but are smaller, their length being 129–136 mm.

In all these four skulls m^1 is fully developed; a line between the tips of zygomatic processes will touch the middle (or in the old male the posterior part) of m^1.

Between the middle stage and the adult there are nine skulls (length from 119 mm. to 146 mm.), none of which have m^1 fully developed. The line between the tips of zygomatic arches will touch the middle of m^3, in the youngest specimens the posterior part of m^3.

Between the middle stage and the young one there are four skulls (length between 118 mm. and 123 mm.). P^3 and the milk p^4 are still present; m^3 is only half-developed.

Hab. The commonest species in Arnhem Land and at Roebuck Bay, and met with everywhere along the great rivers; especially numerous in the big bamboo-jungles.

Native names: Ma, Bulak.

17. Macropus robustus (Gould), 1840.

Macropus robustus, Thos. Cat. Mars. Monotr. Brit. Mus. p. 22 (1888); Ogilby, Cat. Austral. Mamm. p. 58 (1892).

N. Australia: South Alligator River, June 17th, 1895 (one specimen, a female, with a young one from its pouch).

Skull. Length of the skull (female) 139 mm., breadth 77 mm. The last molar has not yet reached its full height.

Hab. In the central tablelands, Arnhem Land, scarce, solitary.

Native name: Tjikurr (male); Tjugeri (female).

18. Petrogale concinna, Gould, 1842.

Petrogale concinna, Thos. Cat. Mars. Monotr. Brit. Mus. p. 71 (1888); Ogilby, Cat. Austral. Mamm. p. 48 (1892).

N. Australia: Daly River, July 21st, 1894 (one specimen). Mary River, May 1895 (seven specimens and two embryos).

Skin. In all specimens the white tips of the hairs on the back

[1] Sex undetermined, but probably both females.

are very conspicuous, and give the orange-rufous back a grizzled silvery appearance.

The terminal pencil of the tail is rather variable in colour, in some specimens being almost brownish black.

Skull. Perhaps none of the specimens are perfectly adult, as the last molar has in no case reached its full growth. Length of the largest specimen (a male) 78 mm., breadth 44·5 mm.

Interorbital space in larger specimens slightly concave; the fronto-nasal suture strongly concave or forming an obtuse angle (open in front).

Posterior palatal foramina large, reaching from front or middle of m^2 to middle of m^4. The bony bridge behind the foramina very thin, with many small openings.

Teeth. The dentition of this species is rather peculiar, and the skulls in the collection seem as if they had five molars and no premolar. The anterior of the teeth is, however, the milk p^4, which has exactly the shape of a true molar.

The eight skulls represent three different stages.

Young stage. In two young specimens (length of skull 49 mm. and 59 mm.) both premolars (p^3 and the milk p^4) are present. P^3 has a normal shape, not very different from that in other species; it has four cusps (the anterior indistinctly divided in two), with shallow notches between them. Its length equals that of p^4.

Middle stage. One skull, length 73 mm., breadth 42 mm. P^3 is still present in the right side of the upper jaw, but has fallen out on the other side and below. Consequently this tooth seems to be changed at the time when m^3 is appearing.

Nearly adult stage. Five skulls, length 72 mm. to 78 mm. As stated above, m^4 has not reached its full development in any of these, although one of them belongs to the mother of one of the young ones.

The perfectly molar-like p^4 is present in all; most likely it is changed at a very late period, and it may even be an open question whether it is ever changed at all.

Hab. Common on the granite on the western heads of the river Mary. On Daly River it was met with in one locality only (about a hundred miles from the river mouth).

Native name: Bolwak.

19. PETROGALE BRACHYOTIS, Gould, 1840.

Petrogale brachyotis, Thos. Cat. Mars. Monotr. Brit. Mus. p. 69 (1888); Ogilby, Cat. Austral. Mamm. p. 49 (1892).

N. Australia: Daly River, July 20th–21st, 1894 (three specimens and one young in spirit). S. Alligator River, April 14th, 1895 (one specimen). Mary River, May 11th–14th, 1895 (two specimens and one embryo). Union Town, Aug. 16th, 1895 (one specimen).

Skin. There are seven specimens, besides one young from the pouch and one embryo.

To the detailed description of Mr. Thomas I may add that in all the specimens there is a faint dark line down the centre of the

occiput and neck, almost obsolete in some, but more distinct in others. In the latter it reaches to between the white shoulder-markings.

Eyelids black, hands and feet dark brownish grey.

The lower side of the tail is greyish white almost to the tip; the longer dark brown hairs are forming a brush chiefly on the upperside of its terminal third or fourth.

A young from the pouch (length 100 mm. without tail) is still almost naked; snout hairy.

Teeth. Only one of the skulls at hand is from an adult specimen, its length is 100 mm., breadth 53 mm. It is a male, with the innermost molar fully developed and the persistent p^4 functional.

Another skull, a younger male, length 90 mm., breadth 46 mm., is in the stage where the persistent p^4 is showing above the root of p^3 and the milk p^4, both of which are still present, but much worn. The first traces of m^4 are visible through the maxilla.

The other skulls are all younger, with p^3 and the milk p^4 still in place.

The milk p^4 is broad, rather like a molar, but not so perfectly molar-like as is the case in *P. concinna*.

Hab. Common in Arnhem Land in broken hilly country; also seen on the Victoria River.

Native names: Petpungo, Doria.

20. ONYCHOGALE UNGUIFERA (Gould), 1840.

Onychogale unguifera, Thos. Cat. Mars. Monotr. Brit. Mus. p. 74 (1888); Ogilby, Cat. Austral. Mamm. p. 48 (1892).

N. Australia: Glencoe, Jan. 1895 (one specimen).

N.W. Australia: Roebuck Bay, Feb. 1st–20th, 1896 (four specimens).

Skull. Posterior palate (*os palatinum*) sieve-like, with numerous vacuities; a few holes in the maxillary part of the palate.

None of the specimens are perfectly adult, the innermost molar not having reached its full height in any of them.

Teeth. The persistent p^4 is very small, with three very distinct cusps and deep notches between them. It is much like p^3, but narrower in front. The milk p^4 is unlike both, rather molar-like, but a little smaller than m^1.

The youngest specimen, a female, length 92 mm., has both p^3 and the milk p^4 functional. M^1 has not yet appeared.

The next specimen, also a female, length 93 mm., has p^3 and the milk p^4 functional in all jaws except in the upper left, where p^3 has fallen out, and the persistent p^4 is showing itself above the root of the milk p^4; m^4 is half-developed.

In two larger specimens, length from 97–101 mm., p^4 is functional, but m^4 not yet fully up.

Canines mostly present.

Hab. In Arnhem Land this Kangaroo was only met with around Fountain Head and Glencoe; at Roebuck Bay, it was common amongst the *Melaleuca* scrubs on the edges of open plains.

Native name: Korrabbal.

21. Bettongia lesueuri (Quoy & Gaim.), 1824.

Bettongia lesueuri, Thos. Cat. Mars. Monotr. Brit. Mus. p. 112 (1888); Ogilby, Cat. Austral. Mamm. p. 41 (1892).

N.W. Australia: Roebuck Bay, Nov.–Dec. 1895 (seven specimens, three young ones, one embryo).

There are in the collection, besides the seven skins, three young ones from the pouch (size of a rat), one embryo (length about 26 mm.), and eight extra skulls, all from Roebuck Bay.

Skin. In some specimens the tail shows traces of a low crest of darker colour towards the tip. Back rather variable in colour, greyish in some, more reddish in others. Tip of tail not white in the seven adult specimens at hand; but in two young ones (from the pouch, size of a small rat) the tip is white for $\frac{1}{4}$ to $\frac{1}{2}$ inch. Arms and legs pale brown, hands darker reddish brown.

Skull. The largest skull has a length of 71 mm., breadth 45 mm. In some specimens the frontal crests meet posteriorly and form a short and low sagittal crest.

Teeth. P^1 has 10 external grooves (in some specimens 9).

In one specimen the canine has two cusps, very distinct on the left, less on the other side.

Hab. Very numerous around Roebuck Bay, burrowing in the sand-hills.

Native name: Jalva.

Fam. Phalangeridæ.

22. Trichosurus vulpecula (Kerr), 1792.

Trichosurus vulpecula, Thos. Cat. Mars. Monotr. Brit. Mus. p. 187 (1888); Ogilby, Cat. Austral. Mamm. p. 78 (1892).

N. Australia; Daly River, July–Aug. 1894 (eleven specimens, three embryos, two young in spirit, one skeleton). Katherine River, July 13th–14th, 1894 (two specimens).

Skin. These specimens seem to form a distinct race (var. *arnhemensis*), characterized by their inferior size and the scantily clothed tail.

Length of head and body (measured from the skin) about 360 mm.; tail 250 mm.

The exterior two-thirds of the tail is naked below and on the sides, and the black hairs form a crest along the upperside, but leaving the tip itself almost bare.

Colour variable, in most specimens (typical) grizzled grey, in others reddish brown, with all transitions between them. Distal part of the tail black; in one specimen it has a faint trace of white on the extreme tip.

Chin blackish, as in the type form; the reddish-brown longitudinal patch on the centre of chest also present in most specimens.

Skull. Nine skulls, all of which with the teeth fully developed have the following size:—

Largest specimen: length 80; breadth 48 mm.

Smallest specimen: length 65; breadth 42 mm.

Two younger specimens, length of the skull in both 60 mm., are just in the stage where the persistent p^4 is pushing out the milk p^4 (which is still present). M^1 is just traceable in the bottom of the gum.

Hab. Common in Arnhem Land and at Roebuck Bay, but nowhere very numerous. All the specimens seen were of the same small size. It was much in request by the natives for food.

Native names: Uia, Uidda.

23. PSEUDOCHIRUS DAHLI, Coll., 1895. (Plate XXIII.)

Pseudochirus dahli, Collett, Zoolog. Anzeiger, no. 490, Dec. 1895, p. 464 (1895).

N. Australia: Mary River, May–June 1895 (eight specimens, one young in spirit, one embryo). Union Town, Aug. 16th, 1895 (two specimens, one skeleton).

There are in the collection ten specimens of this species (with skull), and one skeleton, besides one young and one embryo in spirit.

GENERAL CHARACTERS.

Size large. Head small. Tail short (about half the length of the body), tip almost naked. Ears short.

Fur long and woolly; colour reddish grey above; a blackish median frontal line. Tail more rufous, not white-tipped. Breast-spot rufous.

Muzzle very narrow; meatus auditorius inflated; orbital ridges parallel and not uniting behind; posterior palate with large foramina.

Incisors and molars strong, intermediate teeth very feeble or absent. Upper i^2 elongated horizontally, lower i_1 lancet-shaped.

PLASTIC CHARACTERS.

Size large. Length of the fresh animal (tail included), according to Dr. Dahl, 80–90 cm.

(In the skin the length to the root of tail sometimes exceeds 450 mm., tail 270; together a total of about 720 mm.)

Head proportionally very small, as well as the ears.

Tail very short, its length in some specimens not exceeding half the length of the body (head included).

Fur very thick and woolly, much like that of *P. archeri*; the tail thickly clothed on the upper half or two-thirds of its length, the thick covering gradually tapering towards the tip, which is almost naked (only a few short adpressed hairs). The lower part of the tail entirely naked for two-thirds of its length from the tip.

Ears short and broad, long-haired on their posterior roots, more thinly clothed towards their tips; inside they are well haired along the prominent folds.

Rhinarium very narrow, the height being nearly double its breadth.

Pupil vertical.

Claws short, rather blunt, almost hidden by the hairs.

Colour.

General colouring resembling that of *P. peregrinus*.

The *back* is grizzled grey with more or less reddish hue, all the longer hairs having white tips. The rump more rufous.

Head grey. A whitish spot (sometimes indistinct) above and below the eye. A median dark line, more or less conspicuous, extends from between the eyes to the occiput; in some specimens this line is continued (very indistinctly) along the middle of the back.

Ears with a small patch of white on the lower part of their posterior border. Vibrissæ black.

Tail rufous like the rump, the white-tipped hairs here being scarcer. The thin hairs on the tip are sometimes blackish.

Lower parts from chin to tail whitish; a rusty spot on the middle of the chest. Lower part of the tail reddish, like the upper, only a little clearer.

Legs coloured above like the back, below whitish; hairy covering of the claws in some specimens blackish.

A *half-grown* specimen is coloured like the adult; the white tips of the hairs less conspicuous, and the rusty spot on the chest hardly visible.

Skeleton.

Limbs short and strong.

Femur broadly expanded in its upper part; its length not exceeding that of the pelvis, or even shorter.

Fibula also broadly expanded above, its greatest breadth at its upper extremity being more than that of tibia.

Tibia and *fibula* greatly bowed and diverging.

Humerus also comparatively broad at its upper and lower extremities; *ulna* and *radius* rather diverging in the middle.

Os sacrum formed by three vertebræ, the transverse processes of which are all coalescent.

Caudal vertebræ. The number is in one specimen 23, in another 24, besides a rudimentary one in the tip, together 24–25.

Skull.

Small in proportion to the body. Its length in the largest specimen 72 mm., the breadth 43 mm.

Muzzle very slender and pointed (even narrower than in *Dactylopsila trivirgata*), not swollen.

Nasals narrow, rather flattened above, reaching to about the level of i^1, and but little expanded behind; the naso-frontal angle very deep, bifid, the points reaching the vertical from the middle of m^3. Length of the suture from maxillæ to sutura frontalis

almost equalling the greatest combined breadth of the nasals. Naso-premaxillary suture not longer than the naso-maxillary suture. Nasal notch rather deep, nasals projecting about 5 mm. beyond their junction with the premaxillæ.

Interorbital region very deeply concave in the middle, its edges raised up into high, prominent, sharp-edged ridges, running parallel and not uniting behind.

Meatus auditorius externus swollen (as in *P. peregrinus*); bullæ not inflated.

Anterior palatine foramina short, barely extending backwards to the level of p^1.

Posterior palate with two large foramina, extending from the anterior border of m^2 to beyond m^4, and only separated from the border of choanæ by a thread-thick bony bridge.

Teeth.

Teeth strong. The diastema between i^3 and c is 2–3 mm.; length of molars 1–3 together about 13 mm.

The typical dental formula is :—

$$i.\ \frac{1.2.3}{1.0.0}\ \text{or}\ \frac{1.2.3}{1.2.0};\quad c.\ \frac{1}{0};\quad p.\ \frac{1.0.3.4}{0.0.0.4};\quad m.\ \frac{1.2.3.4}{1.2.3.4}.$$

Upper jaw.—Incisors: anterior incisors separated in front; i^2 elongated horizontally, its antero-posterior diameter equalling twice that of i^3.

Distinct diastemata in front of and behind the canine.

Canine present, small, half the size (or less) of i^3; in one specimen it is absent on one side.

Premolars. P^1 present or absent, rudimentary, smaller than the canine; in three of eleven skulls it is absent on one side[1].

P^2 absent; in one of eleven skulls (the largest of all) it is present but perfectly rudimentary, its crown hardly being raised above the gum[2].

P^3 and p^4 always present; size of p^3 about half that of p^4, the latter about two-thirds the size of m^1.

Molars large, typical; length of molar series reaching 17 mm.

Lower jaw.—Incisors. I^1 long, lancet-shaped, broadest in the middle (as in *Ps. albertisi*); upper and lower edge with an angle separating the enamel-covered cutting portion from the root, which is narrower.

I^2 present or absent, always minute; in eleven skulls it is present in five, absent in six. I^3 always absent.

Canine absent.

Premolars. P^1 absent or present; in four skulls of eleven it is present, minute[3].

[1] The dental formula in these three specimens is: on one side $p.\ \frac{0.0.3.4}{0.0.0.4}$, on the other side (typical) $\frac{1.0.3.4}{0.0.0.4}$.

[2] In this specimen, a male, the formula is on both sides: $p.\ \frac{1.2.3.4}{0.0.0.4}$.

[3] Dental formula in these specimens: $p.\ \frac{1.0.3.4}{1.0.0.4}$.

P^2 and p^3 always absent; p^4 present, long, tricuspid, rather broad behind.

Molars as in upper jaw.

Young, in Spirit.

Size of a half-grown rat. Length from snout to vent about 100 mm., tail 81 mm.

Body still almost naked; the vibrissæ only are well developed, forming 7 rows. A tuft of long hairs on the wart-like protuberance on the inner surface of the forearm.

Lower incisors half developed.

Pads on hands and feet very large, with exceedingly fine transverse striations. Number of palmar pads 5: one very large postero-external, one large pollical, three anterior (as usual only one below 3rd and 4th finger).

Sole-pads 6, one very large postero-external, two pollicals, three anterior (one only below the connected 2nd and 3rd toe).

The small pads below the tip of each finger and toe are comparatively large and distinct.

Claws proportionally very short.

Locality.

Hab. The Rock Phalanger inhabits the granite formations of the western heads of the River Mary, Arnhem Land, and is tolerably numerous there on the great central tableland.

During the daytime it hides amongst the colossal boulders, and leaves the rocks only at night, when it ascends the trees in search of food. This consists principally of the soft parts of a kind of berry with large stone, like a giant cherry (belonging to the genus *Zizyphus*?).

It never sleeps in hollow trees, like its congeners, but it will, when roused, occasionally take refuge in a tree.

Native name: Wogoit.

24. Petaurus breviceps, Waterh., 1838.

Petaurus breviceps, var. *typicus*, Thos. Cat. Mars. Monotr. Brit. Mus. p. 156 (1888); Ogilby, Cat. Austral. Mamm. p. 34 (1892).

N. Australia: Mt. Showbridge, March 16th, 1895 (one specimen). Mary River, May 1895 (one skull).

Skin. Length of female from snout to vent (measured from the skin (about 170 mm., tail (to tip of hairs) 230 mm.

Dorsal stripe strongly marked; tip of tail (in the single specimen) white.

Young. Two young ones (size of a mouse) in spirit. Length from snout to vent 65 mm., tail 85 mm. Tip of tail white.

One young (a little larger). Length from snout to vent 85 mm., tail 110 mm. Tip of tail black. Dorsal stripe well marked in all; tail still short-haired.

Skull. Length in two adult specimens (male and female) 37 mm., breadth 26 mm.

Hab. Met with both in Arnhem Land and at Roebuck Bay, but scarce. It was generally seen along the coast, more rarely inland.

Native name: Lambalk.

Fam. Peramelidæ.

25. Perameles macrura, Gould, 1842.

Perameles macrura, Thos. Cat. Mars. Monotr. Brit. Mus. p. 234 (1888); Ogilby, Cat. Austral. Mamm. p. 22 (1892).

N. Australia: Daly River, July–Aug. 1894 (four specimens and four extra skulls). Katherine River, July 15th, 1895 (one specimen). Mt. Showbridge, Nov. 11th, 1895 (one young, in spirit).

Skull. Size of largest specimen: length 78 mm., breadth 36 mm.

Young (size of a mouse). Shields on lower surface of middle toe broad, undivided (one series).

Hab. Common in Arnhem Land; generally found sleeping in hollow trees.

Native name: Koppol.

26. Perameles obesula (Shaw), 1793.

Perameles obesula, Thos. Cat. Mars. Monotr. Brit. Mus. p. 231 (1888); Ogilby, Cat. Austral. Mamm. p. 23 (1892).

N.W. Australia: Roebuck Bay, Nov.–Dec. 1895 (three specimens, one young in spirit, seven embryos, one skeleton).

Skull. Size of largest specimen 59 mm., breadth 28 mm.

Young (size of a mouse). Shields on lower surface of middle toe divided (two series).

Hab. Common at Roebuck Bay in the dry coast country (not seen in Arnhem Land).

Fam. Dasyuridæ.

27. Dasyurus hallucatus, Gould, 1842.

Dasyurus hallucatus, Thos. Cat. Mars. Monotr. Brit. Mus. p. 269 (1888); Ogilby, Cat. Austral. Mamm. p. 15 (1892).

N. Australia: Daly River, Sept. 7th, 1894 (one skull). Mt. Showbridge, Dec. 4th, 1894; March 10th, 1895 (two specimens). Adelaide River, Dec. 15th, 1894 (one specimen). Mary River, May 10th, 1895 (one specimen). Union Town, May 30, 1895 (one specimen).

Skin. Five specimens, all males. All belong to a dark variety, the ground-colour of the body being of a more or less deep brownish black, with the tips of the hairs yellowish.

Head with small and indistinct spots on the front; legs spotted in some specimens, in others unicoloured.

Tail unspotted; on upper base coloured like the back (or rather

lighter, the hairs here being brownish yellow throughout); outer half and lower surface blackish.

Size rather large; length of an adult male (measured in the skin) from tip of snout to vent about 330 mm., tail 295 mm. (the tail thus is both relatively and absolutely longer than in specimens described by Thomas, *l. c.* p. 270).

Skull. Size of an adult male: length 69 mm., breadth 44 mm., nasals 25 mm., upper m^{1-3} 13 mm., length of palate 35 mm.

Hab. Throughout Arnhem Land, but nowhere common. It lives on trees and amongst rocks.

Native names: Jirian, Tjabbo.

28. PHASCOLOGALE PENICILLATA (Shaw), 1800.

Phascologale penicillata, Thos. Cat. Mars. Monotr. Brit. Mus. p. 294 (1888); Ogilby, Cat. Austral. Mamm. p. 12 (1892).

N. Australia: Daly River, Oct. 10th, 1894 (two young ones). Fountain Head, May 5th, 1895 (one specimen). Union Town, May–July 1895 (five specimens).

N.W. Australia: Roebuck Bay, Feb. 3rd, 1896 (one specimen).

Young. Two specimens (size of a mouse), male and female. Tail-brush already well developed. Upper i^1 not yet visible, c half-grown, m^3 not developed. P^1 is the milk premolar, very small, about half the size of p^3.

Hab. Common in the interior of Arnhem Land, more scarce at Roebuck Bay.

Native name: Wombo.

29. PHASCOLOGALE FLAVIPES LEUCOGASTER, Gray, 1841.

Phascologale flavipes, var. *leucogaster*, Thos. Cat. Mars. Monotr. Brit. Mus. p. 291 (1888); Ogilby, Cat. Austral. Mamm. p. 13 (1892).

N. Australia: Daly River, July 1894 (one specimen, in spirit).

Skin. The tail being imperfect, the specimen cannot be determined with absolute certainty, but there is nothing to prevent it from being the north-western form of *P. flavipes*.

Hab. Only one specimen from Arnhem Land.

30. SMINTHOPSIS NITELA, n. sp.

Diagn. Allied to *S. leucopus* (Gray), but characterized by a central stripe from muzzle to forehead, incrassated tail, and smooth (not striated) pads.

Measurements (from specimens in spirit) :—

	♂. mm.	♀. mm.
Length of head and body	89	70
Tail	99	88
Sole, from heel to tip of claws	22	18

Description.

Size medium, form slender.

Fur close (in one specimen composed mostly of under-fur).

Colour dark greyish brown above, each hair slaty blue for three-fourths of its length, the tip whitish.

Lower surface a little lighter; hands and feet greyish white.

Front and cheeks orange-rufous, snout more greyish; a black mesial stripe from nose to between the ears.

Ears large; laid forwards they reach to the anterior margin of the eye.

Tail greyish white, a little longer than head and body, slightly incrassated, its hair covering thin; on the tip the hairs are (in some specimens) a little longer and darker coloured.

Vibrissæ greyish.

Palms granulated, with six small pads, smooth: four anterior, very small (narrower than the breadth of the claws), two posterior; the postero-external very small, the exterior somewhat larger, about the same size as those on the bases of the claw-joints. Besides these pads there is a small callosity at the wrist.

Soles hairy posteriorly, naked anteriorly (as in *S. leucopus*). Sole-pads 4, very small, not fimbriated; that on the base of the hallux not much larger than the granulations [1].

Skull. Size of skull in an adult male: length 28 mm., breadth 16·5 mm., length of nasals 10·5 mm., length of bony palate 14 mm.

Interorbital space flat or a little concave, with trace of a post-orbital process.

Palatal foramina as in *S. leucopus*.

Upper canine long, considerably longer than p^4.

Premolars not touching; upper p^3 decidedly larger than p^1. Upper p^4 double as large as p^3 (larger than any of the molars).

Lower p^4 of the same size as p^3.

Locality.

Daly River, North Australia, July and Oct. 1894 (four specimens [2]). These four specimens were brought in by the natives, who dug them out in the gardens.

Fam. Echidnidæ.

31. Echidna aculeata (Shaw), 1792.

Echidna aculeata, var. *typica*, Thos. Cat. Mars. Monotr. Brit. Mus. p. 379 (1888); Ogilby, Cat. Austral. Mamm. p. 3 (1892).

N. Australia: Daly River, Aug. 1st–2nd, 1894 (two specimens). Mary River, May 5th, 1895 (one specimen).

Skin. Two males, one female; all belong to the same form as

[1] There is no trace of a second posterior sole-pad, as figured by Thomas in *S. leucopus* (Cat. Mars. Monotr. Brit. Mus. pl. 23. fig. 6).

[2] Two as skins, two preserved in spirit.

in Queensland (and the rest of the Australian continent) : spines powerful, closely set, and entirely hiding the hairs ; 2nd claw on hind foot very long.

Hab. Common in all localities visited in Arnhem Land, inhabiting hilly and mountainous country. Not seen at Roebuck Bay (N.W. Australia).

The *Echidna* is highly valued for food by the natives, and, according to Dr. Dahl, its flavour is excellent.

Native names : Melk, Guarang.

3. On a Collection of Earthworms from South Africa, belonging to the Genus *Acanthodrilus*. By Frank E. Beddard, M.A., F.R.S., &c.

I have to thank Mr. W. L. Sclater, F.Z.S., Director of the South African Museum, for kindly forwarding to me a well-preserved series of Earthworms and also a few aquatic species, collected in the neighbourhood of Cape Town by Mr. Purcell of the South African Museum, and forming part of the collection of that Museum. The worms were without exception in an excellent state of preservation for microscopical work, having been prepared with chromic acid or corrosive sublimate, followed by alcohol. Extremely few specimens of Oligochæta have been hitherto collected in the Cape Colony. I am only acquainted with *Acanthodrilus capensis*, *Perichæta capensis*, and *Microchæta* from the near neighbourhood of Cape Town. The new species of earthworms of which specimens are contained in the collection forwarded to me by Mr. Sclater all belong to *Acanthodrilus* (*sensu stricto*). This fact is of considerable interest. Tropical Africa has numerous representatives of the family Acanthodrilidæ ; but they are all members of the well-marked genus *Benhamia*. Up till the present time the sole instance of a true *Acanthodrilus* from that continent is the species described by myself some years ago as *Acanthodrilus capensis*. I shall, however, comment more fully upon this new fact in the distribution of the genus after describing the new species.

The table on p. 337 will serve to discriminate the species described in the present paper.

The main points of difference are indicated in the table. All the species, however, agree in certain particulars. In all of them the clitellum is of somewhat limited extent—limited, that is to say, as compared with some other species of the genus. The utmost extent of that region is from segment xiii. to segment xvi. In only one species, *A. africanus*, is the clitellum less than this, and in no species is it larger. In all these species the setæ have an unusual, but not unknown arrangement. The ventral setæ are comparatively strictly paired ; they are at any rate closer together than are the lateral setæ ; and in nearly all the species there is a closer approximation of the ventral setæ in a few segments on

	Prostomium.	Papillæ.	Spermathecæ.	Gizzard.	Length in mm.	Sperm-duct funnels.
Ac. arenarius ...	Inc.[1]	+	2 diverticula.	Large.	65	X., XI.
Ac. arundinis ...	,,	+	,,	Feeble.		X., XI.
Ac. sclateri.....	,,	0	,,	,,	45	X.
Ac. purcelli	Compl.[1]	+	1 diverticulum.	Large.	170	X.
Ac. excavatus ...	Inc.	0	,,	Feeble.	48	X.
Ac. falcatus	,,	+	2 or 3 diverticula.	,,	70	X., XI.
Ac. africanus.....	Compl.	0	1 diverticulum.	Large.	49	X.
Ac. photodilus ...	,,	0	,,	,,	81	X.
Ac. lucifuga	,,	+	,,	,,	70	X.

either side of the male pores on segment xviii. The two spermiducal pores of each side of the body are connected by a groove which is a common feature of this genus. In the middle of the groove on the xviiith segment lie the sperm-duct pores. On the inside of this invariably are the two setæ (both present) of the ventral pore. All the species have penial setæ.

As is the case with all members of the genus *Acanthodrilus*, there are two pairs of spermathecæ lying in segments viii., ix., which have at least one and sometimes more diverticula.

The first species I name :—

(1) **Acanthodrilus purcelli**, n. sp.

The collection contained ten specimens of this form, which were collected "under rotten logs in woods on the Newlands slope." Only one of these ten was sexually mature; this individual was the largest of the series. It is a long, rather slender worm of a dark coloration, showing also interference colours. It measured 170 mm. in length by 5 mm. in breadth. I counted 135 segments.

The *prostomium* is "complete," *i. e.* it is continued by grooves to the end of the first segment of the body.

The *clitellum* is saddle-shaped, not developed all round the body, but only dorsally and laterally; it occupies segments xiii.–xvi.

The *setæ* are in eight series; of these each two of the ventral couple are nearer to each other than are the two of the lateral couple.

[1] I apply the term "incomplete" to a *prostomium* which is not continued by furrows over the first segment, "complete" to one that is.

The *nephridiopores* are obvious and lie in front of seta 3.

The *spermathecal pores* are between segments vii./viii., viii./ix. They are in front of and a little to the outside of seta 2.

The *oviducal pores* are exactly in front of seta 1.

The *orifices* of the *spermiducal glands* correspond to the ventral couples of setæ; the two of each side are connected by a straightish groove which passes to the outside of the ventral couples of setæ, both of which are present upon segment xviii.

The worm has an unusual number of *genital papillæ*. In the sexually mature individual which I make the type, and from which the present description is taken, there are a pair of papillæ on each of segments x., xi., xii., xvi., xxi., xxii., xxiii., xxiv. These papillæ lie between and in front of the ventral couples of setæ; they are flattish circular in outline, and appear as if perforated by a pore in the middle. In a smallish specimen without the clitellum all the papillæ enumerated above were present with the addition of a pair upon the xiiith segment. In a larger worm, also without a clitellum, the same number were present with the exception of that upon segment xxiv. It is not usual for the papillæ to be so plain in immature examples of earthworms.

There is a large *gizzard* which I ascertained, by making a longitudinal section of the anterior end of another specimen of the species, to lie in segment vi. On dissection it appears to lie much further back owing to the backward slope of the intersegmental septa in this region of the body. The large intestine begins in segment xvi.

The *sperm-sacs* are racemose and lie in segments ix.–xi. The *sperm-duct funnels* are in segment x.

The two pairs of *spermathecæ* are not large, and lie as usual in viii. and ix.; the single diverticulum of each is in the segment in front of that which contains the pouch.

The *spermiducal glands* are short and stout.

Fig. 1.



Penial setæ of *Acanthodrilus purcelli*.

Penial setæ are present. I found in the individual selected for examination five of these setæ in a bundle. They are short and excessively spiny at the free extremity, as is shown in the accompanying drawing (fig. 1). When examined under a low power the end of the seta has the appearance of the "saw" of a Sawfish,

on account of the series of longish spines which occur along the two edges. A higher power reveals the fact that the spines are really arranged in complete rows which entirely surround the shaft of the seta for the distal half to one-third. The actual extremity is free of spines.

(2) **Acanthodrilus arundinis**, n. sp.

Of this species there were four examples in the collection, of which three were fully mature with a clitellum. They were collected "in and under loose clods of dead sedges on edge of water.

It is a slender and small species, measuring some 40 mm. in length. I counted 75 segments.

The *prostomium* is incomplete.

The *clitellum* completely encircles the body and embraces half of segment xiii. together with segments xiv., xv., xvi.

The *spermathecal pores* are conspicuous orifices lying on the boundary lines of segments vii./viii., viii./ix., on a line with the outer of the two ventral setæ.

The *spermiducal-gland pores* are highly conspicuous and lie in a position corresponding to the ventral couples of setæ. The two pores of each side of the body are connected by a groove which passes to the outside of the ventral couple of setæ of the xviiith segment.

On the last segment of the clitellum there was (at any rate in two of the sexual specimens—I did not examine the third before slicing it for microscopical purposes) a single median *genital papilla*.

The *setæ* are arranged in couples. The distances between the individual setæ vary somewhat in different regions of the body. Anteriorly the two setæ of each ventral couple are about half the distance from each other of that which divides the two lateral setæ. On the xvth and xvith segments the two ventral setæ approach each other, and on the xviiith they are very close together. After this they again diverge, and on the rest of the body the proportions between the intersetal spaces are much as in the anterior region of the body. The gradual approximation of the ventral setæ at the male pore is parallelled in that section of the genus *Microscolex* which Eisen proposed to call *Deltania*. On segments xvii. and xix. the ventral setæ are replaced by the modified penial setæ.

The *gizzard* is but slight; it lies in segment v. The circular muscles, which are ordinarily so strong in this organ, are in the gizzard of the present species not much thicker than the lining epithelium.

There appear to be no calciferous glands.

The *spermathecæ* are, as usual, two pairs; they are globular thin-walled pouches, each having two diverticula. The duct of the main pouch which leads to the exterior is very thick-walled and muscular, and into it open the diverticula. This duct was plugged with a mass of spermatozoa surrounded by a non-staining thick

chitinous-looking case, which I take to be a spermatophore. It is important to notice the apparent existence of spermatophores in this species, as they are structures which, apart from the Lumbricidæ, are not common among earthworms. The diverticula as usual contain masses of spermatozoa, there being none in the spermatheca itself. These are firmly attached to the glandular walls of the diverticula: these glandular walls are composed of a layer of granular, slightly staining cells, whose limits are not definable; the lumen which the cells leave is but narrow. I constantly found that of the two diverticula of each spermatheca, one lay in the segment containing the pouch, and the other in the segment in front.

The *sperm-sacs* are in segments ix.–xii. inclusive.

I did not observe the shape of the *penial setæ*, but ascertained their presence.

(3) **Acanthodrilus arenarius**, n. sp.

Of this species Mr. Purcell collected 23 specimens "in wet sand under stones on the edge of a small vley (lake), situated at the beginning of the sand-dunes due east from Wynberg station."

This is a small slender species rather over two inches in length, with a very prominent swollen clitellum. The measurement of an average individual was 65 mm.

The anterior end of the living worms is darkly pigmented.

The *prostomium* is incomplete.

The *setæ* are more closely paired ventrally than dorsally.

The *clitellum* occupies a portion of segment xiii. and all of segments xiv.–xvi. On the clitellum the *nephridiopores* are obvious, lying in front of seta 3.

This species has a number of *genital papillæ*; the numbers vary in different individuals. In the most fully developed there was a single median papilla upon segments viii.–x., xviii.–xxiii.; and in addition to these unpaired papillæ, paired papillæ upon each of segments xvii.–xix. On xviii. I found two pairs of these paired papillæ situated one in front of the other. These pairs were on a level with the generative orifices. The papillæ have a cup-like appearance. In sections, the epithelium of which they are composed is seen to be glandular like that of the clitellum but not so deep.

The *alimentary canal* has a fairly developed *gizzard*. The œsophagus alters its character in the xiiith segment, becoming rather wider and thinner-walled. In front the epithelial walls are folded, the only trace of calciferous glands which the worm possesses. The intestine begins in segment xv.

The *spermathecæ* are as usual in viii., ix. Each is a thin-walled oval pouch which communicates with the exterior by a much thicker-walled widish duct; into the latter open two sausage-shaped diverticula, one of which appears invariably to lie in front of the other in the segment, in fact in front of that which contains the pouch. The lumen of the diverticula is narrow, and attached to

the glandular cells is a regular fringe of spermatozoa. There are two pairs of sperm-duct funnels in segments x., xi.; corresponding to these are three pairs of sperm-sacs which lie in segments x., xi., xii. There is a single *penial seta* to each spermiducal gland; it is slightly notched at the extremity.

In the intestine of this worm I found numerous examples of an Infusorian belonging, or allied, to the genus *Opalina*, so frequent a parasite of the Oligochæta.

(4) **Acanthodrilus falcatus**, n. sp.

Of this new form Mr. Purcell collected no less than 56 examples from "Cape Flats; in wet sand on edge of a small vley between Retreat Station and Zeekoe Vley."

The species is not a large one; an individual which appeared to be quite typical measured 70 mm. by 3 mm. in breadth: it had rather more than 100 segments, but the mode of preparation (with corrosive sublimate) rendered the number of the segments a little difficult to ascertain with accuracy here and there. The posterior segments are noted to have been during life blackish.

The *prostomium* did not divide the first segment; it had rather the appearance of being simply a continuation of it, just indenting in a semicircle its front margin.

The ventral *setæ*, as in other species, are nearer to each other than the lateral; and the two setæ of the ventral rows converge slightly at the male pores.

The *clitellum* occupies segments xiii.–xvi.

Genital papillæ are present and vary somewhat in number in individuals. I found them to be present in not fully mature individuals as well as in those with a clitellum. On segments x., xi. were a single median papilla, or rather on the first of these two segments a closely approximated pair; on the xith segment the single papilla was seen on a closer examination to be composed of two fused papillæ. On xvi. and on xix. there was also a median papilla.

There is a slight *gizzard*; the intestine begins in segment xvi.

The *spermathecæ* show some variation. The oval pouch has at least two very white sausage-shaped diverticula which are of considerable length.

In the case of one spermatheca there was a third smaller diverticulum. In one worm each spermatheca had three diverticula, and in one spermatheca of this individual there were as many as four. The spermathecæ open on to the exterior in front of seta 2.

There are two pairs of *sperm-duct funnels* in x. and xi. The sperm-sacs are in segments ix.–xii.

The *spermiducal glands* are provided with *penial setæ*. The actual extremity of the seta is much hooked (whence the specific name of the worm) and is free from denticulations or ridges. Immediately in front of this the seta is much wider and is furnished for quite a short space with ridges, as in so many other species of *Acanthodrilus*.

(5) **Acanthodrilus excavatus**, n. sp.

This species comes from Knysna Forest, "in and under rotten wood, leaves, &c." It is a small slender species, measuring 48 mm. by 1·5 or 2 mm. I counted 90 segments in the individual selected for measurement. It is not unlike both *A. crundinis* and *A. sclateri* in general appearance, but may be distinguished at a glance from either of these by the deep excavation upon the segments which bear the three pairs of male pores; it is this peculiarity which suggested the specific name.

The *prostomium* is incomplete, and the other external characters are those of the majority of the Cape species. There are, however, so far as I could make out, no *genital papillæ*. The *male pores*, as already mentioned, lie in a deep excavation which is bridged over by ridges connecting the two spermiducal pores of each pair with each other.

I studied the anatomy of the worm by longitudinal sections.

The *clitellum* extends from segment xiii. to segment xvi.

The *gizzard* is slight, as in the two species with which I specially compare the present. There are no calciferous glands, and the intestine commences in segment xvii. Though there are no special calciferous glands, the œsophagus is moniliform in segments xii.–xiv., and its walls are there rather older and exceedingly vascular; in those segments too the supra-intestinal vessel was especially clear.

The *spermathecæ* have each a single long and sausage-shaped diverticulum.

The *sperm-sacs* are in segments ix.–xi., and, as appears to be always the case when the last pair of sperm-sacs are in the xith segment, there is but a single pair of testes and vas deferens funnels; these lie in segment x.

(6) **Acanthodrilus sclateri**, n. sp.

This is another small and slender species. The specimen selected for measurement was 45 mm. in length. There were no genital papillæ.

The *setæ* do not appear to converge at the male pores as in some other species of the genus described in the present communication.

The *prostomium* is incomplete; it is not always easy to be certain about the arrangement of the prostomium in these small *Acanthodrili*; so the remarks made here will apply to other small species, such as *A. arundinis* &c. The grooves which bound the prostomium where it impinges upon the first segment of the body cease abruptly and are not continued as far as the furrow which separates that segment from the second. In some specimens of this and the other small species it appeared to me that the two furrows by which the prostomium is continued over the first segment met a little way in front of the line dividing that segment from the one following.

The *clitellum* occupies segments xiii.–xvi.

The *gizzard*, as in the other small species, is very slight, and as in them is often hidden behind the mass of gland-cells which deck the pharynx.

There are no *calciferous glands*, and the large intestine begins in segment xvii.

There are but a single pair of *testes* and *vas deferens funnels*, which lie in segment x. As in worms with but one pair of testes, the *sperm-sacs* are limited to segments ix., x., xi.

The *spermathecæ* have two long tubular diverticula.

There are *penial setæ*.

(7) **Acanthodrilus photodilus**, n. sp.

Ten specimens of this species were collected in Knysna Forest, "in and under rotten wood, leaves, &c." It is a moderately large species, measuring 81 mm. by 3½ in breadth. It is dark purple-coloured.

The *prostomium* is complete; the *setæ* are as in other Cape species.

There are no *genital papillæ* even in fully mature examples. The *nephridiopores* are in front of seta 3. There is a slight convergence of setæ at the male pore.

The *gizzard* is large. The intestine begins in xvi. Septa viii/ix. are thick.

The *spermathecæ* have a single lobate diverticulum.

The *sperm-sacs* are in segments ix.–xi. There is but a single pair of testes (?) and sperm-duct funnels in x.

The *spermiducal glands* are long and coiled; they occupy several segments. The *penial setæ* are long and not ornamented; the extremity is curved in a corkscrew fashion.

(8) **Acanthodrilus lucifuga**, n. sp.

In the same tube as that which contained the specimens already described as *A. photodilus* was a single worm which is obviously quite different.

Its dimensions are not widely different from those of *A. photodilus*, but it is a somewhat more slender worm.

The *clitellum* extends over segments xiii.–xvii. The other external characters are as in the last species saving for the presence of *genital papillæ*, which are totally wanting in *A. photodilus*. These papillæ are median and unpaired; they occur on each of segments xi., xii., xx., xxi.

The *sperm-sacs* are in ix.–xi., and associated with this is the existence of only a single pair of sperm-duct funnels in x.

The *spermathecæ* have the remarkable form shown in the annexed drawing (fig. 2, p. 344). The pouch is roundish to oval, and communicates with the exterior by a short duct into which opens a long diverticulum which is curved round into a circle; at its extremity the diverticulum swells out into a globular chamber.

The *spermiducal glands* are, as is by no means usually the

case, quite straight, without a single bend or curve along their entire course; as I have but one specimen at my disposal, it is impossible to say whether this is a specific character or only

Fig. 2.



Spermathecæ of *Acanthodrilus lucifuga*.

individual. The *penial setæ* are smooth, without serrations; they are straight and not coiled at the end as in *A. photodilus*. In other respects this species comes into near relation with the last, having, as it has, a well-developed gizzard and no calciferous glands.

(9) **Acanthodrilus africanus**, n. sp.

From forest at George Town were collected 8 examples of a species which do not agree with any of those already described. It is a stoutish worm but short, measuring 49 mm. by 3 mm. in diameter. Such an individual possessed 94 segments.

The *prostomium* is complete. The *setæ* have the usual disposition characteristic of the Cape *Acanthodrili*. The *nephridiopores* open in front of seta 3. The ventral setæ converge at the male pore.

The *clitellum* occupies segments xiv.–xvi.

A well-developed *gizzard* is present.

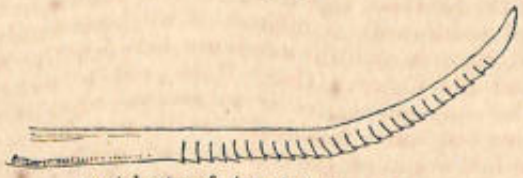
There are no *genital papillæ*.

The *spermathecæ*, as always, lie in segments viii., ix. Each has a lobate diverticulum.

The *sperm-sacs* are in segments ix.–xi.

The *spermiducal glands* are coiled, but not very long. Each

Fig. 3.



Penial setæ of *Acanthodrilus africanus*.

has appended a sac containing *penial setæ*. I counted four of these setæ in a single sac. They have the form which is illustrated in the accompanying sketch (fig. 3). The actual extremity of the

setæ is quite smooth; but a little way in front of this the shaft of the seta is encircled by a series of ridges which are perfectly smooth and not denticulate in any way; their direction is curved.

§ *General Remarks.*

This interesting collection of *Acanthodrilus* suggests several observations of a general character. In the first place, to meet with the genus so very prevalently in the Cape Colony is remarkable, though not perhaps altogether unexpected. That there are so many species (10) seems to negative any suggestion of accidental importation, as does their occurrence not only in the near neighbourhood of Cape Town, but at such distant places as the Knysna Forest. There is also the noteworthy fact that the *Acanthodrili* of South Africa belong to a distinct group of the genus, not unknown it is true elsewhere, as will be pointed out presently, but embracing all the species (with the possible exception of the originally described species *Acanthodrilus capensis*). This again is not suggestive of accidental importation. It may, I think, be fairly assumed that the species described in the present communication are truly indigenous. This being the case, we have a fauna of Earthworms in the temperate part of the African continent which is totally unlike that of tropical regions (characterized as it is by the Eudrilidæ and by the Acanthodrilid *Benhamia*, *not Acanthodrilus*) of that continent, and like that of South America and New Zealand. We have, in fact, in the three great land-masses which extend from the northern into the southern hemisphere—if we may allow a former connection between Australia and New Zealand—a sharp demarcation between the earthworm fauna of their southern and of their equatorial regions. In all of them *Acanthodrilus* is the prevalent genus of the Antarctic half. The bearing of this fact upon the theory of a former extension northward of the existing Antartic continent has been so often referred to by me, that I need do no more than allude to it. I may, however, remark that since I have written upon that matter Dr. Eisen has described two species of *Acanthodrilus* from California. But I am of opinion that this fact, like the spreading northward of *Microscolex*, is not fatal to my views.

To assume the converse, that this genus has started in the north and migrated southwards, is difficult[1] if we keep firmly hold of the fact that there is so little difference between the species of Patagonia and the Cape of Good Hope, not to mention New Zealand. The only alternative is to assume what is certainly becoming more and more fashionable as an assumption—a two-fold or three-fold origin of the worms which are here, and by all other writers, placed in one genus, *Acanthodrilus*. If, however, this view is to be entertained at all it cannot, in my opinion, be

[1] Since these words were written I have received from Dr. Michaelsen a paper ("Weiterer Beitrag zur Systematik der Regenwürmer," Verh. Hamburg, 1896) in which the tropical origin of *Acanthodrilus* is ably urged.

maintained so far as concerns the Patagonian and Cape species. I have pointed out in my Monograph of the Oligochæta the distinctness of the South American *Acanthodrili* from those of New Zealand. The latter all agree in having nephridia which alternate in position from segment to segment, the external orifices being now in front of the dorsal, now in front of the ventral setæ; besides this the nephridia show certain differences of structure according to their position. The only exception to this statement is found in the two closely allied species *A. annectens* and *A. paludosus*. These species, however, are different in other particulars from the typical *Acanthodrili* and should perhaps be placed in a genus apart. The Cape species, however, are so like those of South America, that I have more than once in preparing the foregoing descriptions doubted whether I had not before me identical forms from these widely distant localities. Though this is not, I believe, the case, there can be no doubt of their affinity.

APPENDIX.

On a new Genus of Earthworms belonging to the Family Eudrilidæ.

Among a number of Earthworms which I have recently received from Lagos, West Africa, through the kindness of the authorities at Kew, were two which appear to be representatives of a new genus.

This makes the seventh genus of Eudrilidæ known from the western side of the African continent, the other six being *Preussia* (Mich.), *Paradrilus* (Mich.), *Hyperiodrilus* (F. E. B.), *Heliodrilus* (F. E. B.), *Lybiodrilus* (F. E. B.), and *Alvania* (F. E. B.). It is interesting to note that the genus which I propose to describe in the present communication is nearly akin to several of these and shows no special points of affinity to any East African genus. The distinctness of the West African from the East African Eudrilidæ is the most salient fact in the distribution of this family within the continent. But although there are no genera known which range right across Africa, it is not possible to divide off the western from the eastern forms. The two subfamilies into which I have thought it admissible to divide the Eudrilidæ occur on both coasts. It is noteworthy, however, that, so far as is known, those genera like the present (*Hyperiodrilus*, *Heliodrilus*, *Alvania* and *Lybiodrilus*) which have several gizzards more posterior in situation than is usual are all of them inhabitants of West Africa. But this one character, though curious, can hardly be set against the three or four which I have used in the subdivision of the family.

This new species, for which I propose the name of IRIDODRILUS ROSEUS, is a smallish worm of three inches in length. It has no pigment in the skin, or so little as not to interfere with the

coloration produced by the blood-vessels. The skin is thin and several of the organs show plainly through. As in nearly all Eudrilidæ, *dorsal pores* appear to be completely absent. The only exception seems to be the genera *Platydrilus* and *Eudriloides*. In no other family of terrestrial Oligochæta is there this nearly complete absence of structures so characteristic of earthworms. The absence of these pores may perhaps be related to the partially aquatic life of at any rate many members of the family; on the east coast of Africa the species of Eudrilidæ are largely met with in swamps, and we know that the purely aquatic genera of Oligochæta are without the dorsal pores for the most part. Exceptions to the statement occur among the aquatic members of the genus *Acanthodrilus*. But among the "Limicolæ" of Claparède there are no exceptions. Another feature in the organization of the Eudrilidæ which may possibly be correlated with the absence of dorsal pores, is the often exceedingly dark pigmentation of the chloragogen cells which cover the intestine, and the accumulations of secretory products within the peritoneal cells which cover the nephridia. If the dorsal pores have an excretory function, their absence would naturally lead to a greater accumulation of such waste substances as those referred to. That many of the Eudrilidæ have a great deal of pigment in the skin may be another fact to be noted in the same connection. But this pigmentation is not more excessive than in worms which possess dorsal pores.

The *setæ* have the arrangement that characterizes others of the West African genera that have been mentioned as nearest of kin. The ventral setæ are at some distance from each other, while the more dorsally placed pair are strictly paired. The distance which separates the two setæ of each ventral pair is five or six times as great as that which intervenes between the two setæ of the dorsal pair. The setæ themselves present nothing noteworthy in their form; they are rather small and not obvious until the skin is examined with the microscope.

The *nephridiopores* are very conspicuous orifices lying in line with the dorsal pair of setæ.

When a piece of the skin is examined after being well cleared with glycerine the *tegumentary sense-bodies*, which occur in many Eudrilids, are to be seen. These structures, which have so curious a resemblance to the Pacinian corpuscles of vertebrates, lie imbedded in the skin here and there apparently without regular arrangement. They are in the present worm of an elongated from and lie invariably with their long axis corresponding with the long axis of the worm's body.

The *clitellum*, as in many other species, is developed right round the body, having therefore the form to which it has been proposed to restrict the term cingulum. It occupies segments xiii.–xviii.

The *generative orifices* are exceedingly conspicuous. They are unpaired.

The *female orifice* is situated on the boundary line of segments

xii./xiii. It is rather less obvious than the *male pore*, which is between segments xvii. and xviii. The latter is more conspicuous on account of the fact that the actual pore lies upon the summit of an elevated tract of the skin. The position of the generative apertures and their general appearance presents the closest likeness to the West African *Lybiodrilus*, from which worm the elongated spermiducal glands appearing through the skin serve to differentiate the present species even before dissection.

The *alimentary canal* shows characters that are typically Eudrilid.

In each of segments x. and xi. is a single median *unpaired calciferous gland*, which is of a deep red colour and nearly globular in outline. In segment xiii. are the *paired calciferous glands*, which are white in colour and not large. Each is curved into rather more than a semicircle and the margin is indented. The *large intestine* begins in segment xiv. The *gizzards*, as in other allied forms, are some way down the intestine. There are three of them lying in segments xviii., xix., xx.; there is nothing peculiar about them except the position, which is not unusual among the Eudrilidæ, as already mentioned.

This earthworm has "*hearts*" in each of segments vii.–xi.

As in so many Eudrilids, the *funnels* of the *sperm-ducts*, of which there are two pairs in segments x. and xi., are followed by a dilated sac which in the present species is egg-shaped. The funnels themselves, which look backwards (so far as I could make out), appear to be plunged in the interior of the *sperm-sacs*, of which there are likewise two pairs; these latter organs depend from the anterior wall of segments xi. and xii. and are long and tongue-shaped, being flattened somewhat and wider towards the blind extremities. The testes I did not see.

The *spermiducal glands* are very conspicuous, and, as already mentioned, are visible through the translucent walls before the body is cut open. The two tubes have the nacreous appearance which is so usual with those glands in the present family; they are somewhat spirally twisted in their course, and therefore do not reach so far back in the body as would be the case did they lie straight. Each of the glands measures 22 mm. in length; the two unite just at their opening on to the exterior by a short terminal bursa. The *sperm-ducts* open into them some way before their termination. I could find no *penial setæ*.

The *female reproductive organs* conform generally to the plan characteristic of the family, and are to the full as complicated as in any other genus. The orifice already referred to leads into a sac which lies beneath the nerve-cord and extends back for a distance of 5·5 mm. It has a wide cavity, which in the specimen that I dissected appeared to be empty. Into this sac, which is the *spermathecal sac*, opens on either side a tube of some length which is disposed in a circle. This tube is at first wide and sacculated. After a course of about 10 mm. it suddenly narrows, and the lumen, at first wide in proportion to the thickness of the walls, becomes much constricted. This narrow tube then dilates to form what

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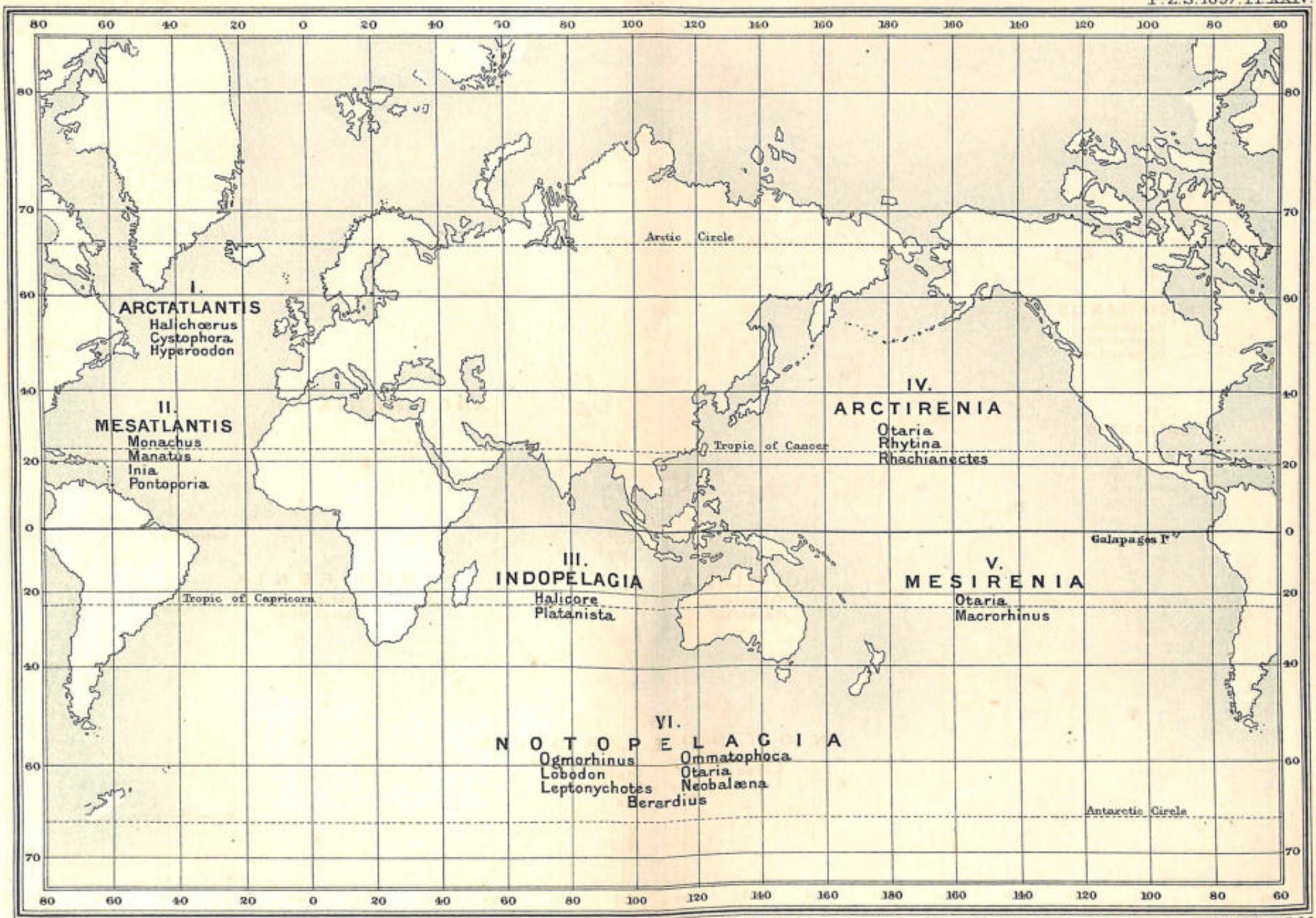
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OUTLINE MAP OF THE WORLD SHOWING THE PROPOSED SIX SEA-REGIONS.

F. S. Waller, F.R.G.S.

Dr. Michaelsen[1] has termed the "*Eitrichterblase.*" Attached to this is the *egg-sac* or Receptaculum ovorum. The interior of this egg-sac is divided by trabeculæ into many compartments, in the interior of which are eggs in all stages of development surrounded by other germinal cells; the structure in fact is precisely like that which is now known to characterize so many, perhaps all the Eudrilidæ. I could not, however, detect a striated membrane surrounding the ripe ova such as that which I have described in *Hyperiodrilus*[2]. The "Eitrichterblase" communicates on the one hand with the short and muscular *oviduct* which opens on to the exterior in the fourteenth segment as usual, and on the other with a delicate tube which ends anteriorly in a swollen oval extremity. This latter sac lodges the *ovary*, which is thus, as in so many Eudrilids, in direct communication with the efferent apparatus.

It will be observed from the description of the egg-apparatus of the present earthworm, that though generally like that of the more highly developed Eudrilidæ, it differs in detail from that of any other genus. As it has been hitherto customary to mark the genera mainly by the differences in this structure, I feel justified in making a new genus for this species from Lagos.

4. On the Distribution of Marine Mammals. By P. L. Sclater, M.A., Ph.D., F.R.S., Secretary to the Society.

[Received March 8, 1897.]

(Plate XXIV.)

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I. *Introductory Remarks.*

Most of the recent writers on Geographical Distribution have confined their attention to terrestrial mammals, or at any rate have but casually alluded to the marine groups of that Class. On the present occasion I wish to call your attention to some of the

[1] W. Michaelsen, "Oligochæten des naturhistorischen Museums in Hamburg," Jb. Hamb. Wiss. Anst. viii.

[2] F. E. Beddard, "On the Structure of two new Genera of Earthworms belonging to the Eudrilidæ and some Remarks on *Nemertodrilus*," Quart. Journ. Micr. Sci. xxxii. n. s.

principal facts connected with the distribution over the world's surface of the marine or aquatic members of the Class of Mammals.

Aquatic mammals which pass their lives entirely, or for the greater part, in the water are, of course, subject to very different laws of distribution from those of the terrestrial forms. As regards aquatic mammals, land is of course an impassable barrier to their extension, and, subject to restrictions in certain cases, water offers them a free passage. Just the opposite is the case with the terrestrial mammals, to which in most cases land offers a free passage, while seas and rivers restrain the extension of their ranges.

The groups of aquatic mammals that are represented on the earth's surface at the present time are three in number, viz.:—(1) the suborder of the Carnivora, containing the Seals and their allies, generally called the Pinnipedia, which are semi-aquatic; (2) the Sirenia, which are mainly aquatic; and (3) the Cetacea, which never leave the water, and are wholly aquatic. We will consider briefly the principal representatives of these three groups, following nearly the arrangement of them employed in Flower and Lydekker's 'Mammals, living and extinct.'

II. *Distribution of Pinnipeds.*

The Pinnipeds, which I will take first, comprise three distinct families—the Otariidæ, the Trichechidæ, and the Phocidæ. Beginning with the *Otariidæ* or Eared Seals, commonly known as Sea-lions and Sea-bears, we find the greater number of the species confined to the South Polar Ocean, where they pass most of their time at sea, but, as is well known, resort to the land at certain seasons for breeding purposes. In the Atlantic Ocean, so far as I know, the Eared Seals have never been ascertained to occur further north than the estuary of the La Plata on the American coast, and the vicinity of the Cape on the African coast. But in the Pacific, on the contrary, three distinct species of *Otaria* are found all over the Arctic portion of that ocean, and there is good evidence of Eared Seals having been met with in the Galapagos, while they still occur on the coasts of Peru and Chili. I think therefore we may assume that *Otaria* was originally an Antarctic form, but has travelled northwards along the West-American coast and is now firmly established in the North Pacific. In a parallel way in the class of birds, the Albatrosses (*Diomedea*), which are essentially a group of the Antarctic Seas, are represented by three distinct species in the North Pacific.

The second family of the marine Carnivora, on the other hand, the Walruses (*Trichechidæ*), are entirely Arctic in their distribution—one species (*Trichechus rosmarus*) being peculiar to the North Atlantic, while a second nearly allied species (*T. obesus*) takes its place in the Northern Pacific.

The third family of Pinnipeds is more numerous and varied, both in genera and species, than the two preceding and has a more

extended range. The Seals, *Phocidæ*, embracing about nine different generic forms, are most numerous in the Arctic and Antarctic seas, but are also feebly represented in some intermediate localities. Beginning with the North Atlantic, we find several species of *Phoca* inhabiting various parts of this area, and the Grey Seal (*Halichœrus*) and the Bladder-Seal (*Cystophora*) exclusively confined to it. In the North Pacific all the four true Seals belong to the genus *Phoca*, and three of them are identical with the North Atlantic species; but when we descend as far south as the Gulf of California on the American coast we meet with a species of Sea-elephant (*Macrorhinus*) which, like *Otaria*, has no doubt penetrated thus far from its ancestral abode in the Antarctic Ocean.

Returning to the Central Atlantic we find two species of Seals inhabiting these waters, both belonging to the same genus *Monachus*. One of these (*M. albiventer*) inhabits the Mediterranean and the adjoining coasts of the Atlantic, while the other (*M. tropicalis*) is in these days restricted to some of the smaller and less known islands of the West Indies.

The *Phocidæ* of the Antarctic Ocean all belong to genera distinct from the Arctic forms and more nearly allied to *Monachus*, the Seal of the Mid-Atlantic. They are of four species belonging to as many genera: *Ogmorhinus*, *Lobodon*, *Leptonychotes*, and *Ommatophoca*. Besides these the Sea-elephant of the whalers (*Macrorhinus*) is essentially an Antarctic form, though now nearly extinct there, after long persecution by man. But, as already noted, it extends, or has in former days extended, far up the west coast of America, and is still occasionally found on Santa Barbara Island on the coast of California.

III. *Distribution of Sirenians.*

Only two forms of Sirenians are at the present time existing on the earth's surface—the Manatee (*Manatus*) and Dugong (*Halicore*)—each representing a distinct family of the Order. The Manatee is an inhabitant of the coasts and estuaries of both sides of the middle Atlantic Ocean—one species (*Manatus senegalensis*) occurring on the African shores, and another (*M. americanus*) on the S. American coast and in the Antilles. A third species (*M. inunguis*), so far as we know at present, is found only in fresh water high up the Amazons.

The Dugong (*Halicore*) is distributed from East Africa, along the shores of the Indian Ocean and its islands, to North Australia. Three species of this genus have been established—*Halicore tabernaculi* from the Red Sea, *H. dugong* from the Indian Ocean, and *H. australis* from Australia; but it is doubtful how far these forms are actually distinguishable.

Besides *Manatus* and *Halicore*, a third quite distinct form of Sirenian was formerly an inhabitant of the North Pacific. This was Steller's Sea-cow (*Rhytina stelleri*), by far the largest animal of

the group, which was exterminated by human agency about 1768. Fortunately recent researches in Bering's Island have been successful in supplying specimens of its skeleton for our principal Museums, and Steller, its discoverer, left to posterity a good account of its habits and anatomy.

IV. *Distribution of Cetaceans.*

Adopting the recognized division of the Cetaceans into two Suborders, Mystacoceti and Odontoceti, according as to whether their mouths are furnished with baleen ('whale-bone') or teeth, we will first consider the True or Whalebone Whales, which consist of a single family Balænidæ, usually divided into five genera:—*Balæna*, *Neobalæna*, *Rhachianectes*, *Megaptera*, and *Balænoptera*. Of these, *Balæna*, *Megaptera*, and *Balænoptera* are almost cosmopolitan—species of them, whether distinct or not is at present more or less uncertain, being met with in nearly every part of the Ocean. But *Rhachianectes* has as yet been ascertained to occur only in the Northern Pacific, and *Neobalæna* in the South Polar Ocean, so that we have in these cases two well-marked local types to deal with.

The Toothed Wales (Odontoceti) are more diversified than the preceding group, and are usually held to embrace at least four existing families besides several extinct forms. The first family, containing the Physeteridæ or Sperm-Whales, consists of at least six genera (*Physeter*, *Cogia*, *Hyperoodon*, *Ziphius*, *Mesoplodon*, and *Berardius*). *Physeter* and *Cogia* are inhabitants of the whole oceanic area between the tropics, extending in certain localities some way beyond them. *Hyperoodon* is confined to the North Atlantic. *Ziphius* has an extensive range, and has been found in nearly every part of the Ocean. *Mesoplodon* is also widely distributed, but is apparently more abundant in the Southern Hemisphere. *Berardius*, however, so far as we know at present, is restricted to the South Polar Ocean.

The third family of Toothed Whales contains only the *Platanistidæ*, or Freshwater Dolphins, which although, in some cases, at the present day entirely fluviatile, must probably have descended from oceanic forms[1]. The three known genera are *Platanista* of the Ganges and Indus, *Inia* of the river Amazons, and *Pontoporia* of the river La Plata; the last form making a connecting link between the two preceding genera and the marine Dolphins.

The fourth family of Toothed Whales, containing the Dolphins, *Delphinidæ*, is very numerous in species and embraces at least fifteen or sixteen genera. But in spite of the efforts of Mr. True, who has recently given us an excellent summary of our present knowledge of them[2], both the genera and species of *Delphinidæ* are still so imperfectly understood that I cannot say much about

[1] Sir William Flower ("Whales, Past and Present," Proc. Roy. Inst. x. p. 360, 1883) rather favours the idea of a freshwater origin of the Cetaceans.

[2] See "A Review of the Family Delphinidæ," by Frederick W. True: Bull. U.S. Nat. Mus. no. 36 (Washington, U.S., 1889).

their geographical distribution. Most of the forms appear to be very widely distributed, but it may be said generally that Dolphins are most abundant in the inter-tropical seas and less plentiful both to the north and south of them.

There are, however, two forms that are exclusively inhabitants of the North Atlantic. These are the very remarkable Narwhal (*Monodon*), in which the male is furnished with a single enormous horn-like tusk, and the Beluga or White Whale (*Delphinapterus*), closely allied to the Narwhal in many points of its general structure. These may be looked upon as quite isolated forms characteristic of the Arctic portion of the Atlantic but not known in the Pacific [1].

V. *Division of the Marine Area of the Globe into Sea-regions.*

From what has been already said, it will be evident that although many of the Marine Mammals have a wide distribution, others are very definitely localized; and a study of the latter will, I think, enable us to divide the oceanic portion of the globe into six Sea-regions, corresponding to a certain extent with the six Land-regions into which I proposed to separate the terrestrial portion of the globe in 1874, and which were subsequently adopted by Mr. Wallace in his standard work on the Geographical Distribution of Animals. I propose to call these Sea-regions:—

(1) The North-Atlantic Sea-region, or Arctatlantis (ἄρκτος and Ἀτλαντίς=the daughter of Atlas), consisting of the northern portion of the Atlantic down to about 40° N. lat.

(2) The Mid-Atlantic Sea-region, or Mesatlantis (μέσος and Ἀτλαντίς), consisting of the middle portion of the Atlantic down to about the Tropic of Capricorn.

(3) The Indian Sea-region, or Indopelagia (Ἰνδός and πέλαγος), containing the Indian Ocean down to about the same degree of S. lat., and extending from the coast of Africa on the west to Australia and the great Oriental islands on the east.

(4) The North Pacific Sea-region, or Arctirenia (ἄρκτος and εἰρήνη=pax), containing the northern portion of the Pacific Ocean down to about the Tropic of Cancer.

(5) The Mid-Pacific Sea-region, or Mesirenia (μέσος and εἰρήνη), containing the inter-tropical portion of the Pacific Ocean; and finally

(6) The Southern Sea-region, or Notopelagia (νότος and πέλαγος), containing the whole of the South Polar Ocean all round the globe south of the above-mentioned limits.

We will now proceed to consider shortly the characteristic Mammals of these six Sea-regions.

VI. *The North Atlantic Sea-region, or Arctatlantis.*

Amongst the Pinnipeds two well-marked generic forms, the Grey Seal (*Halicherus*) and the Bladder-Seal (*Cystophora*), are exclusively

[1] In a recent letter to 'Science' (1897, p. 843) Dr. Dall has pointed out that this is an error. Both *Monodon* and *Delphinapterus* occur in the North Pacific.—P. L. S., 4. vi. 97.

confined to Arctatlantis. The True Seals (*Phoca*) and the Walrus (*Trichechus*) are found in this region and in Arctirenia; and of the former genus three species (*P. vitulina*, *P. grænlandica*, and *P. barbata*) are actually common to both these Sea-regions, while the Walruses (*Trichechus rosmarus* and *T. obesus*) of the two Sea-regions are perhaps somewhat doubtfully distinguishable. It may be easily understood how this has come to pass, because the Seals and Walrus may in the course of time, during unusually mild summers, have extended themselves along the north coast of the American continent into the Northern Pacific. But Arctirenia, as we shall presently show, is markedly distinguishable from Arctatlantis by the presence of Eared Seals (*Otaria*), which are utterly unknown in the whole of the Atlantic area. *Otaria* is in fact as regards Arctatlantis what I have called on previous occasions (see P. Z. S. 1882, p. 311) a "lipotype" of Arctatlantis, but what I now propose to designate a "lipomorph."[1]

The Sirenians are entirely absent from the North Atlantic and constitute another lipomorph of that area.

Coming to the Whales, we find the *Mystacoceti* well represented in the North Atlantic by *Balæna*, *Megaptera*, and *Balænoptera*; but of these the two latter are almost universally distributed over the ocean, and *Balæna* recurs again in the North Pacific as well as in more southern latitudes, so that there is no genus of Whalebone Whales peculiar to Arctatlantis.

Proceeding to the *Odontoceti*, the case is different. Amongst the *Physeteridæ*, *Hyperoodon* is confined to Arctatlantis, and, as already explained, two very well-marked types of the *Delphinidæ*, *Delphinapterus* and *Monodon*, are likewise exclusively denizens of the North Atlantic Ocean. Arctatlantis therefore may be said to be well characterized by the possession of at least five genera of Marine Mammals not found elsewhere, viz. *Halichœrus*, *Cystophora*, *Hyperoodon*, *Delphinapterus*, and *Monodon*.

VII. *The Mid-Atlantic Sea-region, or Mesatlantis.*

Mesatlantis has certainly not so many forms of Marine Mammals confined to its area as Arctatlantis, but there seem to be good grounds for its separation. As we descend towards the tropics the true Seals (*Phocinæ*), which are constituted to live in colder water, gradually fall off in number, and in Mesatlantis are no longer met with. But in their place we find the genus *Monachus* or Monk-Seal restricted to Mesatlantis, one species (*M. albiventer*) occurring

[1] On former occasions I have used the term "lipotype" for a natural group which characterizes a particular locality by its *absence*. It would, however, perhaps be better to change the term to "lipomorph," because the term "type" and its compounds have been generally employed in reference to the particular specimens of a species upon which original descriptions have been based (*cf.* Thomas, P. Z. S. 1893, p. 241). In the same way a natural group which characterizes a particular country may be called a "topomorph" (τόπος, *locus*, and μορφή, *forma*). Thus in Africa *Giraffa* and *Phacochœrus* would be "topomorphs," and *Cervus* and *Ursus* would be "lipomorphs."

in the Mediterranean and on the North African coast, and a second (*M. tropicalis*) being found in the West Indies. Mesatlantis is likewise the true home of the well-marked Sirenian genus *Manatus*, one species of which (*M. americanus*) frequents the coast of America and another (*M. senegalensis*) that of Africa.

As regards the Cetaceans, we are not able to say that Mesatlantis, although well-furnished with many generic types of this Order, has any one peculiar to it. We must therefore rest content with assigning two genera of Marine Mammals, *Monachus* and *Manatus*, as characteristic forms or topomorphs of the Sea-Mammal-life of Mesatlantis.

VIII. *The Indian Sea-region, or Indopelagia.*

The Marine Carnivora, so far as we know, are entirely foreign to Indopelagia, but the Sirenians are well represented by the Dugong (*Halicore*), which pervades all its northern coasts from North Australia to India and the Red Sea and down the African coast to Lamu[1]. Whether the species of *Halicore* found at different points within this area are the same or different is still a matter of discussion, but there can be no doubt that *Halicore* is an exclusive inhabitant of Indopelagia. As regards the Whales of Indopelagia, we know that *Physeter*, *Cogia*, and *Ziphius*, and numerous forms of *Delphinidæ* occur there, but I am not aware of any Cetacean that is entirely restricted to this Sea-region.

IX. *The North Pacific Sea-region, or Arctirenia.*

As was pointed out when speaking of Arctatlantis, Arctirenia has one genus of *Phocidæ* (*Phoca*) in common with the North Atlantic, and three of the species of this genus appear to be actually identical in these two Sea-regions, whilst a fourth *Phoca* (*P. fasciata*) is only found in the North Pacific. The Walrus (*Trichechus*) is again a form of Marine Mammals common to both the great northern Sea-regions. But the feature of Pinnipedian life that absolutely distinguishes Arctirenia from Arctatlantis is the presence in the former of three (if not four) well-marked species of the Eared Seals (*Otariidæ*), which are absolutely unknown in the vast extent of the Atlantic down at least to 30° S. lat.

Arctirenia has unfortunately lost its Sirenian, Steller's Sea-cow (*Rhytina stelleri*), the largest and finest modern representative of this formerly prevalent group, which since the days of the Pleistocene has greatly diminished in numbers, but I think we may still treat *Rhytina* as one of the characteristic forms of the Arctirenian Sea-region. The North Pacific is also even at the present day the sole possessor of a remarkable genus of Whalebone Whales which combines the long head and elongate form of *Balænoptera* with the smooth skin of the throat and absence of the dorsal fin of *Balæna*[2]. This is the Grey Whale, *Rhachianectes glaucus* of Cope,

[1] A fine specimen of the Dugong from Lamu (on the east coast of Africa, lat. 2° 50′ S.), obtained by Mr. J. C. Haggard in 1885, is in the British Museum.

[2] Flower and Lydekker, 'Mammals,' p. 241.

which, in these days, is confined to the North Pacific, and does not range farther south than the 20th parallel in that ocean. At the same time it should be stated that indications have been discovered that a nearly allied form existed in the Atlantic in previous geological ages, though this is by no means certain. Besides *Rhachianectes*, *Balæna*, *Megaptera*, and *Balænoptera* are all represented in the North Pacific, and also many species of *Delphinidæ* of which little is at present known. But *Rhytina* and *Rhachianectes* are the only genera of Marine Mammals absolutely confined to Arctirenia.

X. *The Mid-Pacific Sea-region, or Mesirenia.*

The Eared Seals, *Otaria*, must have necessarily passed through Mesirenia in their passage from south to north, though the only record of their actual presence in the central part of the Pacific is, so far as I know, the recent discovery of them in the Galapagos. It should be stated, however, that Tschudi records the occurrence of two species of *Otaria* on the islands of the coast of Peru, and that in 1802 Humboldt met with an Eared Seal on the Island of San Lorenzo, in the Bay of Callao, which is only some 12° south of the Equator.

Like *Otaria*, the Sea-elephant (*Macrorhinus*) has apparently in former ages travelled up the South American shores and established itself as far north on the coast of California at about 34° N. lat. The Californian Sea-elephant has been discriminated by Gill as a distinct species (*Macrorhinus angustirostris*), but its differences from the southern form (*M. leoninus*) seem to be but trifling.

As regards the Cetaceans of Mesirenia, our information is at present very imperfect, and I have little to say except that species of *Megaptera*, *Balænoptera*, *Physeter*, *Cogia*, and *Ziphius* certainly occur there, besides many representatives of the widely spread *Delphinidæ*.

XI. *The Southern Polar Sea-region, or Notopelagia.*

The wide ocean which surrounds the Southern Pole on every side, and extends up to 40° S. lat., seems to present, as regards its marine mammals, a nearly homogeneous fauna, which we will now briefly consider. In the first place it contains representatives of four genera of true *Phocidæ*—*Ogmorhinus*, *Lobodon*, *Leptonychotes*[1], and *Ommatophoca*, which are peculiar to the southern seas, and are quite distinct from all their northern representatives in the Arctic Ocean. The Sea-elephant, *Macrorhinus*, is also a denizen of Notopelagia, though, as we have already seen, it has wandered north along the South American coast far into Mesirenia.

Like *Macrorhinus*, *Otaria* also, containing the group of Eared

[1] This generic term, established by Gill in 1872, seems to take precedence of *Pœcilophoca*, proposed by Flower and Lydekker for the same type (*L. weddelli*) in 1891. *Cf.* Allen, North American Pinnipeds, p. 418.

Seals, appears to have been originally an Antarctic group, and the greater number of its species, although now-a-days very much reduced in numbers, are still found in the Southern Ocean. But the *Otariæ* have travelled still further north than *Macrorhinus*, and three, if not four, species are, as already stated, in these days well established inhabitants of Arctirenia.

The Sirenians are absent from Notopelagia, but Cetaceans of every kind are abundant. Besides one or more representatives of the true Whalebone Whale (*Balæna*), Notopelagia has a smaller representative of the group (*Neobalæna*) entirely restricted to its area. It has also representatives of *Megaptera* and *Balænoptera*, though it is doubtful how far they are even specifically distinct from some of their northern representatives.

Among the Toothed Whales (*Odontoceti*) we find a large Ziphioid form, *Berardius*, restricted to the Notopelagian area, while *Ziphius* and *Mesoplodon* also occur there. The Dolphins (*Delphinidæ*) are likewise numerous, and present some distinct species, but not, so far as our present knowledge extends, any generic forms that do not occur elsewhere.

But Notopelagia is sufficiently distinguished from all the five more northern sea-regions by possessing four genera of Seals and two of Cetaceans entirely restricted to its area.

XII. *Conclusions.*

It has therefore, I think, been shown that, for the Geography of Marine Mammals, the Ocean may be conveniently divided into six Sea-regions, which, as marked in the chart now exhibited (Plate XXIV.), are as follows :—

I. Regio Arctatlantica, characterized by its Seals (*Phocinæ*), of which two genera, *Halichœrus* and *Cystophora*, are peculiar, whilst *Phoca* is common to it and Arctirenia; by the absence of Sirenians; and by the possession of three peculiar genera of Cetaceans (*Hyperoodon*, *Delphinapterus*, and *Monodon*).

II. Regio Mesatlantica, sole possessor of the Monk-Seal, *Monachus*, amongst the Pinnipeds, and of the Sirenian genus *Manatus*.

III. Regio Indopelagica, characterized by the presence of the Sirenian *Halicore* and by the absence of Pinnipeds.

IV. Regio Arctirenica, with *Phoca* like the Regio Arctatlantica, but having *Otaria* also; the home of the (now extinct) Sirenian *Rhytina* and of the endemic Cetacean *Rhachianectes*.

V. Regio Mesirenica, without true Seals (*Phocinæ*), but having *Otaria* and *Macrorhinus* from the south; no Sirenian known.

VI. Regio Notopelagica, characterized by four endemic genera of *Phocidæ*, and by the presence of many *Otariæ*; without Sirenians, but with two endemic forms of Cetaceans (*Neobalæna* and *Berardius*).

In conclusion, I will call attention to some of the more remarkable points in the general distribution of the marine Mammals and to their apparent significance.

In the first place it is evident that the Pacific has much more in common with the Notopelagian region than the Atlantic. *Otaria* and *Macrorhinus*, quite unknown in the Atlantic, extend themselves to the northern extremity of the Pacific, the former pervading that ocean up to Bering's Straits, and the latter reaching to the Californian coast. It follows that in former ages there must have been some barrier in the Atlantic which did not exist in the Pacific to stop their progress northwards. The only barrier I can imagine that would have effected this must have been a land uniting S. America and Africa, across which they could not travel. Adopting this hypothesis, we have at the same time an explanation of the presence of the Manatee on both the American and African coasts. The Manatee could hardly live to cross the Atlantic. It is only found close to the coast, where it browses on sea-weeds and other vegetable food in shallow water. How did it travel from America to Africa (or *vice versa*), unless there were a continuous shore-line between them? The same may be said of the Monk-Seal (*Monachus*), of which one species lives in the Mediterranean and on the African coast and islands and another in the West Indies. We can hardly believe that these creatures could easily traverse the whole Atlantic. The hypothesis of a former barrier of land between Africa and America, which we know is supported by other facts of distribution[1], would alone explain the difficulty.

On the other hand, in the Pacific we find no such break between the north and south. The aquatic Mammals of Notopelagia have evidently had free access to the whole of the Pacific for a long period and have well availed themselves of this facility.

Again, while the great Southern Ocean exhibits a considerable uniformity of marine Mammalian life, we see the Northern waters divided into two distinctly recognizable Regions by the interposed masses of land. All these facts, with the one exception of the supposed Atlantic Barrier, would tend in favour of the now generally accepted doctrine that the principal masses of land and water are not of modern origin, but have existed mainly in their present shapes throughout all ages.

TOPOMORPHS OF THE SIX SEA-REGIONS.

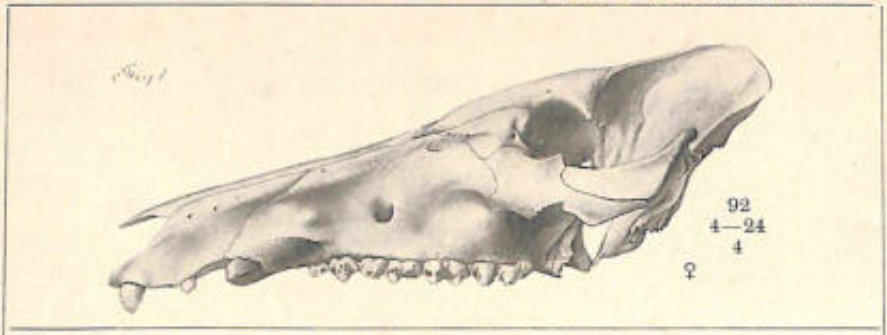
I. ARCTATLANTIS.
Halichœrus.
Cystophora.

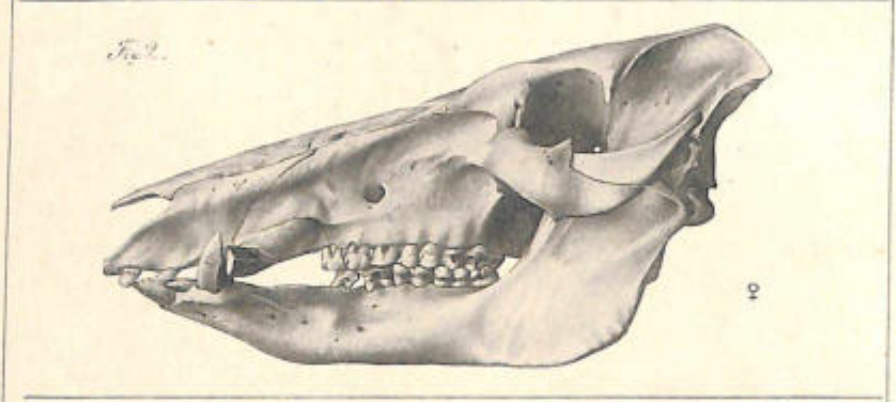
Hyperoodon.

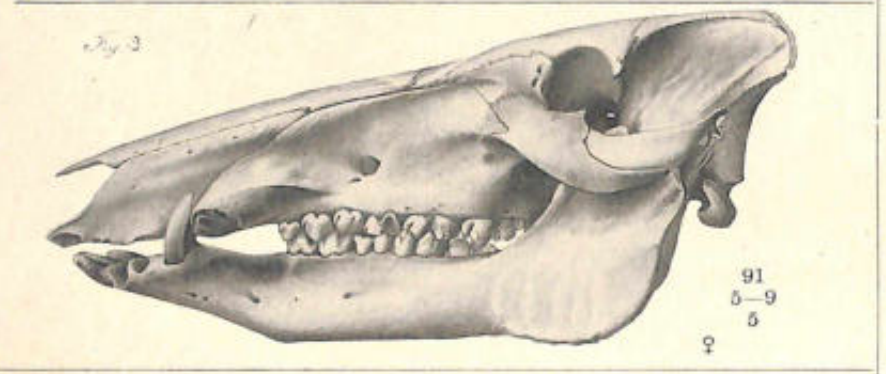
IV. ARCTIRENIA.
Otaria.

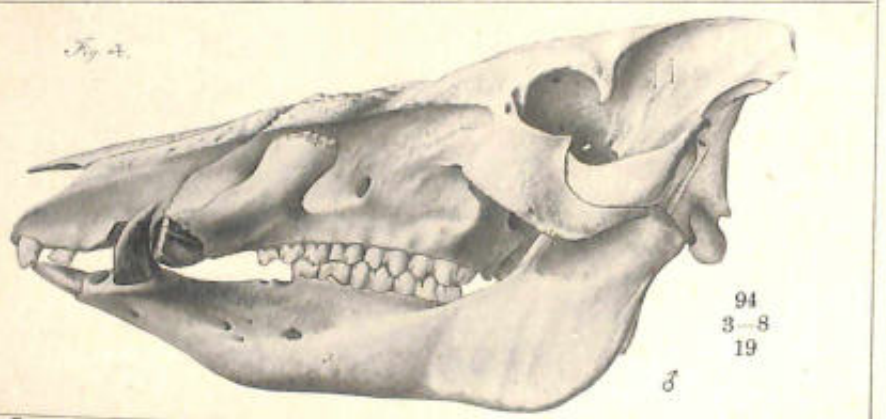
Rhytina.
Rhachianectes.

[1] *Cf.* Wallace, Geogr. Distrib. vol. i. p. 156.









H. Gronvold del.

Collotype, Morgan & Kidd, Richmond, S.W.

$\frac{1}{4}$ nat. size.

Fig. 1. Potamochœrus chœropotamus dæmonis. Fig. 2. P. larvatus.
Fig. 3. P. johnstoni. Fig. 4. P. chœropotamus nyasse.



Fig. 1



Fig. 2.



Fig. 3.



Fig. 4.

H. Gronvold del.

Potamochœrus johnstoni.

P. larvatus.

½ nat. size.

P. chœropotamus dæmonis.

Collotype, Morgan & Kidd, Richmond, S.W.

P. c. nyasæ.

II. Mesatlantis.
Monachus.
Manatus.
Inia.
Pontoporia.

III. Indopelagia.
Halicore.
Platanista.

V. Mesirenia.
Otaria.
Macrorhinus.

VI. Notopelagia.
Ogmorhinus.
Lobodon.
Leptonychotes.
Ommatophoca.
Otaria.

Neobalæna.
Berardius.

5. On the Species of *Potamochœrus*, the Bush-Pigs of the Ethiopian Region. By Dr. C. I. Forsyth Major, C.M.Z.S.

(Plates XXV. & XXVI.)

[Received March 16, 1897.]

A close examination of eight specimens of the Wild Hog of Madagascar, forming part of my collection from that island, has led me to attempt a review of the complete material available of the genus *Potamochœrus*, the results of which I lay before the Society in a very succinct form. I also exhibit two skulls, male and female, of the Madagascar form, and two photographs of the northernmost form, the Abyssinian *P. hassama* (Heugl.).

It may be well at the outset to state the relation which the African *Potamochœrus* bears to the other Swine. Leaving out of consideration the more aberrant or otherwise further removed African *Phacochœrus*, the Oriental *Babyrusa*, and the New-World Peccaries (*Dicotyles*), I limit my remarks mainly to the members of the genus *Sus*, with which *Potomochœrus* bears closer relationship than with the genera just mentioned.

Several years ago [1] I tried to show that the numerous species of *Sus* which had been established could be reduced to four: *Sus scrofa*; *Sus vittatus*; *Sus verrucosus*, of Java, Borneo, Celebes, &c.; and *Sus barbatus*, of Borneo. In later years numerous excellent papers have been published on the subject by Nehring; besides which not less than 35, partly for the present more or less nominal species, have been introduced by Père Heude [2], from the

[1] Zool. Anzeiger, 1883, p. 295.

[2] P.-M. Heude, S.J. "Étude sur les Suilliens," Mémoires concernant l'Hist. Nat. de l'Empire Chinois par des Pères de la Compagnie de Jésus. Chang-Hai, 1888–1894.

Asiatic Continent (especially China) and from the Philippines. These additions to our knowledge have rather strengthened my original views, to the effect that we shall in a near future be able to show the complete passage of *Sus scrofa* into *Sus vittatus* by intermediate forms, although one or two of Heude's continental species may for the present rank as such.

The only characters of some importance, upon which the claims of *Potamochœrus* to generic distinction rest are the curious apophyses which Flacourt, speaking of the Malagasy Boar, compared with horns [1]. Recent authors call these outgrowths fleshy warts; but having had the opportunity of seeing the animal in the flesh—I am speaking of old males—I must say that Flacourt's term is much more to the point. They recall the osseous horn-like apophyses in some Tertiary Ungulates, as the *Dinocerata* and others. Of course, in the male of *Potamochœrus* the underlying osseous nuclei are formed merely by the convex rugosity on the lateral parts of the nasals and by the outgrowth above the canine, reaching scarcely higher up than the upper contour of the skull. But the overlying "horn" is formed by a very resistant, cylindrical, cartilaginous callosity, part of which is generally cut away on the inner side, whilst the rest shrinks considerably in drying, so that the stuffed skin fails to give an adequate idea of this conformation in the living animal.

Whether this is the beginning of a really osseous horn, or the remnant of such, I cannot say; considering that we have to do with a specialized feature, one might prefer the former supposition. There are some tertiary Swine which by their dentition closely approach the *Potamochœrus*, but this part of their skull is still unknown.

Now this peculiar character exists, as I pointed out, only in the adult male, and it might therefore be doubted whether a sexual character justifies the establishing of a separate genus. Besides, the *Sus verrucosus* of Java, with its numerous varieties in Borneo, Celebes, the Philippines, Amboina, Ceram, and even, as it would seem, in Cochinchina [2], shows the beginning of a similar conformation in the large size of the apophysis above the canine, which is particularly well developed in the Celebes and Amboina form, where we have the beginning also of a rugosity on the nasals. *Sus verrucosus* approaches *Potamochœrus* besides as regards the broad zygomatic arches, which are swollen by underlying sinuses. The claims of *Potamochœrus* to generic distinction are hereby somewhat weakened. On the other hand, *Sus verrucosus* and *Sus barbatus* of Borneo are distinguished from the remaining members of the genus *Sus* by the very characteristic conformation of their lower canines; the same character is met with already in Pliocene Boars of the Siwaliks and in the *Sus* of the Upper Pliocene of the Val d'Arno. So that if the

[1] "Ces sangliers (principalement les masles) ont deux cornes à costez du nez, qui sont comme deux callositez." (Histoire de la grande Isle Madagascar composée par le Sieur De Flacourt: Paris, 1661.)

[2] Heude, *l. c.* 1894, p. 219.

African Bush-Pigs are to be separated from *Sus*, the Oriental forms just mentioned have as good claims to be equally distinguished by a separate generic denomination. However, the genus-name *Potamochœrus* being in use, and being very convenient for distinguishing the small group of African Pigs in question, it might as well be maintained.

There are, up to the present day, three recognized species of Bush-Pigs or River-Hogs (*Potamochœrus*) in Africa :—

1. The West-African River-Hog, generally known as *Potamochœrus penicillatus* (Schinz), extending from Angola as far north as Senegambia, and, according to Schweinfurth and Emin Pasha, as far east as Monbuttu.

2. The South- and East-African Bush-Pig, which, in this country at least, is generally called *Potamochœrus africanus* (Schreb.), and is supposed to extend as far north as Abyssinia.

3. The Madagascar Wild Hog, called by Grandidier *Potamochœrus edwardsi*.

As regards first the scientific names, I have the following observations to offer :—

Gervais was the first to assert (Hist. N. Mamm. 1855), and after him Nathusius (Vorstudien, 1864), that the *Sus penicillatus* of Schinz (1847) was the long-forgotten *Porcus guineensis* of Marcgrave, Klein, and others (*Sus guineensis*, Briss.; *Sus porcus*, L., Gmel., &c.); whereupon J. E. Gray, in 1868, restored to this beast its original Linnæan specific name, "*Potamochœrus porcus*."

Linnæus (S. N. 10th ed.) identifies his *Sus porcus* as the *Porcus guineensis* of Ray, who himself had stated that his description and name were taken from Marcgrave. Gray (1868 and 1869), quoting Marcgrave, says :—"Marcgrave describes it as having a cyst on the navel, and says that it had been introduced by the negroes, and naturalized in Brazil." From the text of Marcgrave it appears that he does *not* say that his *P. guineensis* has a cyst on the navel, he does *not* say that it had been introduced by the negroes, and he does *not* say that it had been naturalized in Brazil. Habent sua fata libelli! The following is the description of *P. guineensis* in the posthumous work of Marcgrave :—

"*Porcus guineensis*, et e Guinea in Brasiliam translatus, figura ut nostrates et ruffi coloris : in hoc autem differt a nostratibus, quod caput habeat non ita elatum : aures autem longas et acutas plane et prolongatis acuminibus, caudam longam usque ad talos propendentem, pilorum expertem. Totum corpus tegitur pilis brevibus ruffis splendentibus, non setis, quibus et in dorso caret, sed tantum versus caudam in dorso et circa collum paulo longiores habet pilos. Plane cicur."[1]

Out of evil, however, has come some good, for Gray's more than free translation gave an opportunity to Prof. Reinhardt, of Copenhagen (in a letter addressed to the Secretary of this

[1] Georgi Marcgravi de Liebstad, "Misnici Germani, Historiæ Rerum Naturalium Brasiliæ, Libri Octo": 'Hist. Nat. Brasiliæ,' Lugd.-Bat. et Amstelod. (Elzev.) 1648, p. 230.

Society, and published in the 'Proceedings' for 1869, pp. 56, 57), to put some of the facts under discussion in their true light and to add some interesting particulars. Reinhardt draws attention to the fact that Prince Maurice of Nassau, in whose service Marcgrave was, kept animals, brought over from many countries, at his country-seat near Recife (Pernambuco), and that Marcgrave describes and sketches also several African Monkeys seen in Brazil (of which it is expressly stated that they came from the Guinea Coast). "He" (Marcgrave) "had certainly never thought of saying that his Pig was a domestic animal, but only that in Brazil he had seen such a Pig, brought thither from Africa, and being quite tame—that is to say, doing no harm, but being of a placid, inoffensive nature." Reinhardt further on quotes from a Danish author, Monrad [1], who describes the "Red and Black Boars" on the Gold Coast as being not fierce at all, their hunting being without danger, &c.

I wish to add to Reinhardt's remarks some observations of my own bearing on the subject. No mention is made by Marcgrave of the cartilaginous tuberosities above the upper canines in the male, and neither does his otherwise good, though somewhat rough, woodcut show anything of the sort; apparently he had before him a female or a young male (perhaps he had seen only a single specimen); this circumstance, too, goes a great way to show that, in his time at least, the Pig was not reared in Brazil, and it would give a further illustration to his calling it "*plane cicur*."

Schweinfurth [2], when mentioning the Wild Boar of the Monbuttu, which he considers to be the "*Potamochœrus penicillatus*," says that they are tameable up to a certain extent ("einen gewissen Grad von Zähmbarkeit an den Tag legen"); King Munsa kept a number of them, half wild, in a sort of game-preserve near his residence. I believe the experiences with the West-African *Potamochœrus* in the Zoological Gardens are to the same effect.

The individual, or the individuals, seen by Marcgrave were apparently the first brought over to Brazil; but, from what later authors say, we might be inclined to infer that after his time the species was really reared in America. Erxleben (1777), whom Reinhardt quotes, was not the first to say that the Guinea Hog was found in great numbers in Brazil ("ubi hodie copiosissimus"). The same statement had been already made by Hill (1752), Patrick Browne (1756)—both speaking of America generally,—as well as by Pallas (1766) and Buffon (1767); but from what these authors say, it seems not unlikely that a confusion was made with pigs introduced from Asia, an error against which P. L. S. Müller (Vollst. Natursystem) cautioned us as long ago as 1773.

As to the introduction of the Pencilled Hog into England for

[1] H. C. Monrad. Bidrag til en Skildring af Guinea-kysten og dens Indbyggere og til en Beskrivelse over de danske Colonier paa denne kyst, samlede under mit Ophold i Afrika i Aarene 1805 til 1809 . . . . Med en Fortale af C. Molbech: Kjöbenhavn, 1822. 8°.

[2] Im Herzen von Afrika, ii. pp. 83, 532 (1874).

breeding purposes, Nathusius states ('Racen des Schweines,' 1860, and 'Vorstudien,' 1864) that in English agricultural writings from the beginning to the middle of last century it is stated that besides the Chinese and Romanic Pig, the Red Pig from Guinea has been used in England for crossing. Nathusius quotes no particular author, and I have not been successful in my inquiries in the library of the Royal Agricultural Society, where no books of the last century seem to be kept. The only paragraphs found to the purpose are the following:—John Laurence [1] says: "The *African* Hog is red or sandy in colour, with a small head, long, slender pricked ears, soft and short hair, and a long tail touching the ground. I know not whether this be the same variety used in this country as a cross under the name of the African." David Low is somewhat more positive [2]:—"Hogs are sometimes introduced from Africa, and mingled with the other races. Those from the coasts of the Atlantic are termed Guinea Pigs, their descendants are of tolerable size and square form, and fattened with sufficient facility."

To conclude on this matter. Whilst the question as to the rearing and crossing of the Guinea Hog in former times, either in America or in England, is still an open one, there is no doubt in my mind that the *Potamochœrus penicillatus* (Schinz) must be called

Potamochœrus porcus (L.).

The South and S.E.-African *Potamochœrus* (*P. africanus*, auctt., *P. larvatus*, Fr. Cuv. part.) must be called

Potamochœrus chœropotamus (Desmoul. 1831);

for "*Sus africanus*, Gmel., 1788," the *Phacochœrus africanus*, has priority over "*Sus africanus*," Schreber, the figure of which (head), without text, was published, according to Sherborn [3], in 1791; besides, this figure might as well have been taken from the Madagascar species. The description of *Sus larvatus* of Fr. Cuvier (1817) is mainly based on a skull of the Madagascar Wild Boar, and partly on the drawing by Samuel Daniell [4], a caricature of *Phacochœrus*, with some admixture of *Potamochœrus*, which could never stand as the type of a species.

1. Potamochœrus larvatus (F. Cuv.). (Plate XXV. fig. 2 and Plate XXVI. fig. 2.)

This name must, for the reason given above, be reserved for the Malagasy Wild Boar, of which, for the present, I can only acknowledge one species.

Particular interest attaches to the Wild Hog of Madagascar, on

[1] John Laurence. A General Treatise on Cattle: London, 1805, p. 510.

[2] David Low. The Breeds of the Domestic Animals of the British Islands.—Vol. ii. (London, 1842), "Hog," p. 18.

[3] P. Z. S. 1891, p. 587.

[4] Samuel Daniell. African Scenery and Animals.—No. 21: "The African Hog": London, 1805.

Society, and published in the 'Proceedings' for 1869, pp. 56, 57), to put some of the facts under discussion in their true light and to add some interesting particulars. Reinhardt draws attention to the fact that Prince Maurice of Nassau, in whose service Marcgrave was, kept animals, brought over from many countries, at his country-seat near Recife (Pernambuco), and that Marcgrave describes and sketches also several African Monkeys seen in Brazil (of which it is expressly stated that they came from the Guinea Coast). "He" (Marcgrave) "had certainly never thought of saying that his Pig was a domestic animal, but only that in Brazil he had seen such a Pig, brought thither from Africa, and being quite tame—that is to say, doing no harm, but being of a placid, inoffensive nature." Reinhardt further on quotes from a Danish author, Monrad [1], who describes the "Red and Black Boars" on the Gold Coast as being not fierce at all, their hunting being without danger, &c.

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As to the introduction of the Pencilled Hog into England for

[1] H. C. Monrad. Bidrag til en Skildring af Guinea-kysten og dens Indbyggere og til en Beskrivelse over de danske Colonier paa denne kyst, samlede under mit Ophold i Afrika i Aarene 1805 til 1809 .... Med en Fortale af C. Molbech: Kjöbenhavn, 1822. 8°.

[2] Im Herzen von Afrika, ii. pp. 83, 532 (1874).

breeding purposes, Nathusius states ('Racen des Schweines,' 1860, and 'Vorstudien,' 1864) that in English agricultural writings from the beginning to the middle of last century it is stated that besides the Chinese and Romanic Pig, the Red Pig from Guinea has been used in England for crossing. Nathusius quotes no particular author, and I have not been successful in my inquiries in the library of the Royal Agricultural Society, where no books of the last century seem to be kept. The only paragraphs found to the purpose are the following:—John Laurence [1] says: "The *African* Hog is red or sandy in colour, with a small head, long, slender pricked ears, soft and short hair, and a long tail touching the ground. I know not whether this be the same variety used in this country as a cross under the name of the African." David Low is somewhat more positive [2]:—"Hogs are sometimes introduced from Africa, and mingled with the other races. Those from the coasts of the Atlantic are termed Guinea Pigs, their descendants are of tolerable size and square form, and fattened with sufficient facility."

To conclude on this matter. Whilst the question as to the rearing and crossing of the Guinea Hog in former times, either in America or in England, is still an open one, there is no doubt in my mind that the *Potamochœrus penicillatus* (Schinz) must be called

Potamochœrus porcus (L.).

The South and S.E.-African *Potamochœrus* (*P. africanus*, auctt., *P. larvatus*, Fr. Cuv. part.) must be called

Potamochœrus chœropotamus (Desmoul. 1831);

for "*Sus africanus*, Gmel., 1788," the *Phacochœrus africanus*, has priority over "*Sus africanus*," Schreber, the figure of which (head), without text, was published, according to Sherborn [3], in 1791; besides, this figure might as well have been taken from the Madagascar species. The description of *Sus larvatus* of Fr. Cuvier (1817) is mainly based on a skull of the Madagascar Wild Boar, and partly on the drawing by Samuel Daniell [4], a caricature of *Phacochœrus*, with some admixture of *Potamochœrus*, which could never stand as the type of a species.

1. Potamochœrus larvatus (F. Cuv.). (Plate XXV. fig. 2 and Plate XXVI. fig. 2.)

This name must, for the reason given above, be reserved for the Malagasy Wild Boar, of which, for the present, I can only acknowledge one species.

Particular interest attaches to the Wild Hog of Madagascar, on

[1] John Laurence. A General Treatise on Cattle: London, 1805, p. 510.
[2] David Low. The Breeds of the Domestic Animals of the British Islands.—Vol. ii. (London, 1842), "Hog," p. 18.
[3] P. Z. S. 1891, p. 587.
[4] Samuel Daniell. African Scenery and Animals.—No. 21: "The African Hog": London, 1805.

account of its being the only Ungulate of the recent Malagasy fauna and closely related to the species of an African genus; whilst all the other Mammals, with the exception of the Chiroptera, a *Crocidura*, and the *Viverricula*, belong to distinct genera. For this reason it has been supposed by Blanford that the genus *Potamochœrus* did not exist in Africa when Madagascar was connected with that continent, but found its way there at a later time (at the end of the Pliocene or later Pleistocene), when the connection with Africa was severed, so as to prevent most of the present African Mammalia from crossing over; whilst *Potamochœrus*, being a good swimmer, might have been able to cross the Strait. This hypothesis reposes, of course, on two assumptions: first, that the Strait of Mozambique was very much narrower in later Pliocene times than at present; and secondly, on its being taken for granted that the Malagasy *Potamochœrus* is different from all its African congeners. For it is obvious that if the Malagasy Wild Hog is specifically identical with one of the continental species, it must have arrived in the island at a very recent date; and in that case, the most likely supposition would be that for some reason or other it had been carried over by man, as must be supposed to have been the case with regard to *Viverricula malaccensis*.

The question as to the specific distinctness is not in the least settled at present. There has been in the Natural History Museum, for some months, a mounted specimen of a *Potamochœrus* from Nyasaland, which in colour and general outer appearance so closely resembles the Malagasy form that very few zoologists would venture to separate them on account of some slight differences in the respective skins. On the other hand, most of the cranial characters mentioned as distinctive between the Malagasy form and the *P. chœropotamus*[1] are of such little value, being very variable, that no importance can be attached to them. Such are: the position of the mental foramina in the lower jaw, the more or less irregularity in the lower contour of the zygomatic arch, and the conformation of the lateral depression in the region of the lachrymal and the upper part of the maxillary.

Up to the present time, besides the skin of a very young specimen, only one skull of the Malagasy form, that of an adult male, existed in the Natural History Museum. I have brought back from the Upper Forest Region of the island the remains of eight specimens, viz. six skins with their skulls complete, besides a complete skeleton and a separate skull, making in all eight skulls of different ages and both sexes. Two of the skulls, a male (see figs. 1 and 2, p. 365) and a female (Pl. XXV. fig. 2 and Pl. XXVI. fig. 2), are now exhibited. As a result of my comparisons I have to state that there are very constant cranial characters which enable us to distinguish the Madagascar form from the *P. chœropotamus*, with which, on the whole, it has more affinities than with the West-African *P. porcus*.

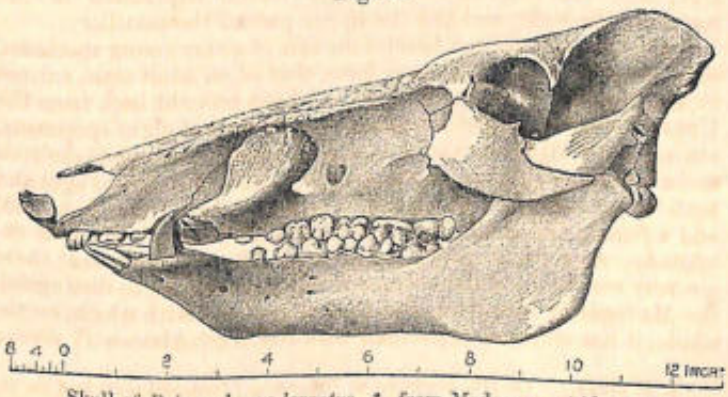
[1] J. E. Gray. "On the Madagascar River-hog (*Potamochœrus*) and on the Skulls of the three Species of the Genus" (Ann. & Mag. N. H. xv. 1875, p. 45).

Fig. 1.



Skull of *Potamochærus larvatus*, ♂, from Madagascar (seen from above).

Fig. 2.



Skull of *Potamochærus larvatus*, ♂, from Madagascar (side view).

With the latter, the Madagascar Hog, which is the smallest of the three, agrees in the more simple pattern of the molar teeth. It approaches *P. chœropotamus*, besides in outer appearance, in the general configuration of the skull, which is narrower and comparatively longer; the upper contour of the profile is straighter in both than in *P. porcus*, the occiput less vertical, the facial region more elongate, and the osseous callosity which rises above and behind the upper canines is always higher. The characters proper to the Malagasy species are the great slenderness of the snout, the nasal region not being flattened nor angular laterally, but rounded off, and the great massiveness and simplicity of the premolars. The lower premolars have an even greater tendency to disappear than in the continental forms, so that in old animals we sometimes meet with only one premolar.

For all these reasons I consider the Malagasy Wild Hog to be a quite distinct form, and I therefore do not see any real reasons for disputing the hypothesis of Blanford. Besides, we have in Madagascar the subfossil *Hippopotamus*, which is very distinct from *H. amphibius*, and the presence of which in the island cannot, in my opinion, possibly be explained in any other way than the case of the *Potamochœrus*, although it has seriously been suggested that the *Hippopotamus* might possibly have been brought over by man.

2. Potamochœrus chœropotamus (Desmoul.).

Under the objectionable name of *P. africanus*, *P. chœropotamus* has been stated to range from the Cape through East Africa to British Central Africa and as far north as the Kilima-njaro.

From British Central Africa the Natural History Museum has three skins, one without the skull, the other two from immature individuals; they are of a rufous colour, much resembling, as I have mentioned, the Malagasy Wild Boar, so that from the skins alone I could not venture to separate the two forms.

Two skulls, male and female, from Lake Mweru (B. C. A.), collected by Messrs. A. Sharpe and R. Crawshay [1], agree fairly well with the South-African *P. chœropotamus*, although showing some features of their own, as in the conformation of the apophysis above the canine &c. It is possible that hereafter this rufous Nyasa Hog may be distinguished by a distinct specific name and that the Mweru skulls belong to the same form; for the present the material is insufficient: on the one side, I have only skulls without skins (Mweru), on the other, skins without, or with only immature, skulls (Zomba, &c.). One thing is certain: all these Nyasa Bush-Pigs approach closely the South-African *Potamochœrus chœropotamus*; and I must insist on this point, since some travellers, relying solely on the colour, have united them with the West-African *P. porcus*, with which they have nothing to do.

I cannot, in fact, find a black-skinned *Potamochœrus* mentioned by

[1] See P. Z. S. 1893, p. 723.

any collector or traveller in this part of British Central Africa, and farther north, too, in Ugogo, Burton met with only *red* wild boars. Now it is well known that A. Smith [1], speaking of the Bosch Vark, says that "scarcely any two specimens of this species exhibit the same colours—some are a brownish black variegated with white, and others are almost entirely of a light reddish-brown or rufous tint without the white markings: indeed such are the varieties that it is scarcely possible to say what are the most prevailing colours." As Smith includes the Malagasy Wild Hog under the same name (*Sus larvatus*), it cannot be made out how far his remarks apply to the South-African form alone.

I propose to distinguish these Nyasa Bush-Pigs, with one exception, to be mentioned later on, as *Potamochœrus chœropotamus nyasæ* (see Pl. XXV. fig. 4 and Pl. XXVI. fig. 4).

From Kilima-njaro, the Natural History Museum has a skin, with incomplete skull (lower jaw wanting) (see Pl. XXV. fig. 1 and Pl. XXVI. fig. 3), of a small form of *Potamochœrus* (female), obtained by the Rev. W. Morris. The skin is covered with long and very dark brownish-black bristles. The skull somewhat approaches female skulls of *P. porcus*, and the last upper molar is short as in the latter species; but the posterior nasal region is flattened, as in *P. chœropotamus*, with which last feature agrees as well the more complicated pattern of the molars. Before pronouncing definitely on this interesting form, I should welcome the opportunity of examining an adult male; in the meantime I propose to call it *Potamochœrus chœropotamus dæmonis* [2].

3. Potamochœrus johnstoni, sp. n. (Plate XXV. fig. 3 and Plate XXVI. fig. 1.)

This is a new form from the Ngarawi River, Nkanga, "in the North Nyasa District (N.W. Nyasaland)," based on the skull of a female presented to the Nat. Hist. Museum by Sir Harry Johnston.

The skulls of the females of the various species of *Potamochœrus*, as a rule, closely resemble each other; this particular one having characters of its own, it may be anticipated that the skull of the male and the rest of the animal will present still greater differences. The skull is remarkable for its large size (the animal was scarcely adult), the straight upper contour, and its slenderness. The whole of the nasal region is not at all flattened and with angular borders as in the other species, but rounded off. Molars and premolars large. Premolars $\frac{3}{3}$.

Sir Harry Johnston, to whom Mr. De Winton wrote in my name for further information, kindly informs us that he brought this skull home because, when he first saw the head in his boy's pos-

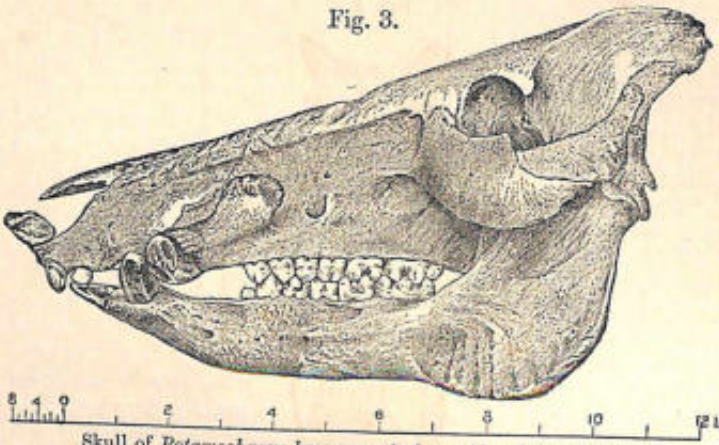
[1] A. Smith. African Zoology (The South-African Quarterly Journal, vol. ii. p. 178, 1834).

[2] "Kilima"=mountain; "njaro," a demon, supposed to produce cold (H. H. Johnston).

session, he thought there was something odd about it. He thinks we shall find the new pig elsewhere in B. C. A., "for, for some time, there has been a rumour among the settlers that there are two species of bush-pig, and that one is permanently though faintly white spotted and striped (along the back)."

4. Potamochœrus hassama (Heuglin).

Fig. 3.



Skull of *Potamochœrus hassama*, ♂, from Abyssinia (side view).

This is an Abyssinian Bush-Pig. The "Hassama" was first mentioned by Rüppell[1] and later on fully described by Heuglin[2] under the name of *Nyctochœrus hassama*. R. Hartmann was of opinion that Heuglin's *Nyctochœrus* was nothing else but the "*Potamochœrus penicillatus*."[3] Selater has identified it with "*Potamochœrus africanus*" = *P. chœropotamus*[4]; and in this he is supported by Nehring[5], who, without entering into particulars, states in the most positive manner ("*mit voller Sicherheit*") that Heuglin's Hassama is "*Potamochœrus larvatus*" = *P. chœropotamus*. If that is so, then there are two species of *Potamochœrus* in Abyssinia; for the photographs of the skull of a male from Abyssinia, from Heuglin's collections (see fig. 3, p. 368, and fig. 4, p. 369)—kindly sent to me by Prof. Eberhard Fraas, Curator of the Stuttgart Nat. Hist.

[1] Ed. Rüppell. Reise in Abyssinien, vol. ii. p. 217 (Frankfurt-a-M., 1840).

[2] M. Th. v. Heuglin. "Beiträge zur Zoologie Afrika's. Ueber einige Säugethiere des Bäschlo-Gebietes": N. Act. Leopold. xxx. pt. ii. Nachtrag, 1863, p. 7.—Heuglin & Fitzinger. "System. Uebers. d. Säugethiere Nordost-Afrika's, &c.": Sitzungsber. Akad. d. Wiss., Math.-naturw. Cl. 54, Bd. i. (Wien, 1866), p. 586.—M. Th. v. Heuglin. Reise in Nordost-Africa, ii. (Braunschweig, 1877), pp. 97, 276.

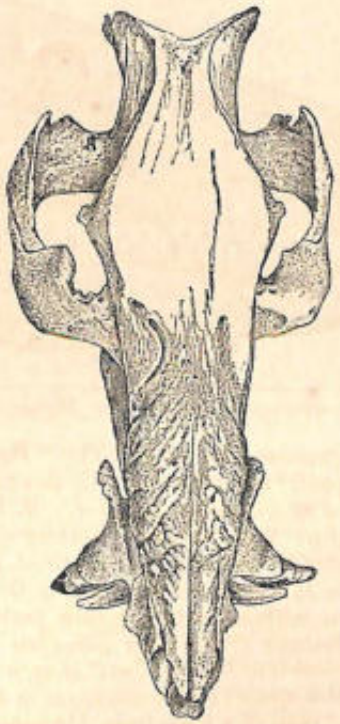
[3] R. Hartmann. "Geogr. Verbr. der im nordöstl. Afrika wild lebenden Säugethiere": Zeitschr. Berl. Ges. f. Erdkunde, 1868, iii. pp. 352, 353.

[4] P. Z. S. 1894, p. 92.

[5] A. Nehring. "Ueber d. javan. Wildschwein-Arten, sowie über *Nyctochœrus hassama*, Heuglin": Zool. Garten, xxxvi. 1895, p. 50.

Museum—show that whilst approaching *P. porcus* in the strong but low apophyses above the canine, and in the breadth of the upper cranial region anterior to the postorbital processes, it is very remarkable and distinct from that of all the other species of *Potamochœrus* in the elongation of the hinder part of the skull backwards from the postorbital processes of the frontals.

Fig. 4.



Skull of *Potamochœrus hassama*, ♂, from Abyssinia (seen from above).

To resume, we have the following species and varieties of the African genus *Potamochœrus* :—

1. *Potamochœrus larvatus* (F. Cuv.). Madagascar.
2. *Potamochœrus chœropotamus* (Desmoul.). S. and S.E. Africa.
   P. chœropotamus nyasæ. Nyasaland (B. C. A.).
   P. chœropotamus dæmonis. Kilima-njaro.
3. *Potamochœrus johnstoni*, sp. n. N.W. Nyasaland.
4. *Potamochœrus hassama* (Heuglin). Abyssinia.
5. *Potamochœrus porcus* (L.). West Africa, from Angola to Senegambia and eastwards to Monbuttu (*teste* Schweinfurth and Emin).

EXPLANATION OF THE PLATES.

PLATE XXV.

Crania of *Potamochærus*, side view. ½ natural size.

Fig. 1. *Potamochærus chæropotamus dæmonis*, ♀. B.M. 92.4.24.4.
2. *P. larvatus*, ♀. From Ampitambé forest (Madagascar).
3. *P. johnstoni*, ♀. Type. B.M. 91.5.9.5.
4. *P. chæropotamus nyasæ*, ♂. B.M. 94.3.18.9.

PLATE XXVI.

Crania of *Potamochærus*, upper view. ½ natural size.

Fig. 1. *Potamochærus johnstoni*, ♀. Type. B.M. 91.5.9.5.
2. *P. larvatus*, ♀. (Ampitambé, Madagascar.)
3. *P. chæropotamus dæmonis*, ♀. B.M. 92.4.24.4.
4. *P. chæropotamus nyasæ*, ♂. B.M. 94.3.18.9.

April 6, 1897.

W. T. BLANFORD, Esq., F.R.S., Vice-President, in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of March 1897 :—

The total number of registered additions to the Society's Menagerie during the month of March was 152, of which 44 were by presentation, 2 by birth, 42 by purchase, 30 were received in exchange, and 34 on deposit. The total number of departures during the same period by death and removals was 106.

Amongst the additions attention may be called to two examples of the Indian Pigmy Goose (*Nettopus coromandelianus*), presented by Frank Finn, Esq., B.A., F.Z.S., of Calcutta, on March 22nd. Many attempts have previously been made to introduce this bird into Europe, but without success ; and these are the first specimens that have reached the Society's Gardens alive.

The Secretary exhibited, on behalf of Mr. A. J. Lawford Jones, a curious cinnamon-coloured variety of the Blackbird (*Turdus merula*), which had been captured near Dorking, Surrey.

The following papers were read :—

1. On the Myology of the Terrestrial Carnivora.—Part I. Muscles of the Head, Neck, and Fore-Limb. By B. C. A. WINDLE, M.A., M.D., D.Sc., Professor of Anatomy at Mason College, Birmingham, and F. G. PARSONS, F.R.C.S., F.Z.S., F.L.S., Lecturer on Comparative Anatomy at St. Thomas's Hospital.

[Received February 11, 1897.]

During the last four or five years a considerable number of bodies of carnivorous animals have come into our possession, partly

EXPLANATION OF THE PLATES.

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Crania of *Potamochærus*, side view. ½ natural size.

Fig. 1. *Potamochærus chæropotamus dæmonis*, ♀. B.M. 92.4.24.4.
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4. *P. chæropotamus nyasæ*, ♂. B.M. 94.3.18.9.

PLATE XXVI.

Crania of *Potamochærus*, upper view. ½ natural size.

Fig. 1. *Potamochærus johnstoni*, ♀. Type. B.M. 91.5.9.5.
2. *P. larvatus*, ♀. (Ampitambè, Madagascar.)
3. *P. chæropotamus dæmonis*, ♀. B.M. 92.4.24.4.
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During the last four or five years a considerable number of bodies of carnivorous animals have come into our possession, partly

through the generosity of this Society, partly from other sources. We have therefore thought it advisable to collaborate in working through this material and in comparing our results with the numerous published records on the myology of Carnivora which are scattered through zoological literature. We are also greatly indebted to Prof. Macalister for several unpublished records of dissections. Altogether we find that we have more or less complete accounts of 79 animals, a number which, we think, justifies us in making an attempt at a comprehensive review of the order—a review which, though it cannot be final, may indicate the present state of our knowledge of the subject, and may serve to direct the attention of future observers towards points which they might otherwise overlook. The great difficulty in a work of this kind is to avoid recording twice observations made by one observer and quoted by another, and thus giving a false idea of the frequency of variations: for instance, it is easy to find a great many statements about the muscles of the Dog and Cat scattered about, but it is often impossible to make out whether the writer really dissected the animal or is relying on the description of someone else. For this reason we have decided to err on the side of safety, and have excluded a good many statements about the originality of which we were doubtful.

With a view to prevent any confusion between the facts which we have observed ourselves and those quoted from others, we commence our paper with a numbered list of all the animals referred to. When a Roman numeral follows an animal's name it refers to the bibliography at the end of the paper; when no such numeral follows, the animal has been dissected by ourselves.

In the text, whenever an animal is mentioned, an ordinary numeral is placed after it to show which specimen in our list is referred to; when more than one numeral is present it shows that the statement holds good for more than one animal.

This first part of the paper is devoted to statements of facts; we propose to reserve all conclusions and generalizations until the whole of the muscles have been described and compared.

List of Specimens of Animals referred to.

FELIDÆ.

1. Lion (*F. leo*). Macalister (unpublished).
1*a*. Lion (*F. leo*). Cuvier & Laurillard. (V.)
2. Lion (*F. leo*). Haughton. (III.)
3. Tiger (*F. tigris*). Macalister (unpublished).
4. Leopard (*F. pardus*). Macalister (unpublished).
5. Leopard (*F. pardus*). Cuvier & Laurillard. (VI.)
6. Cat (*F. catus*). Mivart. (I.)
7. Cat (*F. catus*). Straus-Durckheim. (II.)
7*a*. Cat (*F. catus*). Meckel. (XXXIX.)
8. Caracal (*F. caracal*). Perrin. (XXIX.)
9. Cheetah (*Cynælurus jubatus*). Ross. (IV.)

VIVERRIDÆ.

10. Fossa (*Cryptoprocta ferox*).
11. Fossa (*Cryptoprocta ferox*). Beddard. (VII.)
12. Civet (*Viverra civetta*). Young. (VIII.)
13. Civet (*Viverra civetta*). Macalister. (IX.)
14. Civet (*Viverra civetta*). Devis. (X.)
15. Rasse (*Viverricula malaccensis*).
16. Blotched Genet (*Genetta tigrina*). Mivart. (XI.)
16*a*. Blotched Genet (*Genetta tigrina*).
17. Common Genet (*Genetta vulgaris*). Cuvier & Laurillard. (XII.)
18. Common Genet (*Genetta vulgaris*).
19. Palm Civet (*Paradoxurus typus*).
20. Palm Civet (*Paradoxurus typus*).
21. Palm Civet (*Paradoxurus typus*). Perrin. (XXIX.)
22. Ichneumon (*Herpestes*). Meckel. (XXXIX.)
23. Ichneumon (*Herpestes nepalensis*).
24. Ichneumon (*Herpestes griseus*).
25. Aard Wolf (*Proteles cristatus*). Watson. (XIII.)

HYÆNIDÆ.

26. Striped Hyæna (*Hyæna striata*). Young & Robinson. (XIV.)
27. Striped Hyæna (*H. striata*). Meckel. (XXXIX.)
28. Striped Hyæna (*H. striata*). Cuvier & Laurillard. (XVI.)
29. Spotted Hyæna (*H. crocuta*). Watson & Young. (XV.)
30. Brown Hyæna (*H. brunnea*). Murie. (XVII.)

CANIDÆ.

31. Fox-terrier (*Canis familiaris*).
32. Irish Terrier (*C. familiaris*). Haughton. (XVIII.)
33. Greyhound (*C. familiaris*). Haughton. (XVIII.)
34. Greyhound (*C. familiaris*). Macalister (unpublished).
35. Pointer (*C. familiaris*). Macalister (unpublished).
36. Setter (*C. familiaris*). Macalister (unpublished).
37. Bull-dog (*C. familiaris*). Macalister (unpublished).
38. Dog (? var.) (*C. familiaris*). Meckel. (XXXIX.)
39. Dog (? var.) (*C. familiaris*). Cuvier & Laurillard. (XIX.)
40. Dingo (*C. dingo*). Haughton. (XVIII.)
41. Jackal (*C. aureus*). Macalister (unpublished).
42. Arctic Fox (*C. lagopus*). Macalister (unpublished).
43. Common Fox (*C. vulpes*). Dieck. (XXXVIII.)
44. Cape Dog (*Lycaon pictus*). Pagenstecher. (XL.)

URSIDÆ.

45. Polar Bear (*Ursus maritimus*). Kelley. (XXIV.)
46. Polar Bear (*U. maritimus*). Meckel. (XXXIX.)
47. Brown Bear (*U. arctos*). Meckel. (XXXIX.)
48. Black Bear (*U. americanus*).
49. Black Bear (*U. americanus*). Shepherd. (XX.)

50. Black Bear (*U. americanus*). Testut. (XXIII.)
51. Black Bear (*U. americanus*). Haughton. (XXI.)
52. Black Bear (*U. americanus*). Cuvier & Laurillard. (XXII.)

PROCYONIDÆ.

53. Common Racoon (*Procyon lotor*).
54. Common Racoon (*P. lotor*). Allen. (XXVI.) No. 1.
55. Common Racoon (*P. lotor*). Allen. (XXVI.) No. 2.
56. Common Racoon (*P. lotor*). Meckel. (XXXIX.)
57. Crab-eating Racoon (*P. cancrivorus*). Windle. (XXV.)
58. White-nosed Coati (*Nasua nasica*). Mackintosh. (XXVII.)
59. Brown Coati (*Nasua fusca*). Mackintosh. (XXVII.)
60. Red Coati (*Nasua rufa*). Cuvier & Laurillard. (XXVIII.)
60*a*. Coati (*Nasua* sp. inc.). Meckel. (XXXIX.)
61. Kinkajou (*Cercoleptes caudivolvulus*).
62. Kinkajou (*Cercoleptes caudivolvulus*). Perrin. (XXIX.)

MUSTELIDÆ.

63. Grison (*Galictis vittata*).
64. Tayra (*Galictis barbara*). Macalister. (IX.)
65. Polecat (*Mustela putorius*). Alix. (XXX.)
66. Beech Marten (*Mustela foina*). Cuvier & Laurillard. (XXXI.)
67. Beech Marten (*Mustela foina*). Meckel. (XXXIX.)
68. Beech Marten (*Mustela foina*). Perrin. (XXIX.)
69. Cape Polecat (*Ictonyx zorilla*).
70. Libyan Polecat (*Ictonyx libyca*).
71. Badger (*Meles taxus*). Macalister (unpublished).
72. Badger (*Meles taxus*). Cuvier & Laurillard. (XXXIII.)
73. Badger (*Meles taxus*). Meckel. (XXXIX.)
73*a*. Badger (*Meles taxus*). Haughton. (XXXII.)
74. Common Otter (*Lutra vulgaris*).
75. Common Otter (*Lutra vulgaris*). Lucae. (XXXVI.)
76. Common Otter (*Lutra vulgaris*). Cuvier & Laurillard. (XXXV.)
77. Common Otter (*Lutra vulgaris*). Meckel. (XXXIX.)
78. Indian Otter (*Lutra cinerea*). Macalister. (XXXVII.)
79. Common Otter (*Lutra vulgaris*). Haughton. (XXXIV.)

Muscles of the Head and Neck.

Facial Muscles.—The most superficial and at the same time the most important of the facial muscles is the platysma; this is continued backwards from the orbicularis oris and depressor muscles of the mouth towards the back of the animal's neck and covers very little of the ventral surface of the throat. It evidently corresponds more especially to that part of the platysma which in Man is called the risorius (see figs. 2 and 3, p. 375). Two muscles are partly covered by this: the first rises from the anterior part of the root of the ear and runs downwards and forwards to the deep

VIVERRIDÆ.

10. Fossa (*Cryptoprocta ferox*).
11. Fossa (*Cryptoprocta ferox*). Beddard. (VII.)
12. Civet (*Viverra civetta*). Young. (VIII.)
13. Civet (*Viverra civetta*). Macalister. (IX.)
14. Civet (*Viverra civetta*). Devis. (X.)
15. Rasse (*Viverricula malaccensis*).
16. Blotched Genet (*Genetta tigrina*). Mivart. (XI.)
16*a*. Blotched Genet (*Genetta tigrina*).
17. Common Genet (*Genetta vulgaris*). Cuvier & Laurillard. (XII.)
18. Common Genet (*Genetta vulgaris*).
19. Palm Civet (*Paradoxurus typus*).
20. Palm Civet (*Paradoxurus typus*).
21. Palm Civet (*Paradoxurus typus*). Perrin. (XXIX.)
22. Ichneumon (*Herpestes*). Meckel. (XXXIX.)
23. Ichneumon (*Herpestes nepalensis*).
24. Ichneumon (*Herpestes griseus*).
25. Aard Wolf (*Proteles cristatus*). Watson. (XIII.)

HYÆNIDÆ.

26. Striped Hyæna (*Hyæna striata*). Young & Robinson. (XIV.)
27. Striped Hyæna (*H. striata*). Meckel. (XXXIX.)
28. Striped Hyæna (*H. striata*). Cuvier & Laurillard. (XVI.)
29. Spotted Hyæna (*H. crocuta*). Watson & Young. (XV.)
30. Brown Hyæna (*H. brunnea*). Murie. (XVII.)

CANIDÆ.

31. Fox-terrier (*Canis familiaris*).
32. Irish Terrier (*C. familiaris*). Haughton. (XVIII.)
33. Greyhound (*C. familiaris*). Haughton. (XVIII.)
34. Greyhound (*C. familiaris*). Macalister (unpublished).
35. Pointer (*C. familiaris*). Macalister (unpublished).
36. Setter (*C. familiaris*). Macalister (unpublished).
37. Bull-dog (*C. familiaris*). Macalister (unpublished).
38. Dog (? var.) (*C. familiaris*). Meckel. (XXXIX.)
39. Dog (? var.) (*C. familiaris*). Cuvier & Laurillard. (XIX.)
40. Dingo (*C. dingo*). Haughton. (XVIII.)
41. Jackal (*C. aureus*). Macalister (unpublished).
42. Arctic Fox (*C. lagopus*). Macalister (unpublished).
43. Common Fox (*C. vulpes*). Dieck. (XXXVIII.)
44. Cape Dog (*Lycaon pictus*). Pagenstecher. (XL.)

URSIDÆ.

45. Polar Bear (*Ursus maritimus*). Kelley. (XXIV.)
46. Polar Bear (*U. maritimus*). Meckel. (XXXIX.)
47. Brown Bear (*U. arctos*). Meckel. (XXXIX.)
48. Black Bear (*U. americanus*).
49. Black Bear (*U. americanus*). Shepherd. (XX.)

50. Black Bear (*U. americanus*). Testut. (XXIII.)
51. Black Bear (*U. americanus*). Haughton. (XXI.)
52. Black Bear (*U. americanus*). Cuvier & Laurillard. (XXII.)

PROCYONIDÆ.

53. Common Racoon (*Procyon lotor*).
54. Common Racoon (*P. lotor*). Allen. (XXVI.) No. 1.
55. Common Racoon (*P. lotor*). Allen. (XXVI.) No. 2.
56. Common Racoon (*P. lotor*). Meckel. (XXXIX.)
57. Crab-eating Racoon (*P. cancrivorus*). Windle. (XXV.)
58. White-nosed Coati (*Nasua nasica*). Mackintosh. (XXVII.)
59. Brown Coati (*Nasua fusca*). Mackintosh. (XXVII.)
60. Red Coati (*Nasua rufa*). Cuvier & Laurillard. (XXVIII.)
60*a*. Coati (*Nasua* sp. inc.). Meckel. (XXXIX.)
61. Kinkajou (*Cercoleptes caudivolvulus*).
62. Kinkajou (*Cercoleptes caudivolvulus*). Perrin. (XXIX.)

MUSTELIDÆ.

63. Grison (*Galictis vittata*).
64. Tayra (*Galictis barbara*). Macalister. (IX.)
65. Polecat (*Mustela putorius*). Alix. (XXX.)
66. Beech Marten (*Mustela foina*). Cuvier & Laurillard. (XXXI.)
67. Beech Marten (*Mustela foina*). Meckel. (XXXIX.)
68. Beech Marten (*Mustela foina*). Perrin. (XXIX.)
69. Cape Polecat (*Ictonyx zorilla*).
70. Libyan Polecat (*Ictonyx libyca*).
71. Badger (*Meles taxus*). Macalister (unpublished).
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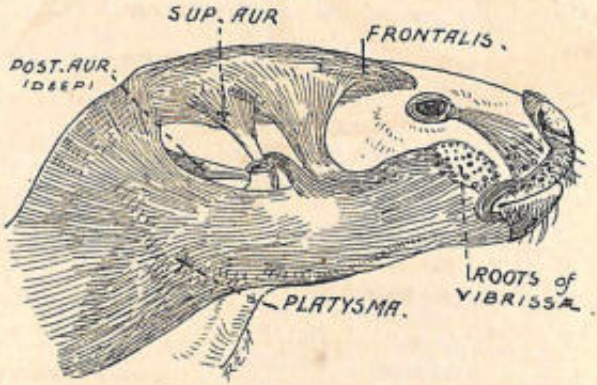
Muscles of the Head and Neck.

Facial Muscles.—The most superficial and at the same time the most important of the facial muscles is the platysma; this is continued backwards from the orbicularis oris and depressor muscles of the mouth towards the back of the animal's neck and covers very little of the ventral surface of the throat. It evidently corresponds more especially to that part of the platysma which in Man is called the risorius (see figs. 2 and 3, p. 375). Two muscles are partly covered by this: the first rises from the anterior part of the root of the ear and runs downwards and forwards to the deep

surface of the platysma, and so reaches the angle of the mouth. In the Polecats (69, 70), where the head is a good deal elongated, this muscle, instead of coming all the way from the ear, rises from the anterior part of the zygoma just behind the orbicularis palpebrarum (see fig. 3, p. 375). As we think it an advantage, wherever possible, to use the names familiar to human anatomists, we shall speak of this as the levator anguli oris, though it only comes from the zygoma in certain cases.

The second muscle which is covered by the platysma is the sterno-facialis or sphincter colli: this rises from the back of the root of the ear and meets its fellow of the opposite side in the mid-ventral line of the neck, covering in its course the parotid gland (see fig. 2, p. 375). In the Felidæ this muscle is strongly marked

Fig. 1.



Face-muscles of *Lutra vulgaris*.

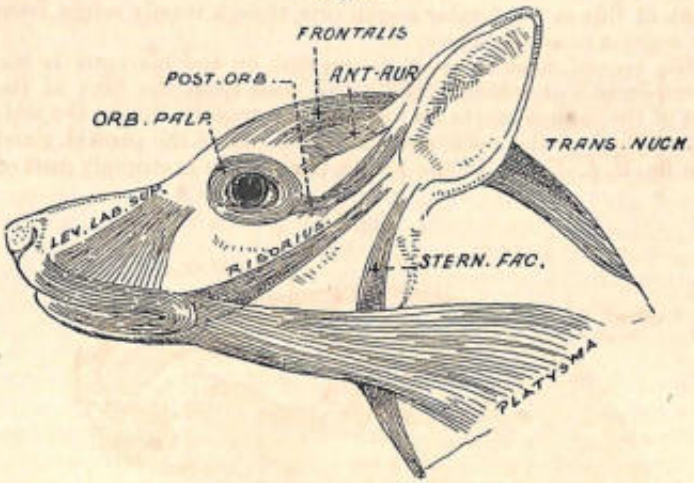
and the anterior part comes from the fascia over the masseter. In no case that we have seen does it reach, as in the rodents, to the sternum[1] (XLI.). The orbicularis palpebrarum is not very strongly marked, from its posterior edge two or three bundles of muscular fibres run backwards and act as retractors of the angle of the eye; these are best seen in the Canidæ. The levator labii superioris is always well marked and passes from the anterior angle of the eye to the upper lip, deep to it is a plane of muscle acting on the nose. The orbicularis oris is well marked. The occipito-frontalis is a plane of fibres which covers the scalp; the lateral part of the frontalis is attached posteriorly to the ear and forms the anterior auricular muscle, while the lateral part of the occipitalis is attached anteriorly to the ear and is thickened to form the transversus nuchæ: deep to this are one or two posterior auricular muscles.

It will thus be seen that the main muscles of the face are disposed in such a way as to draw the soft parts of the lips and nose clear of the teeth, and also to lay back the ears; the sphincter

[1] In *Bathyergus* the sterno-facialis and sphincter colli are coexistent (XLII.).

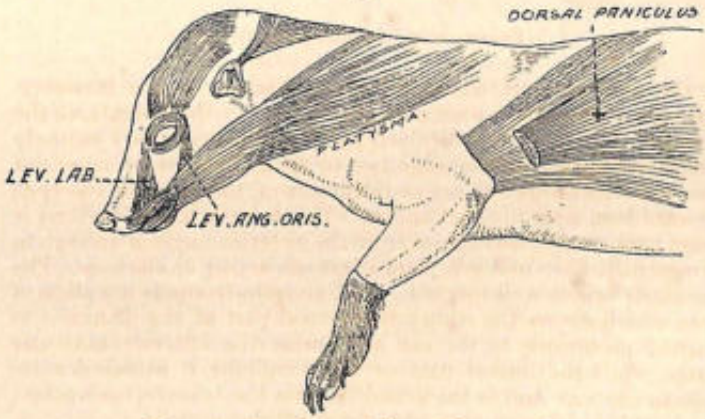
colli would tend to draw the skin of the neck forwards and throw it into wrinkles, possibly with a protective object in case of the animal being seized by the throat. We have not sufficient material to contrast the different families of Carnivora so far as their facial

Fig. 2.



Face-muscles of *Canis familiaris*.
(*For* Risorius *read* Zygomaticus.)

Fig. 3.



Face-muscles and panniculus of *Ictonyx libyca*.

muscles go with any certainty; but from what we have observed we should say that the Felidæ excel in the development of the sphincter colli, the Canidæ in that of the risorius and zygomaticus

and in the greater differentiation of the muscular planes giving an increased power of expression. In *C. vulpes* (43), Dieck (XXXVIII.) describes almost as many muscles as in the human face, but speaking generally his description agrees with our own. The other families seem to resemble the Canidæ more than the Felidæ, especially in the lesser development of the sphincter colli. In *Nasua* (60) there is a strong levator alæ nasi divided into two bundles, which give the great mobility to that creature's snout.

Temporal.—The temporal muscle rises from the side of the skull as high as the sagittal crest when this is present and as far back as the occipital curved line. There is always a tendinous plane in the substance of the muscle which divides it into two fleshy layers and to which both these layers are attached. In *Ictonyx* (70) and *Lutra* (74) it was noticed that this plane was only present in the anterior part of the muscle. As a rule the muscles of opposite sides meet at the sagittal crest, but in *Ictonyx* (70) and *Canis* (31) they are separated by a slight interval, while in *Lutra* (74, 75), owing to the breadth of the skull, a considerable space divides them. In *Viverra civetta*, Young (12) states that the temporal is with difficulty separable from the masseter. Watson (XV.) and Young (XIV.) have drawn attention to the great development of the masticatory muscles in the Hyænidæ.

Masseter.—This muscle is always very strong. It rises from the whole length of the zygomatic arch as well as from the deep surface of the temporal fascia above the arch. As a rule the muscle can easily be separated into a superficial and a deeper layer; the former of these rises from the outer surface of the malar bone and from the anterior half of the zygoma, its fibres run downward and backward to be inserted into the lower border of the mandible near the angular process, where they blend slightly with those of the internal pterygoid, they are also inserted into the lower part of the external surface of the ramus. The deep part rises from the whole length of the zygomatic arch, its fibres converging on to the upper part of the surface of the ramus of the mandible. In *Procyon lotor* (53) it was noticed that this deep part was again easily separable into two layers, superficial and deep, an arrangement which, however, we have not seen in any other animal.

Buccinator.—This muscle is fairly well developed in all Carnivora, but shows nothing of special interest. It is attached to the alveolar margins of both jaws and blends anteriorly with the orbicularis oris.

Pterygoids.—The external and internal pterygoids are with difficulty separable in Carnivora; the former rises from the external surface of the palatine bone and is inserted into the upper part of the internal surface of the ramus of the mandible. The internal pterygoid rises below and internal to the last, and is inserted into the mandible near its angle and into the stylo-mandibular ligament.

Digastric.—This, in spite of its name, is really a monogastric muscle in the Carnivora; it is thick and strong and rises from the

paroccipital process and often from the contiguous paramastoid and bulla tympani; it is inserted into the body of the lower jaw midway between the angle and symphysis (see fig. 4, p. 378). It has no connexion with the hyoid bone, and the only evidence of a separation into two bellies is a feeble line of tendon about the middle, which is quite superficial and does not extend into the interior of the muscle. In some cases, e.g. *Civetta* (12), *Genetta* (18), *Ursus* (52), *Nasua* (60), and *Ictonyx* (70), no tendinous intersection at all was noticed. In spite of its appearance the anterior part of the muscle is supplied by the mylo-hyoid, and the posterior by the facial nerve.

Mylo-hyoid.—The mylo-hyoid has the same attachments as in Man (see fig. 4, p. 378). It usually extends as far forwards as the symphysis menti, but in *Canis* (31), *Hyæna striata* (28), and *H. crocuta* (29) it ends anteriorly in an angle, the convexity of which is towards, but does not reach the symphysis. In *Procyon lotor* (53) the arrangement is the same as in the Canidæ and Hyænidæ, but *Nasua rufa* (60) agrees with the rest of the Carnivora in this respect.

Genio-hyoid and Genio-hyoglossus.—Nothing remarkable was noticed about these muscles. They have the usual human attachments.

Stylo-hyoid.—The typical carnivorous stylo-hyoid seems to consist of two parts, superficial and deep: the former is a small slip which rises from near the root of the paroccipital process and passes over the digastric, to reach the hyoid bone; the latter rises deep to the origin of the digastric and is usually inserted into the epihyal element of the hyoid arch, it is sometimes spoken of as the masto-hyoid (see fig. 4, p. 378). This arrangement was noticed in *F. catus* (7), *Genetta* (17, 18), *Herpestes* (24), *Cryptoprocta* (10), *Canis* (39), and *Cercoleptes* (61).

In the Mustelidæ the superficial part was not seen, but unless looked for it may easily escape notice, and this is also the case with the deep part.

It is possible that the human arrangement of the stylo-hyoid, in which the digastric tendon passes through it, may be explained by looking upon the human muscle as a combination of the stylo-hyoid and masto-hyoid of the Carnivora.

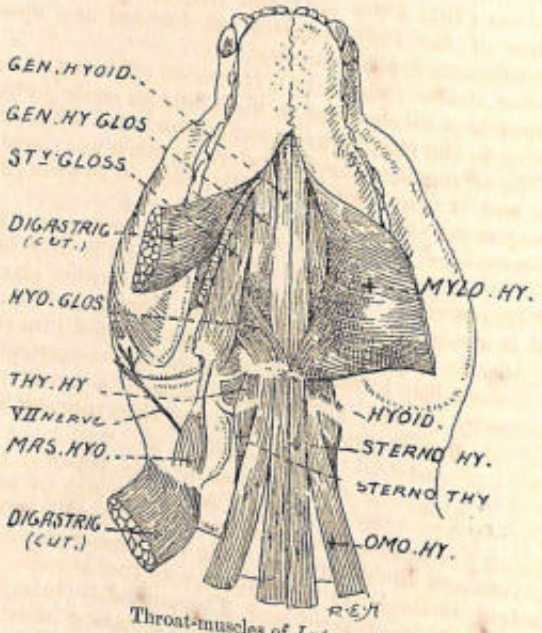
Styloglossus.—This is always present and is by far the best developed of all the styloid muscles in Carnivora; it rises from the stylo- or epi-hyal elements of the hyoid arch, and passes to the superficial side of the hyoglossus as in Man (see fig. 4, p. 378).

Cerato-hyoid.—This muscle is described by Straus-Durckheim in the Cat (II.) and by Alix in the Polecat (XXX.); it passes from the thyro-hyal to the cerato-hyal elements of the hyoid apparatus. We have failed to notice it in any of the animals which we have dissected, while in *Genetta* (18) and *Herpestes* (24) we specially looked for it without success.

Stylo-pharyngeus.—The stylo-pharyngeus is always present though small; it rises from the deep surface of the stylo-hyal and passes to the pharynx.

Sterno-mastoid.—This muscle rises from the anterior part of the sternum and is inserted into the occipital curved line, the paramastoid, and sometimes the paroccipital process; it may be more or less fused with the cleido-mastoid at its insertion. Among the Viverridæ Meckel (XXXIX.) has noticed that the sterno-mastoid consists of two layers, superficial and deep, in *Herpestes* (22), and we have confirmed his observation in *H. nepalensis* (23) and *griseus* (24). In *Genetta vulgaris* (18) the same arrangement exists, but it was not noticed in *Paradoxurus typus* (19, 20) or

Fig. 4.



Throat-muscles of *Lutra vulgaris*.

Cryptoprocta (10); and neither Young (VIII.) nor Macalister (IX.) make any mention of a bilaminar condition in *Viverra* (12, 13). Cuvier and Laurillard (XII.) figure the trapezius as rising from the sternum in the Genet, and Lucae (XXXVI.) does the same in the Otter, so that probably the explanation of the bilaminar sterno-mastoid is that the superficial layer is really trapezius, and that in those animals in which the muscle is unilaminar the sterno-mastoid and trapezius have completely fused. In many cases the sterno-mastoid is fused with its fellow of the opposite side near its origin in the posterior part of the neck; this seems to occur most often among the Hyænidæ, Canidæ, Ursidæ, Procyonidæ, and Mustelidæ, though it does not always happen in these families—for instance, the two sterno-mastoids were fused in the

posterior third of the neck in *Ursus maritimus* (45), in two specimens of *U. americanus* (50, 52), in *Procyon lotor* (53), in four specimens of *Lutra vulgaris* (74, 75, 77, 79), and in Macalister's specimen of *Viverra civetta* (IX.), while in one specimen of *Ursus americanus* (49), in *Nasua rufa* (60), in *Cercoleptes* (61), in *Ictonyx libyca* (70), and in Young's specimen of *Viverra civetta* (VIII.) they were separate. In no animal belonging to the Felidæ [1] have we found any fusion between the opposite sterno-mastoids, and the same applies to the Viverridæ with the exception of one Civet (13), Genet (18), and *Cryptoprocta* (10).

In many animals, e. g. *Procyon lotor* (53), *Ursus maritimus* (45), *U. americanus* (49), *Lutra* (74), and *Herpestes* (24), some of the dorsal fibres of the sterno-mastoid run forward and upward to join the contiguous cephalo-humeral.

In *Hyæna striata* (26, 27, 28), *H. crocuta* (29), and *H. brunnea* (30) the muscle is divided into an inner and an outer portion, the former going to the paramastoid process, the latter to the occipital ridge. This arrangement may therefore be taken as typical of the Hyænidæ, and it is interesting to notice that in *Proteles* (25) the same arrangement was found.

Cleido-mastoid.—This muscle, as has already been pointed out, is usually distinct from the sterno-mastoid though it may be fused with it at its insertion. It rises from the rudimentary clavicle or, when that is absent, from the tendinous intersection in the cephalo-humeral muscle; it passes forwards to be inserted into the par-occipital process deep to the insertion of the sterno-mastoid. The spinal accessory (XIth) nerve seems to have a most constant relation to this muscle, first piercing it and then running between it and the sterno-mastoid to the trapezius.

In *Cercoleptes* (61) the nerve passed entirely between the two muscles, but this was the only exception with which we met. It is interesting to contrast the behaviour of the spinal accessory in the Carnivora and Rodentia (XLI.): in the former it pierces the cleido-mastoid, in the latter it passes deep to that muscle.

Sterno-hyoid, Sterno-thyroid, and Thyro-hyoid.—Owing to the narrowness of the sternum, the two first-named muscles rise largely from the first rib. In *Proteles*, Watson (XIII.) describes the two sterno-hyoid muscles of opposite sides as being fused in the middle line, but this was not noticed in the Hyænidæ or indeed in any other animal. In *Lutra cinerea*, Macalister (XXXVII.) describes a tendinous intersection in both the sterno-hyoid and sterno-thyroid; we found the same thing in the Dog (31), though in that animal the sterno-hyoid and thyroid were fused on the caudal side of the intersection. Devis's specimen of *Viverra civetta* (X.) seems to have shown a similar arrangement. In the other animals examined the muscles had the usual human attachments.

Omo-hyoid.—When this muscle is present it has the usual

[1] In *F. catus* (7) and *F. leo* (1a) we cannot satisfy ourselves whether a fusion does or does not exist.

attachments to the hyoid bone and anterior border of the scapula, there is no central tendon as in Man, and in no case was any connection with the clavicle noticed. Among the Felidæ it is apparently never present; it is certainly absent in *F. leo* (1, 1*a*), *F. tigris* (3), *F. pardus* (4), *F. catus* (6, 7), and *F. caracal* (8), while Ross makes no mention of it in *Cynælurus jubatus* (IV.). Among the Viverridæ it is absent in *Cryptoprocta* (10), in *Viverra civetta* (12, 13, 14), in *V. malaccensis* (15), in *Genetta* (17, 18), and in *Herpestes* (23, 24). Three specimens of *Paradoxurus typus* were examined (19, 20, 21), in one of which (19) a slender omo-hyoid was found though it was absent in the others. In *Proteles* (25) it is absent. Among the Hyænidæ it was found by Meckel in *H. striata* (XXXIX.), but was absent in two other specimens (26, 28); it is also wanting in *H. crocuta* (29). In the Canidæ it was absent in three Dogs dissected by Macalister (35, 36, & 41), and in one dissected by ourselves (31). Testut (XXIII.) also describes it as wanting in the Dog. In the other Canidæ of which we have records, no mention is made of it. In the Ursidæ it is present in *U. maritimus* (45) and in *U. americanus* (48, 49, 50). In the Procyonidæ it was not seen in *P. lotor* (53) or *Nasua* (58, 60, XXIII.), but was present in two specimens of *Cercoleptes* (61, 62). In the Mustelidæ it was found in *Galictis vittata* (63), *Ictonyx zorilla* (69), and *I. libyca* (70), feebly developed in *Meles* (71) and *Mustela foina* (68), well developed in two specimens of *Lutra vulgaris* (74, 79) (see fig. 4, p. 378) and in *Lutra cinerea* (78). On the other hand, it is absent in *Galictis barbara* (64).

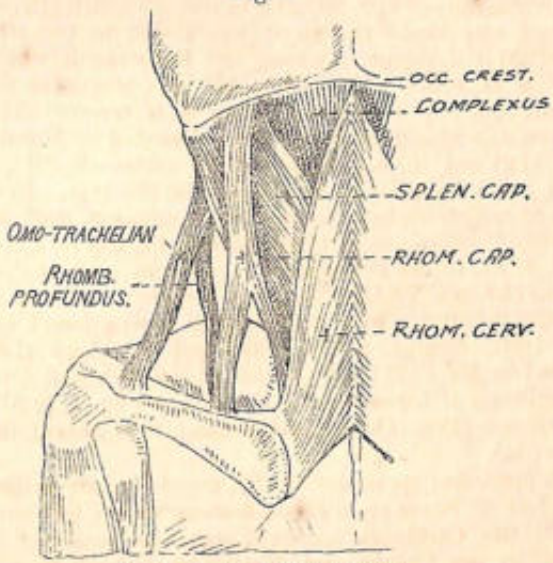
From previous experience of this muscle we are inclined to lay a good deal of stress on its classificatory value; this opinion our study of the Carnivora confirms, since its presence is almost confined to the Ursidæ and Mustelidæ, though it occasionally occurs in other families.

Omo-trachelian.—This muscle is most constant in the Carnivora; it always rises from the transverse process of the atlas and runs backwards to be inserted into the acromion process of the scapula close to the metacromial tubercle. In its course it is pierced by several of the cervical nerves from which it receives its supply. It always appears on the surface between the cervical (cephalo-humeral) and anterior thoracic portions of the trapezius, and hence is often described as piercing that muscle. It was found in every recorded dissection of Carnivora except in Young's specimen of *Viverra civetta* (VIII.); this, however, was evidently abnormal, since Devis (X.), Macalister (IX.), and Meckel (XXXIX.) found it present in that animal. It will be readily understood that this is the same muscle as the trachelo-acromial, acromio-atlantal, and levator claviculæ[1] of other authors. After considerable thought we have preferred the term "omo-trachelian" as giving the best description of the muscle throughout the Mammalia (see fig. 5, p. 381).

[1] Windle has used "levator claviculæ" for the cleido-mastoid.

Rhomboideus profundus (Trachelo-scapular, Levator scapulæ minor).—This has been described by Macalister (XXXVII.) as a lutrine muscle, but our own observations make us regard it as one of the most characteristic features of the whole of the Mustelidæ. It occurs in *Galictis vittata* (63), *Galictis barbara* (64), *Mustela putorius* (65), *Ictonyx zorilla* (69), *Ictonyx libyca* (70), *Meles taxus* (71, 72), *Lutra vulgaris* (74, 75, 79), and *Lutra cinerea* (78).

Fig. 5.



Neck-muscles of *Ictonyx libyca*.

Outside the Mustelidæ we only find it in two specimens of *Cercoleptes* (61, 62), which is of increased interest when we recall the evidence of the omo-hyoid in that animal.

The origin is from the transverse process of the atlas, the insertion into the root of the scapular spine. In many cases the muscle has been described either as part of the rhomboideus capitis or of the acromio-trachelian, since it is connected with the latter at its origin and with the former at its insertion. It is supplied by the cervical nerves (see fig. 5).

Rectus capitis ventralis (anticus) major and *minor*.—Both these muscles have the same attachments as in Man, the major coming from 3rd, 4th, 5th, and 6th cervical transverse processes, and the minor from the ventral arch of the atlas; they are both inserted into the basioccipital.

Longus colli.—The longus colli consists chiefly of the anterior and posterior oblique parts: the latter rises from the anterior thoracic centra as far back as the 5th or 6th, and is inserted into the transverse processes of the posterior cervical vertebræ; the

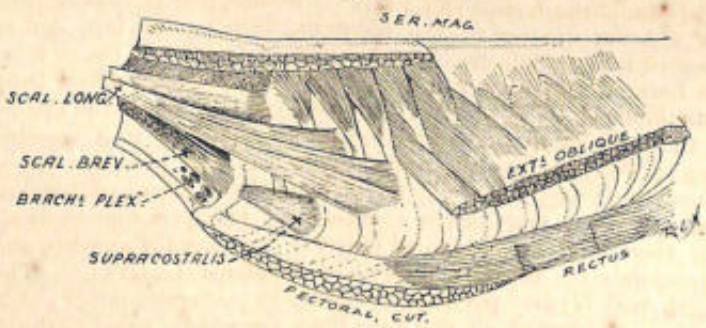
former rises from the mid-cervical transverse processes, and is inserted into the ventral arch of the atlas as well as into the centrum of the second and sometimes the third cervical vertebra.

Scalenus ventralis (Scalenus anticus).—If by scalenus anticus we understand a muscle which passes from the ventral side of the cervical transverse processes to the first rib, ventral to the subclavian artery and brachial plexus, that muscle is very rare in the Carnivora. This is borne out by Gilis's researches (XLIII.); he says that the plexus passes anterior (ventral) to all the scalenes in Carnivora. Straus-Durckheim thinks that in the Cat (II.) the scalenus anticus has become fused with the rectus capitus anticus major, and describes it under the name of "Isoscèle." Alix (XXX.) says that it is represented in *Mustela putorius* by some fibres which are ventral to the transverse processes and are separated from the rest of the scalene mass by the nerves. We agree with Alix that nothing should be looked upon as scalenus anticus which is not ventral to the brachial plexus. In *Viverra civetta* both Macalister (IX.) and Young (VIII.) describe three scalenes; Devis (X.) also speaks of a scalenus anticus in this animal, but in his case the muscle was dorsal to the nerves.

Murie (XVII.) speaks of a scalenus anticus in *Hyæna brunnea*, but we think that it must have been a part of what we term scalenus longus, since it was attached to the 4th and 5th ribs and no mention is made of its relation to the brachial plexus. In no other carnivorous animal is there any mention of a scalenus anticus.

Scalenus longus and *brevis*.—These muscles are always present. The former rises from four or five cervical transverse processes but never reaches the first; it is inserted into the outer surfaces

Fig. 6.



Scalene muscles of *Canis familiaris*.

of 3, 4, or 5 ribs, beginning at the 3rd or 4th. In *Cercoleptes* (61), however, it is very well developed and is inserted from the 3rd to the 8th rib. At its insertion the muscle interdigitates with the serratus magnus and its ventral fibres reach farthest back. The

scalenus brevis lies ventral to the longus and rises from the 5th and 6th cervical transverse processes, and is inserted into the first rib dorsal to the brachial plexus. In *Procyon* (53) it rises from the 3rd, 4th, and 5th vertebræ, some of its fibres being continued into the supracostalis and a few into the rectus abdominis. As the names scalenus anticus, medius, and posticus give a wrong idea of the position of these muscles in quadruped animals, we have ventured to substitute those of ventralis, brevis, and longus, more especially as we are not quite convinced that the longus corresponds entirely to the human posticus (see fig. 6, p. 382).

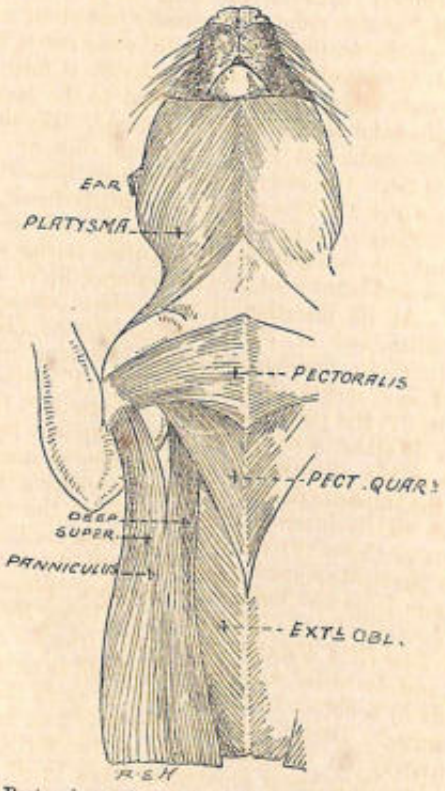
Muscles of the Dorsum of the Neck.—These muscles we find it more convenient to reserve until we deal with those of the trunk.

Muscles of the Anterior Extremity—Pectoral Muscles.

It is doubtful whether any satisfactory division into pectoralis major and minor is possible in the Carnivora. Young, in his description of *Viverra civetta*, says that "the pectoralis minor is wanting as usual in Carnivora" (VIII.). On the other hand, Shepherd and Testut (XXIII.) describe a definite pectoralis minor in the Black Bear (XX.). Occasionally some of the deeper fibres of the mass are inserted into the region of the coracoid process and shoulder-joint, but they are not constant even in different specimens of the same animal. As a rule four fairly distinct parts may be distinguished, and the most satisfactory mode of description seems to be to take an animal like the Racoon, which occupies an intermediate position in the Order, as a type and to notice the chief differences in other animals. In *Procyon lotor* (53), then, one portion (α) rises from the anterior half of the sternum and is inserted into the pectoral ridge in the middle two-fourths of the humerus, the fibres running transversely (this is Windle's Superficial Manubrial factor) (XLVII.). Another part (β) comes from the anterior quarter of the sternum, deep to the last, and is inserted into the humerus from the great tuberosity to the middle; the fibres of this part run forward and outward (Windle's Deep Manubrial) (XLVII.). The third part (γ) rises from the middle of the sternum to the sterno-xiphoid articulation; it is inserted deep to the last into the second quarter of the humerus and is joined on its deep surface by the abdominal and dorsal panniculus, with which it is more or less continuous. This part represents all that there is of the abdominal pectoral or pectoralis quartus, and corresponds to Windle's Superficial Gladiolar (XLVII.). The fourth part (δ) may possibly represent the pectoralis minor; it is the deepest layer of all and rises from the middle two-fourths of the sternum, running obliquely forward and outward to the head of the humerus and capsule of the shoulder (Windle's Costal factor) (XLVII.). It will be noticed that each of these last three layers is deeper than the one before it at its insertion. The proportions and amount of distinctness of the different parts of the pectoral vary infinitely and are seldom alike in two specimens of

the same animal; still, so far as our observations go, the four-layered muscle is the most generalized type and corresponds to the human three-layered pectoralis major and the pectoralis minor. The above description corresponds as closely as can be expected with Allen's *Procyon lotor* (XXVI.). *Procyon cancrivorus* (57) agrees with *P. lotor* except that β is inserted largely into the shoulder capsule, while δ was not distinguished. The Mustelidæ resemble

Fig. 7.



Pectoral muscles and panniculus of *Lutra vulgaris*.

the Procyonidæ in the feeble development of the pectoralis quartus (see fig. 7); in some animals, however, e. g. *Proteles* (25), this part is much more marked, rising from a considerable distance back along the linea alba and being connected by the panniculus to the latissimus dorsi in such a manner that the floor of the axilla is quite closed in by muscular fibres. In the Hyænidæ the muscle is very strong and is inserted into the whole length of the humerus: moreover it does not appear to be as broken up as in other Car-

nivora. In *Herpestes griseus* (24) some of the deeper fibres of the pectoral were continuous with the supraspinatus.

Trapezius.—The first part of the trapezius (clavo-cucullaris of Straus-Durckheim) is continuous with the clavicular part of the deltoid, forming the cephalo-humeral muscle. It rises from the curved line of the occiput and from the ligamentum nuchæ and is usually well developed in Carnivora, especially in the Hyænidæ. When it reaches the region of the rudimentary clavicle there is usually a tendinous intersection marking the line of demarcation between the trapezial and deltoid elements of the muscle; at this point it is usually joined by a part or the whole of the cleido-mastoid muscle. In some cases, e. g. *Procyon lotor* (53) and *Lutra vulgaris* (74), the clavicle is fairly developed, and in these only a few fibres are attached to the bone which lies deep to the aforesaid tendinous intersection[1]. Besides the union with the cleido-mastoid at the intersection, slips are often given to or received from the sterno-mastoid; this is most marked in *Lutra* (74), in which the two muscles are largely fused, and also in *Ictonyx* (70). The second part of the trapezius (acromio-cucullaris) is very constant; it rises from the ligamentum nuchæ and anterior thoracic spines and is inserted into the anterior lip of the spine of the scapula. At its insertion it is in close contact with the acromio-trachelian, and in *Viverricula malaccensis* (15) and to a less extent in *Canis familiaris* (31) the two muscles are fused here. In *Ictonyx zorilla* (69), *I. lybica* (70), *Nasua* (58), and *Cercoleptes* (61, 62) the posterior part of the origin of the acromio-cucullaris has no attachment to the thoracic spines, but is united to the muscle of the opposite side by a tendinous junction. The third part of the trapezius (dorso-cucullaris) rises from the posterior thoracic spines and is inserted into the base of the spine of the scapula. In *Cynælurus* (9) the second part, according to Ross, rose from the ligamentum nuchæ and 7th cervical spine, while the third part came from the anterior six thoracic spines. In some cases—e. g. *Genetta vulgaris* (18), *G. tigrina* (16 *a*), *Hyæna striata* (26), *Procyon lotor* (53), *Galictis vittata* (63), *Ictonyx zorilla* (69), *I. lybica* (70), and *Lutra vulgaris* (74)—the third is separated from the second part by a fibrous interval: in other cases the two parts are in close contact: though the arrangement does not seem to depend in any way on the relationship of the various animals, since *Procyon lotor* (53) has a separation, while in *P. cancrivorus* (57) the two parts are continuous. It may be noticed that in all Carnivora the second and third parts of the trapezius are feebly developed in comparison with the first; this is true even of the Hyænidæ, in which the neck and shoulder muscles are so very powerful.

Latissimus dorsi.—The latissimus dorsi rises from a large number

[1] The development of the clavicle seems to vary a good deal individually; we found it well marked in *Lutra vulgaris*, but Macalister did not notice it in *Lutra cinerea*. Perrin (XXIX.) found it in *Cercoleptes*, but in our specimen there was no trace. Possibly age is the explanation.

of the posterior thoracic spines, usually from the 4th or 5th to the last, from the lumbar aponeurosis, and sometimes from the last three ribs. No muscular fibres can be traced to the ilium. At its insertion it usually divides into two layers, the anterior of which unites with the dorso-lateral panniculus to be inserted deep to the pectoral into the pectoral ridge of the humerus; while the deep is more or less united with the tendon of the teres major, though it is seldom twisted round that tendon as it is in the Rodents and in Man. These two parts enclose the biceps. In *Cynælurus* (9), *Procyon* (53, 54), *Mustela putorius* (65), and *Lutra* (74) it rises from the last three ribs; in *Canis* (31) from the last two; in *Viverra civetta* (12), *Genetta* (18), *Proteles* (25), *Hyæna crocuta* (29), and *H. brunnea* (30) it has no attachment to the ribs. In the other animals, unfortunately, no record has been kept as to whether it rose from ribs or not. *Procyon cancrivorus* (57) is remarkable for having the muscle divided into an anterior and posterior part; the former, which is the larger, joins the teres major and gives off the dorso-epitrochlearis, while the latter joins the dorso-humeral panniculus and is inserted with it deep to the pectoral.

Dorso-epitrochlearis.—This muscle shows frequent variations in its size and attachments; its usual origin, as in most other animals, is from the latissimus dorsi just before the latter becomes tendinous; it then runs down the inner side of the triceps to be inserted into the inner side of the olecranon process as well as into the fascia of the forearm (see fig. 8, p. 390). It is supplied by the musculo-spiral nerve. In the Cat, Mivart (I.) describes two muscles which he calls external and internal, the former rising from the spine of the scapula, the latter from the surface of the latissimus dorsi; these unite before their insertion. Straus-Durckheim, in his work on the Cat (II.), only records the internal of these. In one specimen of *Paradoxurus* (19) the muscle rose from a sling over the axillary vessels reaching from the latissimus dorsi to the biceps. In *Ursus americanus* Shepherd (XX.) describes it as rising from the axillary border of the scapula as well as from the surface of the latissimus, and says that it receives slips from the panniculus and teres major. Macalister describes two muscles in *Galictis barbara* (IX.), but one of them is evidently a structure to which we shall have to call attention under the head of the triceps.

Rhomboids.—Instead of the rhomboideus major and minor of human anatomy we find in the Carnivora one plane of muscle rising from the curved line of the occipital bone and the ligamentum nuchæ, the rhomboideus anterior, and another rising from the spines of the anterior thoracic vertebræ, which it would be convenient to speak of as the rhomdoideus posterior. The insertion is into the vertebral border of the scapula. Occasionally the posterior edge of the r. anterior is continuous with the anterior edge of the posterior, but more often there is a distinct interval between them. It is usual for many writers to speak of only that part of the muscle which is attached to the skull as a rhomboideus

capitis; consequently when they state that this is absent the muscle may still rise from the whole length of the ligamentum nuchæ. Among the Felidæ the rhomboideus anterior is always present; this is the case in *F. leo* (1 *a*), *F. tigris* (3), *F. pardus* (4), *F. catus* (6), and *Cynælurus* (9). The Viverridæ are remarkable for the frequence with which the rhomboid sheet fails to reach the skull, due probably to the great distance which there is between the head and the shoulder-blades in many of these animals. In *Cryptoprocta* (10), *Viverra civetta* (12, 13, 14), *Viverricula malaccensis* (15), *Genetta tigrina* (16), *Genetta vulgaris* (18), and *Paradoxurus typus* (19) the rhomdoideus anterior never reached further forward than the level of the spine of the axis; another specimen of *Paradoxurus* (20) showed a fascial continuation of the muscle up to the occiput, while in *Herpestes nepalensis* (23) and *Herpestes griseus* (24) a definite occipital origin was noticed. *Proteles* (25) has no occipital origin for its rhomboids. Among the Hyænidæ the occipital origin was found in *H. striata* by Meckel (27), but not by Young (26) or Cuvier (28); it is also wanting in *H. crocuta* (29).

In the Canidæ there is an occipital origin in *Canis familiaris* (31, 32, 33, 37, 39) and *C. aureus* (41).

Among the Ursidæ the rhomboideus anterior is well developed and comes from the skull in *U. maritimus* (45), in two specimens of *U. americanus* (48, 52), and in *U. arctos* (47). In two other specimens of *U. americanus* (49, 50) the occipital portion was absent.

Among the Procyonidæ the occipital origin is well marked and the whole muscle forms one continuous sheet in *Procyon* (53, 54, 55, 56, 57), *Nasua* (58, 60, XXXIX.), and *Cercoleptes* (61).

In the Mustelidæ the portion of the rhomboid which rises from the occiput is always present and usually is a separate slip (see fig. 5, p. 381); this is the case in *Galictis vittata* (63), *Galictis barbara* (64), *Mustela putorius* (65), *Mustela foina* (66, 67), *Ictonyx zorilla* (69), *Ictonyx lybica* (70), *Meles taxus* (71, 72, 73), *Lutra vulgaris* (74, 79), and *Lutra cinerea* (78).

It is interesting to note that these Mustelidæ in which the gap between the occipital and cervical portions of the rhomboid sheet is so constant are equally remarkable for the constant presence of the rhomboideus profundus muscle. This muscle, as has already been stated, is fused with the rhomboid at its insertion, and by many authors is described as part of the rhomboid. We cannot help throwing out the suggestion, though we have no direct proof, that the gap in these animals between the occipital and nuchal portions of the muscle is caused by a sinking down of some of the fibres to acquire a new origin from the transverse process of the atlas, so that the rhomboideus profundus is a displaced portion of the rhomboid sheet.

To sum up, the rhomboid always seems to have an occipital origin in the Felidæ, Canidæ, Procyonidæ, and Mustelidæ. In the Viverridæ and Hyænidæ the occipital origin is the exception.

In the Ursidæ it is more often present than not. In the Mustelidæ it is not only present but is quite a separate slip.

Subclavius.—This is a very small muscle rising from the inner end of the first rib and inserted into the spicular clavicle. We have only records of it in *Viverra civetta* (12) and *Genetta* (16, 18). It never seems to occur outside the Viverridæ, though from its insignificance it might easily be overlooked. The claviculo-scapularis, which is such a distinguishing feature of Hystricomorphine Rodents (XLI.), is never found in Carnivora.

Levator anguli scapulæ and *Serratus magnus.*—These two muscles, as in Rodents, form one continuous plane rising from a large number of the posterior tubercles of the cervical transverse processes and from a large number of the anterior ribs (see fig. 6, p. 382). The latter origins interdigitate with the scalenus longus and the external oblique. Although the muscle forms one sheet it is well to emphasize the distinction between the two parts, since the levator anguli scapulæ is supplied by the cervical nerves and the serratus magnus by the posterior thoracic, or nerve of Bell. Meckel (XXXIX.) speaks of the levator anguli scapulæ as a separate muscle coming from the atlas in the Dog, Badger, Otter, and Marten. In the Dog we have no other records of any origin from the atlas and regard Meckel's specimen as a variation, but in the other three animals that which he describes as the levator anguli scapulæ is undoubtedly the rhomboideus profundus. The insertion of the combined muscles is into the dorsal or vertebral part of the subscapular fossa of the scapula, the attachment being much more strongly marked anteriorly than posteriorly.

The following table gives the exact origins in various animals :—

Felis leo (1 *a*)	2–7	C. V.	1–9 ribs.
„ *catus* (6)	3–7	„	1–10 „
„ „ (7)	3–7	„	1–10 „
Cynælurus jubatus (9)	?	„	1–10 „
Cryptoprocta ferox (10)	3–7	„	1–8 „
Viverra civetta (12)	2–7	„	1–8 „
„ „ (13)	4–7	„	1–7 „
„ „ (14)	3–7	„	1–8 „
Genetta tigrina (16)	4–7	„	1–9 „
„ „ (17)	2–7	„	1–6 „
„ *vulgaris* (18)	3–7	„	1–7 „
Herpestes griseus (24)	1–7	„	1–8 „
Proteles cristatus (25)	1–7	„	1–8 „
Hyæna striata (26)	3–7	„	1–8 „
„ „ (27)	2–7	„	1–8 „
„ „ (28)	2–7	„	1–8 „
„ *crocuta* (29)	3–7	„	1–8 „
Canis familiaris (31)	4–7	„	1–7 „
„ „ (39)	?	„	1–7 „
Ursus maritimus (45)	3–7	„	1–10 „
„ *americanus* (50)	2–7	„	1–10 „

Procyon lotor (53)	3–7 C. V.	1–7 ribs.
„ „ (54)	2–7 „	1–7 „
Nasua (XXXIX.)	1–7 „	1–9 „
Cercoleptes caudivolvus (61)..	2–7 „	1–8 „
„ „ (62)..	2–7 „	1–9 „
Galictis barbara (64)	4–7 „	1–8 „
Mustela putorius (65)	3–7 „	3 (?)–6 „
„ *foina* (66)	2–7 „	1–8 „
„ „ (67)	3–7 „	1–8 „
Ictonyx lybica (70)	3–7 „	1–8 „
Meles taxus (72)	3–7 „	1–8 „
Lutra vulgaris (74)	3–7 „	1–7 „
„ „ (76)	2–7 „	1–7 „
„ „ (79)	2–7 „	1–7 „
„ *cinerea* (78)	2–7 „	1–7 „

From this list it would appear that in the Felidæ and Ursidæ the costal attachment is most extensive, while in the Mustelidæ it is least so.

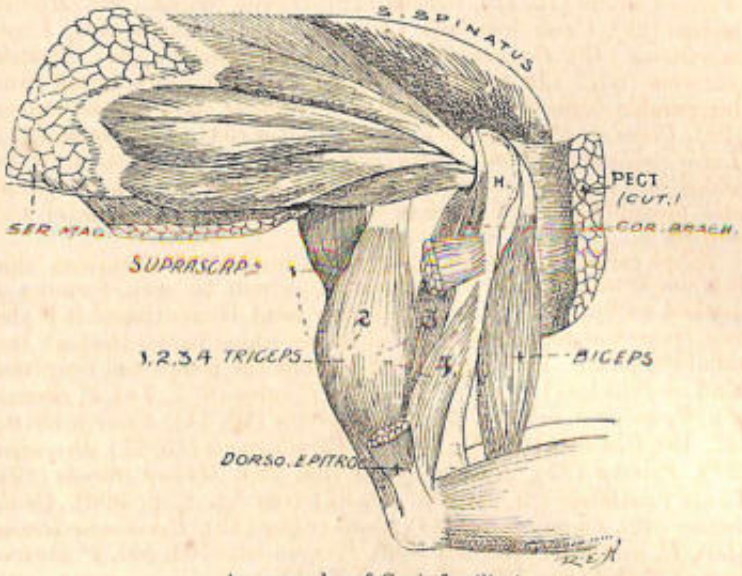
Deltoid.—This muscle consists of the usual three parts—clavicular, acromial, and spinous. The former blends with the ventral portion of the trapezius to form the cephalo-humeral or levator humeri, and is inserted into the lower half of the humerus or the bones of the forearm.

In the Felidæ the insertion seems to be into the forearm, at least this is the case in *F. leo* (1 *a*, 2) and *F. catus* (6). Among the Viverridæ the insertion is also into the forearm in *Cryptoprocta* (10), *V. civetta* (13), *Genetta* (17, 18), and *Herpestes* (24). In Young's specimen of *V. civetta* (VIII.) the muscle was inserted into the lower end of the humerus. In *Proteles* (25) the insertion is also into the forearm. Among the Hyænidæ the muscle is inserted into the humerus in *H. striata* (26) and *H. brunnea* (30), into the forearm in *H. striata* (28). Among the Canidæ it goes to the humerus in *Canis familiaris* (31), to the forearm in *Lycaon pictus* (44). In the Ursidæ its insertion is into the humerus in *U. maritimus* (45) and *U. americanus* (49, 52). Among the Procyonidæ it goes to the humerus in *P. lotor* (53, 54) and *Cercoleptes* (61). In the Mustelidæ it is also usually inserted into the humerus; this is the case in *Galictis barbara* (64), *Mustela putorius* (65), *M. foina* (67), *Ictonyx zorilla* (69), *Lutra vulgaris* (74, 79), and *Lutra cinerea* (78). In *Ictonyx lybica* (70) the insertion is into the lower end of the humerus as well as into the forearm bones.

From this it will be seen that in the Felidæ and Viverridæ the normal insertion of the first part of the deltoid or cephalo-humeral is into the forearm. In the Ursidæ, Procyonidæ, and Mustelidæ it is into the lower end of the humerus, while in the Canidæ and Hyænidæ it may go into either. The acromial and spinous parts of the deltoid are inserted into the middle of the humerus, the acromial lowest, the spinous just above and deep to it.

Supra- and *Infra-spinatus.*—These muscles always rise from the dorsal parts of their respective fossæ and are inserted into the great tuberosity of the humerus. The former muscle is usually the larger and considerably overlaps the cephalic border of the scapula (see fig. 8). In *Herpestes griseus* (24) some of its fibres are continued into the deep part of the pectoral. Macalister (IX.) found the supra-spinatus of *Viverra civetta* divided into two parts, prescapular and spinous, but this arrangement has not been recorded again.

Fig. 8.



Arm-muscles of *Canis familiaris.*

Subscapularis.—The subscapularis usually consists of four bundles, the anterior (cephalic) two of which are bipenniform, while the posterior (caudal) two contain parallel fibres. As they near their insertion into the lesser tuberosity of the humerus the most anterior bundle becomes superficial to the second, and this, in its turn, superficial to the third. The fourth or most posterior bundle is very distinct and rises from the axillary border of the scapula ventral to and continuous with the origin of the teres major, by whose nerve it is supplied. Haughton (XXI.) describes this part in the Black Bear as an infraspinatus secundus, but says that it may belong to the subscapularis (see fig. 8).

Teres major.—The teres major rises from the axillary border of the scapula in its dorsal third; as has been pointed out, its origin is continued towards the glenoid cavity by the fourth bundle of the subscapularis. It is inserted into the anterior surface of the

latissimus dorsi tendon and occasionally, as in the case of one specimen of *Ursus americanus* (49), *Viverricula malaccensis* (15), and *Nasua* (60), gives off the dorso-epitrochlearis.

Teres minor.—This muscle is sometimes very closely fused with the infraspinatus, sometimes fairly distinct. We are not inclined to lay any stress on this condition, since it varies in different specimens of the same animal; moreover, that which to one observer would be fairly distinct might be indistinct to another. Meckel (XXXIX.) says that the teres minor is absent as a distinct muscle in most Carnivora. In the following animals the muscle is described as distinct:—*Felis leo* (1), *F. catus* (6), *Cryptoprocta* (10), *Viverra civetta* (12, 13), *Genetta* (18), *Hyæna striata* (26), *Hyæna crocuta* (29), *Canis familiaris* (31, 39), *Lycaon pictus* (44), *Ursus maritimus* (45), *Procyon lotor* (53), *Galictis barbara* (64), *Mustela putorius* (65). In the following animals the teres minor was inseparable from the infraspinatus:—*Proteles* (25), *Hyæna striata* (28), *Ursus americanus* (49), *Procyon lotor* (54), *Cercoleptes* (61), *Lutra vulgaris* (74), and *Lutra cinerea* (78). To these must be added the animals on which Meckel founded his generalization and probably many of those in which no mention is made of the muscle.

Biceps cubiti.—In by far the greater number of Carnivora this is a single-headed muscle, the Ursidæ, as will be seen, forming a marked exception. When only one head is mentioned it is the one from the top of the glenoid cavity which passes through the shoulder-joint. In the following animals the biceps had only one head:—*Felis leo* (1, 1*a*), *F. tigris* (3), *F. catus* (6, 7, 7*a*), *F. caracal* (8), *Cynælurus jubatus* (9), *Cryptoprocta* (10, 11), *Viverra civetta* (12, 13), *Genetta* (16, 16*a*, 17, 18), *Paradoxurus* (19, 21), *Herpestes* (24), *Proteles* (25), *Hyæna striata* (26, 28), *Hyæna crocuta* (29), *Canis familiaris* (31, 34, 35, 36, 37) (see fig. 8, p. 390), *Canis aureus* (42), *Lycaon pictus* (44), *Canis vulpes* (42), *Ursus americanus* (50), *U. arctos* (47) (on left side), *Procyon lotor* (54, 55), *P. cancrivorus* (57), *Nasua* (58, 59, 60, XXXIX.), *Galictis vittata* (63), *Mustela putorius* (65), *M. foina* (66), *Ictonyx* (69, 70), *Meles taxus* (71, 72, 73), *Lutra vulgaris* (74, 76), *L. cinerea* (78). In describing the biceps of the Civet both Macalister (IX.) and Young (VIII.) speak of the single head as rising from the coracoid process. We found the same arrangement in *Herpestes* (24), but were convinced that this head corresponds not to the short but to the long one of human anatomy; our chief reason for this is that it passes through the shoulder-capsule and bicipital groove.

In the following animals a second head was found rising from the coracoid process with the coraco-brachialis: *Paradoxurus* (20), *Ursus maritimus* (45, 46), *Ursus arctos* (47) (on right side), *Ursus americanus* (48, 49, 52), *Procyon lotor* (53) (very feebly marked), *Cercoleptes* (61, 62). The insertion is, in most cases, into the radius only, though in the Hyænidæ it is described as going to the radius and ulna. As a rule, there is very little insertion into fascia, though Shepherd describes a strong bicipital fascia in

Ursus americanus (XX.), which is interesting, because that animal has a two-headed biceps and also because in the specimen of *Procyon lotor* dissected by us (53) the small coracoid head could be separated by a little tearing from the rest of the muscle and was found to end in the fascia of the forearm. So far as we are able to generalize from the material at our disposal, we should say that in the Carnivora a single-headed biceps inserted into the radius is the normal arrangement, but that the Ursidæ are characterized by a double-headed muscle, a condition that is approached by the nearly related Procyonidæ, e. g. *Procyon lotor* (53) and *Cercoleptes* (61, 62).

Coraco-brachialis.—This muscle usually rises by a small rounded tendon from the tip of the minute coracoid process; it soon becomes fleshy to be inserted into the humerus near its surgical neck, having passed above (over the cephalic border of) the latissimus dorsi tendon (see fig. 8, p. 390). This coraco-brachialis brevis or rotator humeri was the only part of the muscle seen in the following animals:—*Felis leo* (1, 1*a*), *F. tigris* (3), *F. pardus* (5), *F. catus* (6), *F. caracal* (8), *Cynælurus jubatus* (9), *Cryptoprocta* (10), *Viverra civetta* (12, 13, 14), *Genetta* (16), *Paradoxurus* (21), *Herpestes* (24), *Proteles* (25), *Hyæna striata* (26, 28), *H. crocuta* (29), *Canis familiaris* (31) (in four other dogs Macalister describes the coraco-brachialis as present, but does not say which parts; he would probably have made a note had there been anything more than the rotator humeri), *Canis aureus* (41), *Procyon lotor* (53, 54, 55), *P. cancrivorus* (57), *Nasua* (58, 59, 60, 60*a*), *Cercoleptes* (61), *Galictis vittata* (63). In Straus-Durckheim's cat a delicate tendon rose with the rotator humeri and passed down ventral to the latissimus dorsi to be inserted into the lower third of the humerus just above the supra-condylar foramen (II.). In four specimens of *Ursus americanus* (48, 49, 50, 52) a coraco-brachialis longus was present in addition to the rotator humeri; in one of these Shepherd (XX.) describes the long part of the muscle as being pierced by the musculo-cutaneous nerve, while, in another, Testut (XXIII.) mentions that the brevis was double. In a fifth specimen of the same animal Haughton (XXI.) describes the rotator humeri and then speaks of a coraco-brachialis accessorius, "which," he says, "is like the gemelli"; whatever may be the exact meaning of his description, it is evident that more than one part of the muscle was present in his case. Both *Ursus maritimus* (45) and *U. arctos* (47) resemble the rest of the Bears in having both the brevis and the longus. The Procyonidæ, as has been shown, usually have the normal carnivorous arrangement, but Perrin's specimen of *Cercoleptes* (62) differed from our own in having the bear-like double muscle. Among the Mustelidæ, *Galictis barbara* (64) and *Mustela foina* (67) are bear-like. In four specimens of *Lutra vulgaris* (74, 75, 76, 77) the muscle was entirely absent, while in a fifth described by Haughton (XXXIV.) no mention is made of it, though all the surrounding muscles are spoken of. In *Lutra cinerea* Macalister (XXXVII.) describes the brevis as being present on the left side but absent on the right. In two specimens of *Ictonyx*

(69, 70) the muscle was also absent, as was the case in *Mustela putorius*. In *Meles* (71, 72) the coraco-brachialis is a single muscle and is inserted into the middle third of the humerus, ventral to the insertion of the latissimus dorsi. Unfortunately no mention is made of the relation of the muscle to the musculo-cutaneous nerve, but it looks very much like the only instance of a coraco-brachialis medius which we have met with in Carnivora.

Brachialis anticus.—In its typical arrangement this muscle seems to consist of two parts: (1) a long head rising from the back of the surgical neck of the humerus and winding round the outer side of that bone to reach the front, forming in its passage the musculo-spiral groove; (2) a short head rising from the anterior border of the lower half of the humerus. These two heads are inserted together into the coronoid process of the ulna. In the Carnivora the long head is always present and is most constant in its attachments, while the short head we have not met with at all. We believe that the proper nerve-supply of the long head is the musculo-spiral and that of the short head the musculo-cutaneous; in two or three Carnivora, in which we have carefully looked for this point, we have only found a branch from the musculo-spiral, but further observation is necessary before a definite statement can be made.

Triceps.—This muscle shows a good deal of variation in the number of bundles into which the humeral portion is divided, though we are not inclined to regard these divisions as of any classificatory importance; as an example of this we may quote the case of the Racoon, of which we have three records. In the first of these (53) we were able with great ease to distinguish five heads, the external of human anatomy being double, while the part of the internal head which rose from the bridge of bone over the supracondylar foramen was separate. On comparing this with Allen's description (XXVI.) we find only four heads mentioned, the one from the supracondylar bridge not being distinct. In *Procyon cancrivorus* (57) only the three heads described in Man were noticed. The middle or long head, with one exception, is quite constant and usually rises from the glenoid half of the axillary border of the scapula. Among the Felidæ there are altogether five heads in *F. catus* (6). In the Viverridæ, *Cryptoprocta* is described as having four heads by Beddard (VII.), but in our own specimen we noticed an extra scapular head rising from the dorsal part of the scapular spine and from the fascia over the infraspinatus. In *Viverra civetta* (13) and *Herpestes* (24) four heads were seen, in two specimens of *Genetta* five (16) and four (18) respectively. In *Proteles* (25) Watson found five heads, one coming from the spine of the scapula and probably corresponding to the spinous head in *Cryptoprocta*. Among the Hyænidæ only three heads were seen in *H. striata* (26), but in *H. crocuta* (29) there were four, the external head being double. Among the Canidæ, we found five heads in *C. familiaris* (31), the long head being double (see fig. 8, p. 390); the same arrangement is figured by Cuvier and

Laurillard (XIX.). In the Ursidæ there are three heads in *U. maritimus* (45), four in *U. americanus* (49). Among the Procyonidæ, *Procyon* has already been alluded to. *Cercoleptes* (61) has four heads. The Mustelidæ are remarkable for having an extra head, rising from the angle of the scapula and joining the rest of the muscle in the lower part of the arm, to be inserted into the inner side of the olecranon. This head was noticed in *Galictis vittata* (63), *G. barbara*[1] (64), *Mustela putorius* (65), *M. foina* (66), *Ictonyx lybica* (70), *Meles taxus* (72), and *Lutra vulgaris* (74, 75, 76). The insertion of the triceps is into the upper internal and external surfaces of the olecranon process.

Anconeus.—This muscle is large and triangular and is always closely connected with the lower part of the triceps: its base rises from the back of the external condyle and supracondylar ridge, while the truncated apex is inserted into the outer side of the olecranon process. The muscle is evidently present in all the Carnivora, and only varies in size and in the degree of its fusion with the triceps.

Epitrochleo-anconeus (Anconeus internus).—The epitrochleo-anconeus is a most constant muscle in Carnivora. It is described by Gruber in a good many animals besides those in our list. It is a round muscle which passes from the back of the internal condyle to the inner side of the olecranon, lying superficial to the ulnar nerve by which it is supplied.

Pronator radii teres.—This muscle rises from in front of, and just above, the internal condyle and passes obliquely to the side of the radius farthest from the ulna. There is never any sign of a deep head. The position of the insertion of the muscle seems to be of some interest from a systematic point of view. In the Felidæ it is inserted about the middle of the radius in *F. leo* (1 *a*), *F. tigris* (3), and *F. catus* (6). In *Cynælurus*, Ross (IV.) describes it as reaching to within 2 inches of the lower end, and from its insertion a small tendinous prolongation extends to the palmar fascia. In the Viverridæ the insertion is rather variable; in *Cryptoprocta* (10), *Viverra civetta* (12), and *Hemigalea* (XI.) it goes to the lower half, while in *Viverra civetta* (13), *Genetta* (17, 18), and *Herpestes* (24) it goes to the middle. In *Proteles* (25) it is very small and is inserted about the middle. Among the Hyænidæ, *Hyæna striata* (26, 27, 28) and *H. crocuta* (29) closely resemble *Proteles*. In the Canidæ the muscle is small and is usually inserted above the middle of the radius; this is the case in *Canis familiaris* (31, 39), *C. aureus* (41), and *C. vulpes* (42), while in *Lycaon pictus* (44) it goes to the middle. In the Ursidæ we have records of three specimens of *Ursus americanus* (48, 49, 52) and one of *U. arctos* (47); in all of these the insertion was into the lower end of the radius. Among the Procyonidæ it went to the middle of the radius in three specimens of *Procyon* (53, 54, 57), but Meckel describes it as going to the lower end of the bone in that animal (XXXIX.).

[1] *Vide* description of Dorso-epitrochlearis on p. 386.

In *Nasua* (58, 60, 60 *a*) and *Cercoleptes* (61) it also goes to the lower end. In the Mustelidæ the usual insertion is into the lower end of the bone; at least this is the case in *Galictis barbara* (64), *Ictonyx zorilla* (69), *I. libyca* (70), *Meles taxus* (72), and *Lutra vulgaris* (74, 75, 76): on the other hand, it is attached to the middle in *Mustela putorius* (65), *M. foina* (66), and *Lutra cinerea* (78).

It will thus be seen that in the Felidæ, Viverridæ, Hyænidæ, and Canidæ the insertion of the pronator radii teres is usually into the middle of the radius or, in the Canidæ, above that point, while in the Ursidæ, Procyonidæ, and Mustelidæ its insertion is more often into the lower end.

Flexor carpi radialis.—This muscle, as usual in Mammals, is very constant; it rises from the internal condyle and is inserted into the base of the second metacarpal bone. The following are the only variations with which we have met in its attachments. In *Cynælurus* (9) Ross (IV.) describes slips to the styloid process of the radius and to the trapezium. In *Ursus americanus* (50), Testut (XXIII.) found it ending in the scapholunar. In *Ursus arctos* (47), Meckel (XXXIX.) notices its insertion into the 1st and 2nd metacarpal bones.

Palmaris longus.—The palmaris longus in Carnivora is sometimes double; when this happens we shall speak of an externus and internus. The former is the more constant and is closely connected with the flexor sublimis digitorum at its origin; it spreads out in the palm to form the palmar fascia, and often has definite tendons running to the vaginal sheaths of the proximal phalanges. The palmaris longus internus appears to be a delamination from the flexor carpi ulnaris, and ends in the fascia over the pisiform bone.

Among the Felidæ the externus alone is present. In *Felis tigris* (3) it ends in five definite tendons, one for each digit. In *F. leo* (1) and *F. pardus* (4) Macalister describes a palmaris accessorius which rises from the main tendon a little above the wrist and is inserted into the pads over the 4th and 5th digits; we find a similar muscle figured in Cuvier and Laurillard's plate of the lion's manus (V.), and in our opinion it is the same thing that we describe later under the name of flexor brevis digitorum manûs.

Among the Viverridæ the externus and internus were present in *Cryptoprocta* (10), *Genetta* (18) (see fig. 9, p. 396), and *Viverra civetta* (12). In *Herpestes* (24) (see fig. 10, p. 404), *V. civetta* (14), and *Paradoxurus* (21) the externus alone was present, while in *V. civetta* (13) and *Genetta* (17) the internus was the only part found.

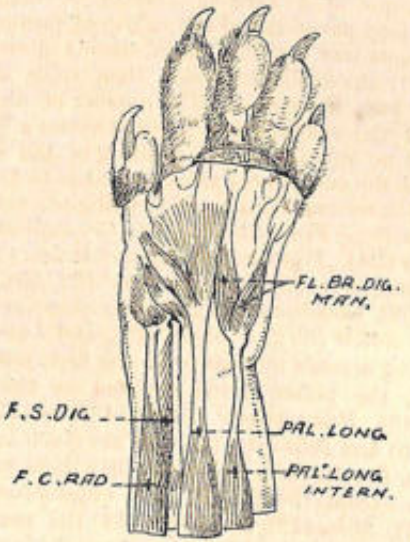
In *Proteles* (25) the externus is distinct from the flexor sublimis digitorum, and there is no internus.

Among the Hyænidæ the arrangement is the same in *Hyæna striata* (26, 28) and *H. crocuta* (29), but in Meckel's specimen of the former animal (27) the muscle was closely blended with the flexor sublimis digitorum.

In the Canidæ we have records of seven specimens of *Canis familiaris*; in four of these the muscle is absent altogether (31,

35, 36, XLIV.), in one (34) a trace was found, while in the remaining two (37, 39) the externus was fairly well developed. In *C. aureus* (41) it was absent, but was found in *C. lagopus* (42). Among the Ursidæ we have records of five specimens: in three of these (46, 51, 52) the external muscle was present, though closely connected with the flexor sublimis; in two (48, 49) it was absent altogether. In the Procyonidæ there are four records of *Procyon*, in three of which (53, 54, 57) both the externus and internus were present; in the other (55) only the externus was found. In *Nasua* (60) the palmaris longus is large, but there is apparently no

Fig. 9.



Manus of *Genetta vulgaris*, showing double palmaris longus and fl. br. dig. manûs.

internus. In two specimens of *Cercoleptes* (61, 62) both externus and internus were present, and it was noticed that the latter was in close connection with the flexor carpi ulnaris and was supplied by the ulnar nerve. Among the Mustelidæ the internus alone is present in *Galictis barbara* (64), while in *Mustela putorius* (65), *M. foina* (66), *Ictonyx zorilla* (69), *I. libyca* (70), and four specimens of *Lutra vulgaris* (74, 75, 76, 79) a large externus alone was found. In *Lutra cinerea* (78) both externus and internus were present, the latter being regarded by Macalister as part of the flexor carpi ulnaris. The summing up of the above results is as follows:—The Felidæ and Hyænidæ always have a palmaris longus externus only. The Mustelidæ usually have the same arrangement. The Viverridæ are very variable. In the Canidæ the palmaris longus

is usually absent altogether. In the Ursidæ it is often so. In the Procyonidæ both p. l. externus and internus are usually present.

Flexor sublimis digitorum.—In looking through the literature of carnivorous myology one finds this muscle sometimes described as rising from the internal condyle and giving slips to the flexor profundus, at other times as coming off from the surface of the profundus itself. The method of description seems to depend chiefly on whether the flexor sublimis exceeds in size the condylar origins of the profundus or *vice versâ*. The description which seems to us most applicable to the whole order is that the sublimis rises in common with the condylo-ulnaris head of the profundus from the internal condyle. The insertion is, as usual, into the middle phalanges of a variable number of digits; before its attachment a loop passes round the subjacent profundus tendon in exactly the same way that has been already noticed in Rodents (XLI. p. 266); the sublimis tendon then splits and allows the profundus to pass through it. The number of digits into which the tendons of the sublimis are inserted varies a good deal, and seems to bear no relation to the position of the animals in the order. By far the commonest arrangement is to find the tendons inserted into the second, third, and fourth digits; this occurs in the following animals:—*Viverra civetta* (12), *Cryptoprocta* (11), *Genetta* (17), *Herpestes* (24), *Proteles* (25), *Hyæna striata* (27), *H. crocuta* (29), *Canis familiaris* (39), *Procyon lotor* (53, 55), *P. cancrivorus* (57), *Nasua* (60), *Cercoleptes* (61), *Mustela putorius* (65), *M. foina* (66), *Ictonyx zorilla* (69), *I. libyca* (70), and *Lutra cinerea* (78). In the following animals tendons go to the first, second, third, and fourth digits, the pollex being counted as the first; *Ursus americanus* (48), *Procyon lotor* (54), and *Nasua* (58). In *Ursus americanus* (49) and *Felis catus* (6) slips are given to all five digits. In *Lutra* (76), *Genetta* (16), and *Canis* (31) there were tendons to all the digits except the thumb. In *Cryptoprocta* (10), *Ursus maritimus* (45), *Meles* (72), and *Lutra* (74) the muscle only gave off two tendons to the third and fourth digits respectively. In *Hyæna striata* (26) tendons passed to the third, fourth, and fifth digits.

Flexor carpi ulnaris.—This muscle consists of two parts, condylo-pisiform and olecrano-pisiform, the former rising from the internal condyle, the latter from the olecranon process. In certain cases these two heads are quite distinct from their origin to their insertion, but more usually they unite in the forearm, leaving a gap for the ulnar nerve to pass between them as in Man. Laurillard (XXII.) has suggested that possibly the double arrangement is characteristic of young animals, the single of older ones, but we have not come across any facts which bear out this theory. Among the Felidæ the two parts join in the upper part of the forearm in *Felis catus* (6), while in *F. leo* (1) (æt. 8 years) and *F. tigris* (3) they unite in the lower quarter. In the Viverridæ the two parts remained distinct until their insertion in Macalister's and Devis's specimens of *Viverra civetta* (13, 14), in *Cryptoprocta*

(10), and *Genetta* (17), but they fused high up in the forearm in *Viverra civetta* (12), in *Genetta* (18), *Herpestes* (24), and *Proteles* (25). Among the Hyænidæ the head from the olecranon was absent in *H. striata* (27) and *H. crocuta* (29), but in *H. striata* (26) both heads were present and joined high up. Among the Canidæ we have records of the dissection of this muscle in six specimens of *C. familiaris* (31, 32, 34, 36, 37, 39), in one of *C. aureus* (41), in *C. lagopus* (42), and in *Lycaon pictus* (44). In all these nine animals the two parts were distinct. Among the Ursidæ we unfortunately have records of only two specimens (49, 52), but in both of these the muscle was double. In the Procyonidæ the two heads are distinct in *Procyon lotor* according to Allen (54), but united in our experience (53). In *Nasua* (60) and *Cercoleptes* (61) they are fused. Among the Mustelidæ the two parts unite high up in *Mustela putorius* (65) and *Ictonyx* (70). In *Lutra vulgaris* (76) they join about the middle of the forearm, while in *L. cinerea* (78) and *Meles* (71, 72) they remain distinct. The insertion of both parts is usually into the pisiform bone, but in *H. striata* (26) expansions are continued to the four metacarpals, while in Testut's specimen of *Ursus americanus* (50) the tendon passed the pisiform and was inserted into the fifth metacarpal. Both bellies of the flexor carpi ulnaris are supplied by the ulnar nerve.

Flexor profundus digitorum.—In a former paper (XLV.) one of the authors has described this muscle as consisting of five primary parts, condylo-radialis, condylo-ulnaris, centralis, radialis, and ulnaris; so that when the typical arrangement is present there are three origins from the internal condyle as well as one each from the radius and ulna. It is difficult to be quite sure in all cases which of these parts were really present, since different authors have adopted different methods of description, but in most instances the arrangement is evident enough. Among the Felidæ all the heads are present in *F. catus* (6, XLV.). In the Viverridæ all five origins are present in *Cryptoprocta* (10), *Genetta* (16, 16 *a*, 18), *Paradoxurus* (19, 20), *Viverricula malaccensis* (15), and *Cynictis penicillata* (XLV.), while in *Herpestes nepalensis* (23), *H. griseus* (24), and *Viverra civetta* (13) the centralis was absent. In all these animals there is a slip to the pollex as well as to the other four digits. In the Hyænidæ it is not possible to say which elements of the muscle were present. In *Hyæna striata* (26) Young found no slip to the pollex, though Meckel describes a small one in his specimen of the same animal (27); in *H. crocuta* (29) the pollex slip was also absent. It is interesting to notice that, so far as the pollex tendon goes, *Proteles* (25) agrees with the Viverridæ rather than with the Hyænidæ. Among the Canidæ, Windle found all the heads present and distinct in the dog (XLV.). In Cuvier and Laurillard's dog (39) the centralis is apparently wanting. In another dog which we dissected (31) the condylar heads were fused into one broad origin from the internal condyle, though we are inclined to think that the centralis was not combined with

this. Krause[1] also does not notice the centralis in the dog. Among the Ursidæ, Windle notices the absence of the condylo-ulnaris in *Ursus americanus* (48), while in two other specimens of the same animal (49, 52) only one condylar origin is described. In the Procyonidæ all five heads were found in *Procyon lotor* (53), *P. cancrivorus* (57), *Nasua rufa* (XLV.), and *Cercoleptes* (61). In Perrin's specimen of *Ceroleptes* (62) the centralis was not noticed. In the Mustelidæ all five heads were present in *Mustela putorius* (XLV.), *Ictonyx zorilla* (69), *Meles* (XLV.), *Lutra vulgaris* (XLV., 74), and *L. cinerea* (78), while in *Galictis vittata* (63) and, apparently, *M. putorius* (65) the centralis was absent[2].

From the foregoing details it will be seen that in the Carnivora it is usual to find all five origins of the flexor profundus digitorum, that the condylo-centralis is the part most frequently missing, and, after that, the condylo-ulnaris. The two specimens of Hyænidæ were the only animals in which the muscle did not send slips to all five digits.

Lumbricales.—As a rule there are four of these muscles, but when there are less it seems that the one on the radial side disappears first and the ulnar one next. In the following animals four muscles were found:—*Felis catus* (6), *Viverra civetta* (12), *Genetta* (16), *Herpestes* (24), *Hyæna striata* (27), *H. crocuta* (29), *Ursus maritimus* (45), *U. americanus* (49), *Procyon lotor* (53), *Nasua* (60), *Cercoleptes* (61), *Meles* (71, 72), and *Lutra* (76). In the following there were three lumbricales:—*V. civetta* (13) (ulnar one absent), *Proteles* (25), *Canis familiaris* (31) (radial absent), *Mustela putorius* (65) (radial absent), *Lutra vulgaris* (79) (radial absent), and *L. cinerea* (78) (radial absent). In *Hyæna striata* (26) and *Ictonyx libyca* (70) only the two middle lumbricales were present.

Pronator quadratus.—This muscle is always present in the Carnivora and is usually of considerable thickness when cut through. The part nearest the carpus is always the thickest, strongest, and most persistent. The muscle may extend for the whole length of the bones or may only occupy a fraction of them at their carpal ends. Among the Felidæ the pronator quadratus almost always occupies the lower half of the forearm; this is the case in *Felis leo* (1), *F. tigris* (3, XXIII.), *F. pardus* (4), and *F. catus* (6). In *Cynælurus* (9), however, it seems to occupy rather more than half. In the Viverridæ the muscle is very variable. In *Cryptoprocta* (10) it is attached to the lower $\frac{2}{3}$. In *Herpestes nepalensis* (23), *H. griseus* (24), one specimen of *Paradoxurus* (19), and *Viverricula malaccensis* (15) it is present in the lower half; in *Genetta* (16), *Viverra civetta* (12), and the second specimen of *Paradoxurus* (20) in the lower third; in *V. civetta* (13) in the lower quarter. In *Hemigalea* Mivart (XI.) describes

[1] 'Anat. des Kaninchens.'

[2] It should, however, be borne in mind that the centralis is very easily overlooked.

it as being very large, and says that it is inserted into the plate-like process of the radius. In *Proteles* (25) it resembles the same muscle in the Hyænidæ and is attached to the whole length of the bones. Among the Hyænidæ it occupies the whole length of the forearm in *Hyæna striata* (26, 27) and *H. crocuta* (29). In the Canidæ all writers agree in saying that the pronator quadratus of the dog occupies the whole length of the forearm, and we have verified the statement (31). The same arrangement is found in *Canis aureus* (41), *C. vulpes* (42, XXIII.), *C. lupus* (XXIII.), and *Lycaon pictus* (44). Among the Ursidæ the muscle only occupies the lower third of the forearm in *Ursus arctos* (47) and *U. americanus* (48, 49, 50, 51). In the Procyonidæ it was found in the lower two-thirds in *Procyon lotor* (53) and *P. cancrivorus* (57), but Allen (XXVI.) describes it as occupying half the forearm in the former animal (54). In *Nasua* (58, 60 *a*) and *Cercoleptes* (61) it was only present in the lower third, though Perrin (XXIX.) describes it as taking up the lower two-thirds in the latter. Among the Mustelidæ the muscle occupies the whole forearm in *Mustela putorius* (65); the lower half in *Galictis vittata* (63), *Lutra cinerea* (78), and *L. vulgaris* (74); the lower third in *Meles* (71) and *Ictonyx* (70). From the foregoing it will be seen that in the Felidæ the pronator quadratus is attached to the lower half of the ulna and radius, in the Canidæ and Hyænidæ to the whole length, in the Ursidæ to the lower third, while in the Viverridæ, Procyonidæ, and Mustelidæ it is variable.

Supinator longus.—This muscle rises from the external supracondylar ridge of the humerus for a variable extent, in some cases reaching as high up as the surgical neck; it is inserted into the radial side of the lower end of the radius. Among the Felidæ it is present in *Felis leo* (1), *F. tigris* (3), *F. pardus* (4, XXXIX.), *F. catus* (domestic) (6, 7, 7 *a*), *F. catus* (wild) (XXXIX.), but in *Cynælurus* (9) it was not found. In the Viverridæ it was found in *Cryptoprocta* (10), *Viverra civetta* (12, 13), *V. malaccensis* (15), *Genetta tigrina* (16), where it sends an expansion to the dorsal carpal ligaments, *G. tigrina* (17), *Paradoxurus typus* (19, 20), *Herpestes nepalensis* (23), and *H. griseus* (24). In *Hemigalea* (XI.) it is also present and is attached to the plate-like process of the radius. In *Proteles* (25) it is absent. Among the Hyænidæ it is absent in *H. striata* (26, 27, 28), and is a mere vestige in *H. crocuta* (29). With regard to the Canidæ we have had some little difficulty in following the accounts of other writers. The muscle is certainly absent in the following four dogs: 31, 34, 36, 38. In one specimen (37) it was absent on the left, rudimentary on the right. In another specimen (35) it only weighed 1·07 grs., and must therefore have been very feebly marked.

In a dog described by Haughton (32) the muscle is said to be present, but he states that there is only one extensor carpi radialis, which is inserted into the little and ring fingers; in this case we cannot help suspecting that the muscle described by him as supinator longus was really the other extensor carpi radialis. In *Lycaon*

pictus (44) Pagenstecher says that the "supinator brevis is absent, as in the cat and dog"; in this instance supinator longus, not brevis, must surely have been meant. There can, we think, be little doubt that in the Canidæ the muscle is usually absent. In the Ursidæ the supinator longus is very constantly present; it is so in four specimens of *Ursus americanus* (48, 49, 51, 52), and one of *U. maritimus* (45), of which we have records. In the Procyonidæ it is present in three specimens of *Procyon lotor* (53, 54, 55), in *Nasua* (60), and *Cercoleptes* (61). Among the Mustelidæ it is present in *Galictis vittata* (63), *G. barbara* (64), *Mustela putorius* (65), *M. foina* (66), *Ictonyx libyca* (70), and *Meles taxus* (71, 72). In four specimens of *Lutra vulgaris* the muscle was found to rise from the humerus as far up as the neck (74, 75, 76, 77); it was also present in *L. cinerea* (78).

To sum up, the supinator longus is present in the Felidæ with the exception of *Cynælurus*, the Viverridæ, the Ursidæ, the Procyonidæ, and the Mustelidæ. It is usually absent in the Hyænidæ with which *Proteles* agrees, and in the Canidæ.

Extensor carpi radialis longior and *brevior*.—The point on which the greatest stress is laid in descriptions of these muscles is as to whether they are completely separate or more or less blended at their origin. We are not inclined to pay much attention to this distinction, since it has frequently been our lot to find muscles, apparently inseparable, separate easily with a little traction. The origins of the muscles are the same as those described in human anatomy, the longior rising from the supracondylar ridge, the brevior from the condyle. The insertions are respectively into the shafts of the metatarsal bones of the second and third digits. The following are the only variations with which we have met:—In *Hyæna striata* (26, 27) the two tendons are united by a transverse band about the level of the wrist. In *Lutra cinerea* the extensor carpi radialis longior divides, and one part is inserted on each side of the base of the second metacarpal, the inner one being connected by a transverse slip with the tendon of the extensor carpi radialis brevior.

Extensor communis digitorum.—This muscle rises from the back of the external condyle, and is inserted into the middle and distal phalanges of the second, third, fourth, and fifth digits; on the dorsum of the hand the tendons are connected by broad, thin vincula. This insertion is most constant in all the Carnivora, the only exceptions with which we have met being a dog (32) dissected by Haughton, where the tendons are described as going chiefly to the fourth and fifth digits, and our own specimen of *Herpestes* (24), where the slip to the fifth digit was wanting.

Extensor minimi digiti.—This muscle rises from the external condyle and, in the dorsum of the hand, usually divides into three tendons which pass to the medius, annularis, and minimus, uniting on the backs of the digits with the expansions of the extensor communis. In the following animals tendons to these three digits were present:—*Felis tigris* (3), *F. catus* (6), *Cryptoprocta* (10, 11), *Viverra*

civetta (12, 13), *Genetta* (16), *Herpestes* (22, 24), *Canis familiaris* (31, 38, 39), *Ursus arctos* (47), *U. americanus* (48, 49, 51, 52), *U. maritimus* (45), *Procyon lotor* (53), *P. cancrivorus* (57), *Nasua* (60, 60 *a*), *Cercoleptes* (61), *Galictis vittata* (63), *Mustela putorius* (65), *M. foina* (66, 67), *Meles* (71, 72, 73), and *Lutra* (74, 75, 76, 77, 78, 79). In the following animals tendons were only supplied to the annularis and minimus:—*Felis leo* (1), in which the extensor minimi and the extensor quarti digiti are separate muscles and lie in distinct sheaths, *Genettta* (17), *Herpestes* (23), *Proteles* (25), *Hyæna striata* (26), *H. crocuta* (29), and *Canis aureus* (41). In *Ictonyx libyca* (70) two tendons were found, but these went to the medius and annularis. In *Cynælurus* (9) Ross describes only one tendon to the second phalanx of the fifth digit, but he says that there is also an "extensor minimi digiti tertii" rising from the upper fifth of the radius and passing through a separate sheath of the annular ligament to the 1st phalanx of the minimus (IV.).

Extensor carpi ulnaris.—This muscle has the human attachments and is extremely constant. The only point of interest which we have come across is that Meckel (XXXIX.) describes it as double in the White Bear; it must be borne in mind, however, that in the Bears the flexor carpi ulnaris is double, so that there may be some confusion between the two muscles.

Supinator brevis.—This consists, as in most mammals below the Primates, of one layer, which lies superficial to the posterior interosseous nerve; it rises from the orbicular and external lateral ligament, and in some cases reaches as high as the external condyle. It is inserted into the outer side of the radius, reaching a greater distance in some animals than in others. In the Felidæ our records of this muscle are very scanty, but it seems usually to occupy the upper third of the forearm. In the Viverridæ it occupies the upper third in *Cryptoprocta* (10) and *Genetta* (18); in *Viverra civetta* (12, 13) it is merely described as well marked, while in *Herpestes* (22, 24) it was found in the upper two-thirds of the forearm. In the Hyænidæ it seems to be only slightly developed (26, 28, 29), and Watson (XIII.) does not mention it at all in his description of *Proteles*. In the Canidæ, Meckel (XXXIX.) describes it as occupying the upper half of the forearm, but in other specimens (31, 39) it did not extend so far down. The Ursidæ are remarkable for the great development of the supinator brevis; in *Ursus maritimus* (45) it reaches to within $1\frac{1}{2}$ inches of the lower end of the radius, while in *U. americanus* (48, 49, 52) it occupies the upper two-thirds to three-quarters. Among the Procyonidæ it covered the upper half of the radius in *Procyon lotor* (53, 56) and *Nasua* (60), the upper third in *P. lotor* (54) and *Cercoleptes* (61). Allen (XXVI.) describes it as being pierced by the posterior muscular branch of the musculo-spiral nerve (posterior interosseous?), an arrangement which was not present in our specimen of *Procyon* and which we have never seen in any other Carnivore. In the Mustelidæ the length of the muscle varies. Macalister describes it as well marked in *Galictis barbara*

(64), while in *Mustela putorius* (65) and *Lutra* (74, 77, 78) it reaches as low as the third quarter. In *Meles* (72, 73), however, it only goes as far as the middle of the radius.

Extensor ossis metacarpi pollicis.—This muscle is always present in Carnivora and is constant in its attachments; it rises from the dorsal surfaces of the radius and ulna, especially the latter, and is inserted into the base of the metacarpal bone of the pollex and often into the radial sesamoid bone near it. In *Procyon lotor* (53) and *Galictis barbara* (64) slips were given to the trapezium. In the former animal and in *Viverra civetta* (12) the highest fibres rose as far up as the olecranon.

Extensor digitorum profundus.—Instead of describing the extensor secundi internodii pollicis and extensor indicis as two separate muscles, we have found it more convenient to follow the example set in Bronn's 'Thierreich'[1] and to speak of them under the above heading. We do not propose to include the extensor ossis metacarpi pollicis with the other two, as it is not an extensor of a digit but of a metacarpal bone. The extensor primi internodii we have never seen in the Carnivora. The origin of the extensor profundus is from the dorsal surface of the ulna, below that of the extensor ossis metacarpi pollicis, as well as, sometimes, from the dorsal surface of the radius. In the Felidæ the muscle goes to the pollex and index as a rule; this is the case in *Felis leo* (1), *F. tigris* (3), *F. pardus* (4), and *F. catus* (6). In *Cynælurus* (9), however, no slip goes to the index. Among the Viverridæ the insertion is very constant and is the same as it is in most of the Felidæ: *Cryptoprocta* (10), *Viverra civetta* (12, 13), *Viverricula malaccensis* (15), *Genetta* (16), *Paradoxurus* (19, 20), and *Herpestes* (24). In *Proteles* (25) it is inserted into the third digit only. Among the Hyænidæ there is no tendon for the aborted pollex; in *Hyæna striata* the muscle went to the third digit only in Meckel's specimen (27), to the second and third in Cuvier and Laurillard's (28), and to the second, third, and fourth in Young's (26). In *H. crocuta* it went to the second only. The Canidæ resemble the Hyænidæ in the feebleness of the slip to the pollex. Out of three specimens of *Canis familiaris* it went to the first and second in one (37); to the second, with a very feeble slip to the pollex, in another (31); and to the second digit only in a third (39). In *C. aureus* (41) Macalister found an extensor secundi internodii, but no extensor indicis, while in *C. lagopus* (42) a very feeble extensor indicis alone was present. Among the Ursidæ, Windle and Shepherd found no index slip in *Ursus americanus* (48, 49), but in Cuvier and Laurillard's specimen (52) it went to the pollex and index. In *U. arctos* (47) and *U. maritimus* (45) it had the same insertion. Among the Procyonidæ the muscle is more constant; it goes to the first and second digits in *Procyon lotor* (53), *P. cancrivorus* (57), *Nasua* (60, 60 *a*) (in the former (60) the two muscles were quite distinct as far as their origin), and in *Cercoleptes* (61). In two other specimens of *P. lotor* (54, 56) the insertion was into the pollex, index, and

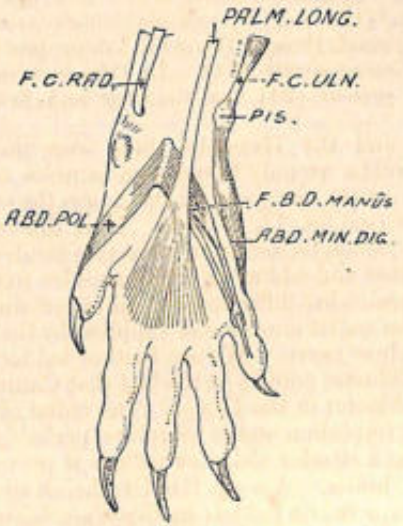
[1] Sechster Band, V. Abtheilung, 37–39 Lieferung, p. 816.

medius. Among the Mustelidæ the muscle is very constant, being inserted into the first and second digits in *Galictis vittata* (63), *Mustela putorius* (65), *M. foina* (66), *Ictonyx zorilla* (69), *I. libyca* (70), *Meles* (71), *Lutra vulgaris* (74, 76), and *L. cinerea* (78). In Haughton's specimen of *L. vulgaris* (79) the insertion was into the second and third digits.

Muscles of the Hand.

Flexor brevis digitorum manûs.—When this muscle is present in the Carnivora it rises from the annular ligament, pisiform bone, and palmar fascia, and occasionally from the lower part of the palmaris longus tendon. It is inserted into the vaginal sheath of the minimus, or, if it is more fully developed, forms the flexor perforatus of that digit. Among the Felidæ the muscle was

Fig. 10.



Manus of *Herpestes griseus*, showing single fl. br. dig. manûs.

present in *F. leo* (1 *a*), and apparently in Macalister's specimens of *Felis leo* (1) and *F. pardus* (4), though in these it went to the fourth and fifth digits. In the Viverridæ it was present and formed the flexor perforatus tendon to the minimus in *Viverra civetta* (12), *Herpestes* (24) (see fig. 10), and *Genetta* (17). In *V. civetta* (14) and *Genetta* (18) it ended in the vaginal sheath, and, in the latter animal, went to the fourth and fifth digits (see fig. 9, p. 396). Among the Hyænidæ it was present in *Hyæna crocuta* (29), but not in *H. striata* (26, 28). We have no records of it among the Canidæ or Ursidæ, and it was certainly absent in our specimen of *Canis familiaris* (31). In the Procyonidæ it seems very constant; it is present in *Procyon lotor*

(53, 54, 55) and *P. cancrivorus* (57). In *Nasua* (60) it is figured by Cuvier and Laurillard, and, in all these animals, seems to end in the sheaths of the tendons. In *Cercoleptes* (61, 62) it forms the flexor perforatus of the little finger. In the Mustelidæ it seems to be usually absent, or at all events very feebly marked: the only record we have of it in this family is in *Mustela putorius*.

Palmaris brevis.—The palmaris brevis is apparently never present in Carnivora.

Thenar Muscles.—This group consists of the abductor, flexor brevis, and opponens of human anatomy. Among the Felidæ the only record we have is of the Cat (6), in which the abductor rises from the trapezium and annular ligament; the usual double-headed flexor brevis is present, and the opponens very small. From our experience of the rest of the muscles of the Felidæ we presume that the other animals of the family closely resemble the Cat in their thenar muscles. In the Viverridæ, we found a weak abductor and a well-marked flexor brevis in *Cryptoprocta* (10). In *Viverra civetta* (12) and *Viverricula malaccensis* (15) the same muscles were found, though Devis (X.) describes an opponens in addition in *Viverra civetta* (14). In *Paradoxurus typus* (19, 20) and *Herpestes griseus* (24) the abductor and flexor brevis alone were found.

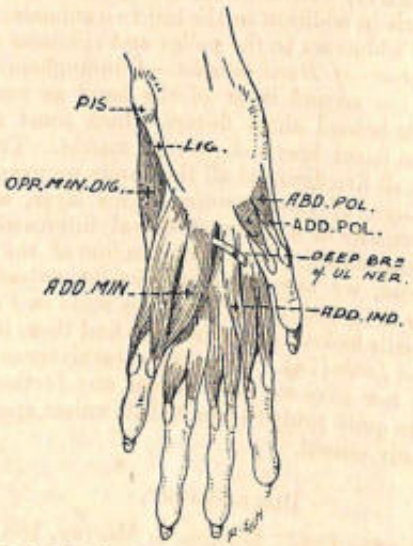
In *Proteles* and the Hyænidæ there were no thumb-muscles. Among the Canidæ we only found two muscles of the thumb in *Canis familiaris* (31), one going to the inner, the other to the outer sesamoid bone (see fig. 11, p. 406). It is difficult to determine whether these should be looked upon as two heads of a flexor brevis or as an abductor and adductor. The muscles were small and the nerve-supply somewhat difficult to be quite certain of, but we are of opinion that the radial muscle was supplied by the median, and the ulnar by the ulnar nerve. We are further led to regard the latter muscle as an adductor pollicis by the fact that Cunningham (XLVI.) describes an adductor in the Dingo. The radial of the two muscles rises from the trapezium and is therefore probably an abductor, so that in the Dog a slender abductor pollicis is present, but no opponens or flexor brevis. Among the Ursidæ, Kelley (XXIV.) only mentions a flexor brevis pollicis in *Ursus maritimus* (45). Meckel (XXXIX.) describes the thenar muscles as very strong in *U. arctos* (47), the abductor in his specimen had two origins, from the trapezium and base of the first metacarpal; there was in addition a flexor brevis. In *U. americanus* (49) there were also abductor, flexor brevis, and opponens. Among the Procyonidæ, *P. lotor* (53, 56) has an abductor and flexor brevis, while *P. cancrivorus* (57) has a small opponens besides. *Cercoleptes* (61, 62) has an abductor, flexor brevis, and small opponens. Among the Mustelidæ, Alix (XXX.) describes a superficial and deep abductor pollicis in *M. putorius* (65); probably these correspond to our abductor and flexor brevis. In *M. foina* (66) the same two muscles exist, as they do also in *Ictonyx* (69, 70) and *Lutra vulgaris* (74). In *Lutra cinerea* (78) a small opponens was found by Macalister.

Summing up the above results, we find that in the Hyænidæ and *Proteles* the short thumb-muscles are absent, in the Canidæ they are ill-developed, while in the other families there is usually an abductor and flexor brevis, but occasionally a small opponens may be developed.

Hypothenar Muscles.—The minimus has, in all cases, a double flexor brevis, as have the other digits; there is also an abductor minimi, which rises from the pisiform and is inserted into the inner sesamoid bone on the palmar surface of the head of the fifth metacarpal. Shepherd (XX.) describes an opponens minimi in *Ursus americanus* (49). Macalister (IX.) mentions two abductors of the little finger in *Viverra civetta* (13), while in *Lutra cinerea* (78) he found the usual abductor of that finger in two layers, as well as an additional one from the unciform. In our specimen of *Canis familiaris* (31) the abductor seemed to have missed its insertion into the sesamoid and to have acquired a new one into the fifth metacarpal, thus becoming an opponens.

Adductor Muscles of the Hand (First layer of deep muscles).—With regard to the layer of adductor muscles, which rise from the palmar ligaments of the carpus and lie superficial to the flexores

Fig. 11.



Manus of *Canis familiaris*, showing the deep muscles of the palm.

breves of the fingers, there can be no doubt that the normal arrangement in the Carnivora is, one for the pollex, another for the index, and a third for the minimus; of these the one for the minimus is as a rule the largest, and that for the pollex the

smallest. It is satisfactory to find that the same conclusions were arrived at by one of the authors of this paper in a former communication, founded on the study of a smaller number of animals (XLV.). Among the Felidæ *F. leo* and *F. catus* (XLV.) have the normal arrangement, though Mivart (I.) makes no mention of an adductor indicis in the former animal. In the Viverridæ, *Cryptoprocta* (10), *V. civetta* (12), *Genetta* (18), *Paradoxurus* (19, 20), *Herpestes nepalensis* (23), and *H. griseus* (24) were normal. *Proteles* (25) had only an adductor to the index and minimus. Among the Hyænidæ, *H. crocuta* (29) had adductors to the middle and little fingers, while *H. striata* (26, 28) had them to the index and minimus. Among the Canidæ, the muscles are normal in *C. familiaris* (31, 39, XLV.), but the adductor pollicis is rudimentary and is, according to Meckel (XXXIX.), merely aponeurotic (see fig. 11, p. 406). *C. dingo* (XLVI.) agrees with the other Dogs recorded, but in *C. aureus* (XLV.) adductors of the pollex, annularis, and minimus were found. Among the Ursidæ the muscles were normal in *U. maritimus* (46) and *U. arctos* (47). In Kelley's specimen of *U. maritimus* (45) the left-hand was normal, but in the right an adductor annularis was found. In the Procyonidæ, *P. lotor* (53), *P. cancrivorus* (57), *Nasua* (58), and *Cercoleptes* (61, 62) were normal. In the Mustelidæ, *M. putorius* (65), *Ictonyx libyca* (70), *Meles* (XLV.), and *Lutra* (74, XLV.) were normal, though Young[1] describes an adductor annularis in addition in the last two animals. In *Galictis vittata* (63) only adductors to the pollex and minimus were found.

The Second Layer of Hand-muscles.—Cunningham and Young have described the second layer of the hand as consisting of a series of double-headed short flexors which must not be confounded with the flexor brevis digitorum manûs. These muscles were present in all five digits of all the hands we examined.

The Third Layer of Hand-muscles.—This layer, according to Cunningham, consists of a series of dorsal interosseous muscles which abduct the digits, acting from the line of the third metacarpal. Of these, we saw three in *Genetta vulgaris* (18) and *Herpestes griseus* (24), and Young describes some in *Viverra civetta* (12). We specially looked for and failed to find them in *Canis* (31), *Ictonyx* (70), and *Lutra* (74). In no other carnivorous animal have we found them nor have we come across any further records of them, but we are quite ready to admit that, unless specially looked for, they are easily missed.

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XLIII. Gilis.—"Anatomy of Scalenes in Ruminants, Solipeds, and Carnivora." Comptes Rendus, ser. 9, tome iv. no. 20, p. 464.
XLIV. Windle.—"Deep flexor mass of the Forearm." Journ. Anat. vol. xxiv. p. 72.
XLV. Windle.—"Adductor Muscles of the Hand." P. Birm. Phil. Soc. vol. v. pt. 2, no. 12.
XLVI. Cunningham.—"Report on the Marsupialia." Challenger Reports, vol. v. part 16, p. 19.
XLVII. Windle.—"Pectoral Group of Muscles." Trans. R. I. Acad. xxix. p. 345.

2. Note upon the Minute Structure of the Teeth of *Notoryctes*. By Charles S. Tomes, M.A., F.R.S.

[Received February 11, 1897.]

So far as I know no description of the minute structure of the teeth of this remarkable marsupial has been published. Dr. Stirling has been so kind as to send me a fragment of a jaw containing three teeth. From these I have been able to make two sections, which present some points that seem worth recording.

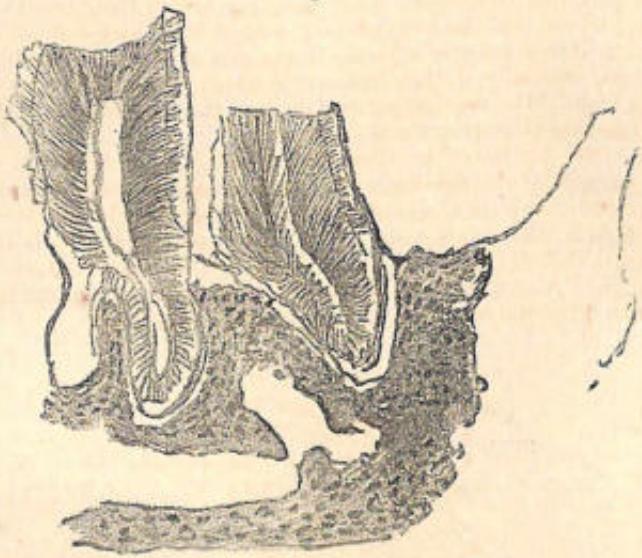
Dr. Stirling, in his original memoir (Trans. Roy. Soc. South Australia, 1891), described the naked-eye characters of these teeth; and Dr. Gadow subsequently (Proc. Zool. Soc. 1892) further investigated them, stating that the teeth were of the "zoophagous

marsupial plan." This is to a certain extent true; but yet they differ from all other teeth with which I am acquainted, and they are interesting in respect of the question of the food of this creature, which is unfortunately not known with exactitude. Dr. Stirling found the remains of ants in the digestive tract; but in confinement these animals would not eat ants, though one did eat a large soft grub, the larval form of a longicorn beetle, or perhaps of a lepidopterous insect, and another ate a piece of bread. The structure of the teeth would seem to indicate that its food is not very hard.

In Dr. Stirling's figures of the grinding-surfaces of the molar teeth it is shown that the middles are worn into concavities, and that the retention of the cuspidate form is not due to the persistence of the sharp enamelled cusps, as is the case in Insectivora generally, but that it is due to the upstanding of the edges.

This is well seen in the drawing (fig. 1), which shows the enamel absent (*i. e.* worn through) on the masticating surfaces, but remaining and projecting a little all round the circumference of the tooth, so that an area of dentine surrounded by an upstanding ring of

Fig. 1.



The last two lower molars of *Notoryctes, in situ*, ×14; the ascending piece of bone to the right of the figure is a portion of the coronoid process. In the front of the two teeth the pulp-cavity still persists, in the other it is apparently nearly obliterated. Two obsolete vascular canals are to be seen near the surface of the dentine.

enamel is used for mastication. This condition of severe wear appears not to be very common in insectivorous mammals, whose teeth generally long retain their enamel and bristling cusps; but it may be seen in old specimens of *Perameles* and in some true

Insectivora—usually, however, in specimens hidden away in store, as not good for display in the cases of a museum, so that, until I specially looked up this point, I was under the impression that great wear of the molars was more uncommon than it really is. The cusps of the teeth in young specimens are, of course, covered by enamel.

It seems probable, at all events in the case of *Notoryctes*, that the wearing-down of the teeth is due to sand, in which the animal is perpetually burrowing, being taken in with the food, rather than to the hardness of the food itself; for the feeble implantation of the teeth militates against the idea that they are put to very hard work.

In *Notoryctes* only about one third, even of the worn tooth, is implanted in a socket, whereas most Insectivora have very long and firmly implanted roots to their teeth; as, however, the sections are not exactly in the axis of the middle of the teeth, the roots may be a little, though not very much, longer than they appear.

The occurrence of obsolete vascular canals near the worn surface of the left-hand tooth (as seen in fig. 1, p. 410) is an indication, so far as it goes, that these teeth come into wear before their growth is complete, and that the roots are only formed late; such obliterated vascular canals are very common in the axis of the worn teeth of rodents, especially of their incisors, in which the dentine forms a large share of the masticating surface, and the enamel only fulfils the function of keeping the edge sharp.

In 1849 my father described (Phil. Trans.) the penetration of the enamel by the dentinal tubes as a character common to all Marsupials, with the exception of the Wombat, though the extent to which it takes place varies much in different members of the group. This character is not peculiar to the Marsupials, as it occurs in a good many Insectivora, and occasionally, though rarely, in other Placental mammals, as for example in the Hyrax.

Fig. 2.



A portion of dentine and enamel from the anterior tooth of *Noto*[illegible]*es*, more highly magnified. The dentine lies to the left in the fig[illegible]

In the *Macropodidæ* the tubes pass across in very g[illegible] abundance, there being a marked dilatation at the junction o[illegible] enamel

and the dentine, while the tubes in the enamel are straight and regular.

In *Dasyuridæ* they pass across more sparsely, as is the case also in *Didelphyidæ*, and no dilatation takes place at the passage, but there is an abrupt bend at this point.

In *Notoryctes* (fig. 2, p. 411) this marsupial character is very strongly marked; the tubes pass into, and through almost the whole thickness of, the enamel in great abundance: they show no dilatation, but a very strongly marked bending at the point of passage. They have another peculiarity: when in the enamel they often show several sharp abrupt bends, the concavities of which lie towards the grinding surface, but they resume sooner or later their original direction parallel with the enamel prisms.

This character also is met with in *Thylacinus* and markedly in *Didelphys*, but is not to be found in Macropods; hence in this feature of minute structure a point of resemblance with *Didelphys* is shown.

It is interesting to find in these points of minute structure some confirmation of the correctness of the view, arrived at on quite different grounds, that *Notoryctes* has affinities with the *Dasyuridæ* and *Didelphyidæ*.

3. The Blue Bear of Tibet, with Notes on the Members of the *Ursus arctus* Group. By R. Lydekker, F.R.S., F.Z.S.

[Received February 17, 1897.]

(Plate XXVII.)

In the year 1853 the late Edward Blyth[1] gave a brief notice of the imperfect skin of a Bear from Tibet, obtained by Dr. A. Campbell, and now preserved in the Indian Museum, Calcutta. He regarded it as probably referable to a variety of the Himalayan Black Bear (*Ursus torquatus*), but suggested that if it proved specifically distinct, the Tibetan Blue Bear, as Dr. Campbell called it, might be known as *U. pruinosus*. As Mr. Blanford subsequently pointed out, this title is little more than a *nomen nudum*, and the name apparently dates from the description of a skin and imperfect skull described by the latter writer[2]. These specimens were brought to the late Mr. Mandelli at Darjiling by a native who stated that he had purchased them at Lhasa, and that the animal inhabited the plains around that city. This skin and skull are likewise in the Indian Museum.

Mr. Blanford considered that the skin obtained by Mr. Mandelli was specifically identical with Blyth's Blue Bear of Tibet, and he accordingly described it as a distinct species, under the name of *U. pruinosus*; his description being as follows:—

"The general coloration above is tawny brown, palest on the

[1] Journ. Asiat. Soc. Bengal, vol. xxii. p. 589 (1853).

[2] Ibid. vol. xlvi. p. 318 (1877).



J.Swan del et lith.

THE BLUE BEAR OF TIBET.

$\frac{1}{10}$ nat. size

Mintern Bros. imp.

head and shoulders, darker on the back, where the hairs are black with tawny tips, and black on the limbs. The head is tawny, much of the same colour as *Ursus isabellinus*, a little darker and browner under the eyes and on the forehead; the ears have tufts of long hair mixed tawny and black. Behind the head the neck is rather darker, but on the upper part of the breast there is a broad pale tawny crescentic band, with the upper terminations prolonged upwards, in front of the shoulder, almost to the back, precisely as in *U. isabellinus*. . . . . The upper and hinder parts of the shoulder in *U. pruinosus* are covered with tawny hairs about 3½ to 4 inches long, whilst the interscapulary region, like the rest of the back, is clothed with black hairs, fulvous at the tips. The hair is moderately fine and about 3 inches long on the back. Apparently the animal when killed was about to lose its long winter coat, for the hair is much felted and matted together in places, and a short fine tawny hair is seen to be growing beneath. The hoary appearance given to the fur by the fulvous tips is extremely characteristic, but it may very possibly be less conspicuous at some seasons.

"The claws are pale in colour, strong and moderately curved, the first (and longest) claw on the fore foot measuring 2·2 inches in a straight line from insertion to tip, and 2·75 round the curve; the corresponding measurements of the first hind claw are 1·3 and 1·4 inches.

"The animal is evidently very old, several of the premolars have been lost and the alveoli obliterated; the molars are much worn. As already mentioned, the size of the teeth, and especially of the molars, is unusually large; the canines appear very little larger than in *U. labiatus*. The posterior molar in the upper jaw is wanting on one side and imperfect on the other, it must be nearly 1¼ inches long and its anterior portion is 0·88 broad; the antepenultimate [1] (first true molar) measures 0·9 inch in length by 0·72, the tooth anterior to this, or hindmost premolar, is 0·62. The three together when perfect must have measured nearly 3 inches in length."

The writer also describes a large skull which he thinks may very probably belong to the same species, but as this identification is not certain, I prefer not to take the specimen into consideration. In a later work [2] Mr. Blanford suggests that *U. pruinosus* may not be specifically distinct from *U. arctus*, of which *U. isabellinus* is regarded merely as a local race. Still later Mr. W. L. Sclater [3] considers that *U. pruinosus* is not separable from *U. isabellinus*, although the latter is separated from *U. arctus*. He remarks that "in the Eastern Thibetan variety (*U. pruinosus*) the hair is blackish or bluish, but it is hardly worthy of separation even as a geographical race."

In the year 1892 the Natural History Museum received a skin

[1] The author obviously means penultimate.
[2] Fauna of Brit. India, Mamm. p. 194 (1888).
[3] Cat. Mamm. Ind. Mus. pt. ii. p. 302 (1891).

and skull of the Blue Bear of Tibet, the former of which is mounted and exhibited in the Mammal Gallery. As this Bear has never been figured, I think the accompanying coloured figure of this specimen (Plate XXVII.) will be acceptable to naturalists, in order that they may see for themselves its very peculiar type of coloration. The skin and skull belong to a sub-adult animal of comparatively small size; the permanent molar dentition, although fully protruded, being practically unworn. The hair on the back and flanks is long, but that on the lower part of the legs shorter; and it seems probable that the animal was killed in winter dress. As regards coloration, the specimen is unlike any other member of the *Ursus arctus* group that has ever come under my notice; the hue of the hair being either white or black, or a mixture of both. Thus on the face and fore part of the body white largely predominates, although in places there are some black hairs, and these are more strongly developed about the forehead, ears, and the fore part of the nape. On the hind nape is a pure white band, or collar, followed by a nearly black transversely elliptical patch above the shoulder-blades. Over the rest of the body the hair is mingled black and white, so as to present a bluish tinge; and the hind limbs are similar, although the lower parts of the fore legs are almost black. The claws are whitish.

As regards the skull, the large size of the last lower premolar, which is such a characteristic tooth in the genus, clearly indicates that this Bear is a member of the *U. arctus* group. Nothing very distinctive appears in the other teeth, although the last lower molar has the elongation generally found in the Himalayan Brown Bear. The cusps of all the cheek-teeth are relatively tall, but not, I think, more so than in some specimens of other members of the group. The upper carnassial is also proportionately large, but some examples of the Himalayan form come very close in this particular. The skull has a nearly straight profile, and in this respect differs very remarkably from crania of the same age of the Himalayan Brown Bear, in which there is a very sudden rise at the front border of the orbits, with a median depression at the root of the nasals.

The difference in the coloration of the skin from that of the specimen described by Mr. Blanford is so great, that I have no hesitation in regarding the British Museum example as belonging to a distinct form, this being Blyth's *Ursus pruinosus*. And I may add that Mr. Blanford agrees with me on this point, and considers that the skin he described under that name belongs to a large brown or grizzly Bear,—perhaps *U. arctus isabellinus* or *U. arctus collaris*. I have never seen a Himalayan Bear with any approach to the coloration of the specimen now described, and, taking also into consideration the characters of the skull, it seems to me that the Tibetan Blue Bear differs more from the typical *U. arctus* than does any other Old World member of the group. With regard to the proper name for this form, I am in some difficulty, seeing that *U. pruinosus*, Blanford, belongs to another form. I find, however, in

the Catalogue of the Zoological Collections of H. M. Prejevalsky, p. 9 (St. Petersburg, 1887), reference to a Tibetan Bear under the name of *U. lagomyarius*, which is probably the present form. And, if this name has been properly published, it will probably stand for the species, if the term *pruinosus* is to be superseded.

A very noticeable feature in the British Museum skin is the curious approximation which it makes to the type of coloration distinctive of *Æluropus melanoleucus* of the same region. This is especially shown by the pure white band on the hind nape, followed by the black interscapular patch; and less markedly by the tendency to blackness on the ears and forehead. Is it too much to consider that this type of coloration has been produced in both animals by similar environment? I think not. Of what advantage to its owner may be the peculiar coloration of *Æluropus* has never been determined. It may be suggested that in a forest country where snow lies deep in the winter, the black shoulder-stripe and limbs with the white of the rest of the body would be very inconspicuous among dark tree-stems; but such an explanation affords no clue to the advantage of this very remarkable type of coloration in summer, when we may presume snow would have disappeared from the forests. Moreover, it is not certain that both forms do not dwell above the forest level.

I now come to the very difficult question whether the brown and greyish Bears of the Northern Hemisphere form more than one species. Very different views are held on this subject by different writers, and as the literature is extensive, I shall not attempt to give a summary of what has been written. A few examples of different views may, however, be advantageously cited. Middendorff [1], in a long essay on the subject, came to the conclusion that all the Bears of the *U. arctus* group in both the Eastern and Western Hemisphere were merely varieties of but one species. On the other hand, Gray [2] not only split them up into a number of species, but actually separated some of them generically. Perhaps the most remarkable feature in his work is the separation of a Brown Bear from Norway, as *Myrmarctos eversmanni* [3], from the Brown Bear of Sweden, which is regarded as referable to the typical *U. arctus*. Moreover, he identifies one of the Kamschatkan skulls described by Middendorff as *U. arctus* var. *beringiana* with the former, whereas the other is regarded as referable to a subspecies (*collaris*) of *U. arctus*.

In 1877, the late Mr. George Busk [4] referred all the living Old World Brown Bears to varieties of *U. arctus*. An important statement in this paper regarding the fossil Pleistocene Brown Bear of Europe (*U. fossilis* of Goldfuss) runs as follows:—"This form has appeared to me to coincide so very closely with the existing *U. ferox* or *horribilis* of North America, that I was induced some years

[1] Sibir. Reise (1851).
[2] See Cat. Carniv. Brit. Mus. (1869).
[3] This is founded on a young skeleton in the Museum.
[4] Trans. Zool. Soc. vol. x. p. 53 *et seq.*

since to suggest that they might be regarded as specifically the same, so far as dental and cranial characters are concerned." Later on in the same paper it is stated, in reference to remains of a Bear from the Gibraltar bone-caverns, "that the preponderance of its characters is in favour of its being closely related to *U. fossilis* sive *priscus*, or to a form intermediate between that and *U. arctos* var. *isabellinus*." Although I confess to great difficulty in distinguishing between the teeth of Old World and American Brown Bears, I think it will be admitted that, if we trust Mr. Busk's conclusions, the Pleistocene Brown Bear of Europe must have been the common ancestor of the existing Brown Bears of both the Eastern and Western Hemispheres.

Passing over certain other writers, I have next to mention that in 1881 Fitzinger [1], if I understand him rightly, came to the conclusion that most of the so-called species of Brown Bears described from Europe and Asia were mere colour-phases or other varieties of *U. arctus*. He, however, recognized the so-called "halsband" Bear—the *U. collaris* of F. Cuvier—as a distinct species, inhabiting Kamschatka and Siberia. And he regarded the "golden" or "silver" Bear of Europe as a subspecies, under the name of *U. arctus aureus*; considering *U. formicarius* of Eversmann (= *U. longirostris*, Schinz, and *Myrmarctos eversmanni*, Gray) as inseparable from this variety.

Eight years later Dr. E. Schärff [2], in a paper on the skull-variation of *U. arctus*, came to the conclusion that *Myrmarctos eversmanni* is only a variety of the former species, with which he also identified *U. syriacus*, *U. isabellinus*, and *U. piscator*. With regard to *U. syriacus* and *U. isabellinus*, the same view is held by Mr. Blanford [3], but Mr. W. L. Sclater [4] regards them as together forming a distinct species, and uses the latter name.

This will suffice for the Old World Brown Bears, and I have now to quote two papers referring to those of the New World, in which totally opposite views are expressed. In the first of these, Mr. A. E. Brown [5] considers that *U. americanus*, *U. cinnamomeus*, *U. luteolus*, and *U. horribilis* are nothing more than varieties of *U. arctus*, the first and second being more distinct than is the last. On the other hand, Dr. C. H. Merriam [6], comes to the conclusion that not only are all the North-American Bears (exclusive of the Polar Bear) distinct from those of the Old World, but that the Black Bears, of which four forms are recognized, should be separated subgenerically from the members of the *U. arctus* group. Of the latter no less than five species and one or two subspecies are recognized as inhabiting the North American continent. From the structure of the lower carnassial tooth, Dr. Merriam seems to have made out pretty clearly

[1] SB. Ak. Wien, vol. lxxxiv. pp. 1–22 (1881).
[2] Archiv f. Nat. 1889, vol. i. pp. 244–267.
[3] Fauna of Brit. India, Mamm. p. 194 (1888).
[4] Cat. Mamm. Ind. Mus. pt. ii. p. 302 (1891).
[5] Proc. Ac. Philadelphia, 1894, pp. 119–129.
[6] Proc. Biol. Soc. Washington, vol. x. pp. 65–83 (1896).

that the Black Bear (whether one or more forms are recognized is immaterial) is decidedly different from all the members of the *U. arctus* group.

The feature which strikes me as the most remarkable in his paper is the recognition of three distinct species of the Brown Bear group as inhabiting Alaska alone—one being from Kadiak Island, the second from Yakutat Bay, and the third from the coast near Sitka. Now when we take into consideration the large size of these animals and the circumstance that Carnivora are generally in the habit of wandering over wide tracts of country, it appears to me impossible to have three distinct species inhabiting such a limited area, although there may be grounds for regarding the island form as separable from those inhabiting the mainland. In the separation of the American Bears, Dr. Merriam relies very largely on differences in the skull and cheek-teeth; but it appears to me that too much importance has been attached to such points of difference both by himself and Gray. A remarkable instance of this is afforded by the case of the so-called *Myrmarctos eversmanni*, to which Gray refers one of the skulls figured by Middendorff as *U. arctos*, var. *beringiana*; this skull coming from Kamschatka, where the typical form of that Bear dwells. And to believe that there are two closely allied Bears in Kamschatka seems to me an absolute impossibility. I cannot help agreeing with Dr. Schärff that when we find Bear-skulls from the same district showing considerable differences from one another, we must attribute such differences either to individual or sexual variation, or to age[1]. Similarly, we may find among the Bears of Europe some individuals with long limbs, high foreheads, and elongated muzzles, whereas in others from the same district the limbs are shorter and stouter, the forehead broader and flatter, and the muzzle shorter. And surely such differences cannot be regarded as of specific, or even subspecific, value. On the other hand, when all the Bears of one particular district differ in one or more characters from those inhabiting the neighbouring regions, specific or subspecific differences may fairly be claimed.

Admitting, then, that there are certain differences to be found among the members of the *U. arctus* group inhabiting different areas, the next question is whether these should be regarded as of specific or subspecific value. It may fairly be allowed that the question is not of very much importance one way or the other, and also that it is one in which scarcely any two observers are likely to agree. All are, however, I believe in accord as to the close alliance between the Bears of this group. And an important point to my mind—though it is one which others will probably deem worthy of little consideration—is that the Pleistocene Brown Bear of Europe, according to Busk, is nearer to the American Grizzly than to the typical existing Brown Bear. If this be true, it points to the

[1] In the case of the type of *Myrmarctos eversmanni* the difference is due to immaturity alone.

conclusion that all the living forms have been differentiated from one another at a very recent epoch indeed, and probably in the Old World. On the whole, then, I am inclined to regard the various members of the group, with the exception of the Tibetan Blue Bear, as subspecies rather than species[1]. It is true that in some of the North American Bears the front claws are longer and straighter than in their Old World relatives, but this character does not serve to separate all the American forms as a species apart from all the latter. Neither, if I unite the Old World Bears, can I admit the right of all the American forms to stand as distinct species. I take this opportunity of mentioning that I am inclined to regard many mammals having representative forms in the two hemispheres as subspecies. This, I think, is the case with the Foxes, the Wolves, and the Weasels; while the Asiatic Wapitis (*Cervus eustephanus* and the allied *C. luehdorfi*) are probably only races of the American *C. canadensis*. And I also think that the host of species recently made in North America out of the form which used to be known as *Tamias asiaticus* will come under the same category. I am fully aware that in this view I shall be running atilt at all the modern school of American zoologists; but I have, at least to some extent, on my side men like Messrs. Blanford and Mivart, to whose opinions I attach the very highest value. And I also side with Huxley that it is a far less important error to overlook differences than not to see resemblances.

In the following list I have endeavoured to arrange the Bears of the *Ursus arctus* group according to my ideas of what their classification should be. I have not attempted to give the whole synonymy, as in several cases I am at loss where to place synonyms.

1. URSUS ARCTUS.—*Brown Bear.*

Ursus arctos, Linn. Syst. Nat. ed. 12, vol. i. p. 69 (1766).
Ursus arctus, Blanford, Fauna Brit. Ind., Mamm. p. 194 (1888).

Under this name I include all the brown, greyish, and grizzled existing Bears. In all these the cheek-teeth are large, the inner tubercle of the upper carnassial is large, the last lower molar has a large talon, and there is a considerable interval between the fourth lower premolar and the canine, in which are situated the three anterior premolars in young individuals. The first lower premolar is very small, and the fourth large and generally furnished with two small tubercles on the inner side, one in advance of and the other behind the main cusp. The lower carnassial is also a large and complex tooth, generally with accessory cusps on the inner border of its talon.

With regard to the two inner tubercles on the fourth lower premolar, a few words are necessary. As is well known to palæont-

[1] If they are regarded as species, *Ursus* ought to be split up into several genera.

ologists, in *Ursus spelæus* (fig. 1) this tooth is short and has two very large tubercles. Busk[1] considered that only one of these tubercles (the posterior) is represented in the corresponding tooth of the typical *U. arctus* group, and apparently regarded the anterior tubercle as distinct. I cannot, however, but consider them as homologous, and I think Busk has attached far too much importance to them, as also to the structure of the talon in the same tooth.

Fig. 1.



Fourth right lower premolars of *Ursus spelæus* (1) and *U. arctus isabellinus* (2). *a*, anterior; *b*, posterior tubercle.

1. Ursus arctus fossilis.—*Pleistocene Brown Bear.*

Ursus fossilis, Goldfuss, Nova Acta Ac. Cæs. Leop.-Car. vol. x. pt. 2, p. 259 (1821); Busk, Trans. Zool. Soc. vol. x. p. 64 (1877).
Ursus priscus, Cuvier, Ossemens Fossiles, vol. iv. p. 380 (1823).
Ursus ferox fossilis, Busk, Phil. Trans. 1873, p. 546.

According to Busk, the Brown Bear of the English caverns and Irish peat-bogs is much nearer to the Grizzly than to the European Brown Bear, which first makes its appearance in the English fen-deposits. In this determination he relies chiefly on the characters of the skull and the large size and structure of the fourth lower premolar. Although, as I shall show presently, one of the characters of the latter tooth on which he lays stress is not constant, yet I feel bound to accept the general conclusions of one who has devoted so much labour to a very difficult subject. It is important to notice that he regards the Brown Bear from the Gibraltar caverns as probably intermediate between *U. arctus fossilis* and *U. arctus isabellinus*.

As already said, if his conclusions are correct we must regard *U. arctus fossilis* as the ancestral stock from which have sprung all the other members of the group.

2. Ursus arctus typicus.—*European Brown Bear.*

Ursus pyrenaicus, F. Cuv. Hist. Nat. Mamm. livr. xlv. (1824).
Ursus norvegicus, F. Cuv. *op. cit.* livr. vii.
Ursus cadavarinus, Eversmann, Bull. Soc. Moscou, 1840, p. 8.
Ursus formicarius, Eversmann, *loc. cit.*
Myrmarctos eversmanni, Gray, Proc. Zool. Soc. 1864, p. 695; Cat. Carniv. Brit. Mus. p. 232 (1869).

Under this name may be included the living Bears of Europe at

[1] Trans. Zool. Soc. vol. x. pp. 65, 66 (1877).

least as far east as the Caucasus and Urals. Although variable in this respect, this form is not excessively large, and the colour is typically dark brown; while the skull has a comparatively regular and low profile and a wide palate. According to Busk, the fourth lower premolar is relatively small, without trace of the posterior inner tubercle. I find, however, that in a young skeleton from Russia, in the British Museum, this tubercle is very well developed, while there are slight traces of it in a skull from Norway (B.M. no. 62.3.29.8). The front claws are short and curved.

3. Ursus arctus syriacus.—*Syrian Brown Bear.*

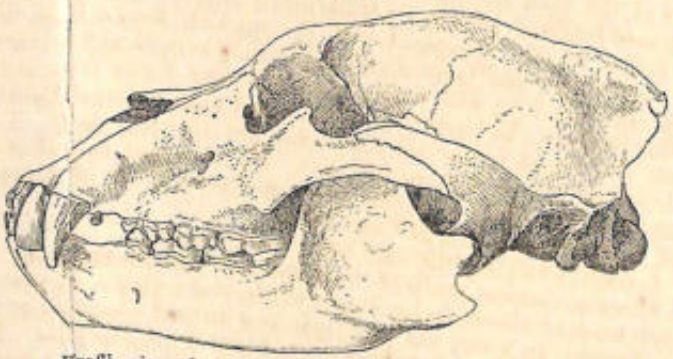
Ursus syriacus, Hempr. & Ehrenb., Symb. Phys. vol. i. pl. i. (1828); Gray, Cat. Carniv. Brit. Mus. p. 224 (1869); Fitzinger, SB. Ak. Wien, vol. lxxxiv. p. 14 (1881).

This form, which inhabits Syria and Palestine, has been very generally identified with the next[1], and I am not prepared to say that this may not be correct. Among the few skins that have come under my notice, I have, however, seen none presenting the creamy tint characteristic of immature examples of the Kashmir form. In the one skull I have seen the profile lacks the deep concavity characteristic of the Kashmir Brown Bear. In the last lower premolar there is a slight trace of the posterior inner tubercle.

4. Ursus arctus isabellinus.—*Kashmir Brown Bear.*

Ursus isabellinus, Horsfield, Trans. Linn. Soc. vol. xv. p. 332 (1826); W. L. Sclater, Cat. Mamm. Ind. Mus. pt. ii. p. 302 (1891).

Fig. 2.



Profile view of sub-adult skull of *Ursus arctus isabellinus*.

The Bear which inhabits the middle Himalaya, extending from

[1] See Fitzinger, *loc. cit.*

Afghanistan to Nepal, appears to be generally smaller than the European Brown Bear, but is specially characterized by the light creamy-brown tint of the winter pelage. Very old males, which grow to a large size, are, however, considerably darker. The skull (fig. 2, p. 420) is characterized by the obtuse angle formed in the profile at the anterior border of the orbits, and the median hollow where the nasals join the frontals. The fourth lower premolar (fig. 1, p. 419) is relatively long and narrow, with both the anterior and posterior inner tubercles well developed.

5. URSUS ARCTUS COLLARIS.—*Kamschatkan Brown Bear.*

Ursus collaris, F. Cuvier, Hist. Nat. Mamm. livr. xliii. (1825); Fitzinger, SB. Akad. Wien, vol. lxxxiv. p. 16 (1881).

Ursus arctos, var. *Beringiana*, Middendorff, Sibir. Reise, vol. i. pt. ii, taf. i. (1851).

Ursus piscator, Pucheran, Rev. Zool. 1855, p. 392; Sclater, Proc. Zool. Soc. 1867, p. 817.

Ursus lasiotus, Gray, Ann. Mag. Nat. Hist. ser. 3, vol. xx. p. 301 (1867); Cat. Carniv. Brit. Mus. p. 223 (1869).

Ursus beringiana, Merriam, Proc. Biol. Soc. Washington, x. p. 69 (1896).

The typical *U. collaris* of F. Cuvier is from Siberia, but there can be no reasonable doubt of its identity with the *U. arctos* var. *beringiana* of Middendorff (= *U. piscator* and *U. lasiotus*). Busk[1], who regarded all the North American members of the group as referable to a single species, identified *U. piscator* therewith. Fitzinger[2] gives the range as extending from the Ural through the whole of Siberia to Kamschatka. It is one of the largest of all living land Bears, old specimens probably attaining a length of fully nine feet. Fitzinger's description is as follows:—The hinder part of the head is broad and long, with convex parietals, and a flattened forehead, passing gradually into a long, thick, and abruptly truncated snout. Compared with the common Brown Bear, the ears are shorter and more rounded, the body is thick and massive, and the hair long and tangled. The colour varies from light yellowish-brown to blackish-brown, a broad whitish gorget extends from the throat to the shoulders, and the legs are black. The hair on the flanks darkens with age. He adds that this Bear is undoubtedly distinct from the common Brown Bear of Europe, and that it is abundant in Kamschatka.

According to Gray the light collar is not constant.

There are several skulls of this form in the British Museum. In a sub-adult specimen the vaulting of the frontal region is moderately developed. In a very old one there is a distinct concavity at the root of the nasals, and the zygomatic width is not excessive. The fourth lower premolar has only the posterior inner tubercle developed. I do not know the form and length of the claws.

[1] Trans. Zool. Soc. vol. x. p. 64 (1877).
[2] SB. Ak. Wien, vol. lxxxiv. p. 16 (1881).

least as far east as the Caucasus and Urals. Although variable in this respect, this form is not excessively large, and the colour is typically dark brown; while the skull has a comparatively regular and low profile and a wide palate. According to Busk, the fourth lower premolar is relatively small, without trace of the posterior inner tubercle. I find, however, that in a young skeleton from Russia, in the British Museum, this tubercle is very well developed, while there are slight traces of it in a skull from Norway (B.M. no. 62.3.29.8). The front claws are short and curved.

3. URSUS ARCTUS SYRIACUS.—*Syrian Brown Bear.*

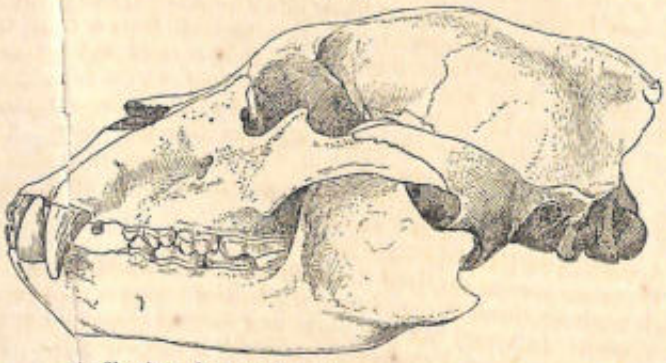
Ursus syriacus, Hempr. & Ehrenb., Symb. Phys. vol. i. pl. i. (1828); Gray, Cat. Carniv. Brit. Mus. p. 224 (1869); Fitzinger, SB. Ak. Wien, vol. lxxxiv. p. 14 (1881).

This form, which inhabits Syria and Palestine, has been very generally identified with the next[1], and I am not prepared to say that this may not be correct. Among the few skins that have come under my notice, I have, however, seen none presenting the creamy tint characteristic of immature examples of the Kashmir form. In the one skull I have seen the profile lacks the deep concavity characteristic of the Kashmir Brown Bear. In the last lower premolar there is a slight trace of the posterior inner tubercle.

4. URSUS ARCTUS ISABELLINUS.—*Kashmir Brown Bear.*

Ursus isabellinus, Horsfield, Trans. Linn. Soc. vol. xv. p. 332 (1826); W. L. Sclater, Cat. Mamm. Ind. Mus. pt. ii. p. 302 (1891).

Fig. 2.



Profile view of sub-adult skull of *Ursus arctus isabellinus*.

The Bear which inhabits the middle Himalaya, extending from

[1] See Fitzinger, *loc. cit.*

Afghanistan to Nepal, appears to be generally smaller than the European Brown Bear, but is specially characterized by the light creamy-brown tint of the winter pelage. Very old males, which grow to a large size, are, however, considerably darker. The skull (fig. 2, p. 420) is characterized by the obtuse angle formed in the profile at the anterior border of the orbits, and the median hollow where the nasals join the frontals. The fourth lower premolar (fig. 1, p. 419) is relatively long and narrow, with both the anterior and posterior inner tubercles well developed.

5. Ursus arctus collaris.—*Kamschatkan Brown Bear.*

Ursus collaris, F. Cuvier, Hist. Nat. Mamm. livr. xliii. (1825); Fitzinger, SB. Akad. Wien, vol. lxxxiv. p. 16 (1881).

Ursus arctos, var. *Beringiana*, Middendorff, Sibir. Reise, vol. i. pt. ii, taf. i. (1851).

Ursus piscator, Pucheran, Rev. Zool. 1855, p. 392; Sclater, Proc. Zool. Soc. 1867, p. 817.

Ursus lasiotus, Gray, Ann. Mag. Nat. Hist. ser. 3, vol. xx. p. 301 (1867); Cat. Carniv. Brit. Mus. p. 223 (1869).

Ursus beringiana, Merriam, Proc. Biol. Soc. Washington, x. p. 69 (1896).

The typical *U. collaris* of F. Cuvier is from Siberia, but there can be no reasonable doubt of its identity with the *U. arctos* var. *beringiana* of Middendorff (= *U. piscator* and *U. lasiotus*). Busk[1], who regarded all the North American members of the group as referable to a single species, identified *U. piscator* therewith. Fitzinger[2] gives the range as extending from the Ural through the whole of Siberia to Kamschatka. It is one of the largest of all living land Bears, old specimens probably attaining a length of fully nine feet. Fitzinger's description is as follows:—The hinder part of the head is broad and long, with convex parietals, and a flattened forehead, passing gradually into a long, thick, and abruptly truncated snout. Compared with the common Brown Bear, the ears are shorter and more rounded, the body is thick and massive, and the hair long and tangled. The colour varies from light yellowish-brown to blackish-brown, a broad whitish gorget extends from the throat to the shoulders, and the legs are black. The hair on the flanks darkens with age. He adds that this bear is undoubtedly distinct from the common Brown Bear of Europe, and that it is abundant in Kamschatka.

According to Gray the light collar is not constant.

There are several skulls of this form in the British Museum. In a sub-adult specimen the vaulting of the frontal region is moderately developed. In a very old one there is a distinct concavity at the root of the nasals, and the zygomatic width is not excessive. The fourth lower premolar has only the posterior inner tubercle developed. I do not know the form and length of the claws.

[1] Trans. Zool. Soc. vol. x. p. 64 (1877).
[2] SB. Ak. Wien, vol. lxxxiv. p. 16 (1881).

6. URSUS ARCTUS MIDDENDORFFI.—*Kadiak Brown Bear.*

Ursus middendorffi, Merriam, Proc. Biol. Soc. Washington, vol. x. p. 69 (1896).

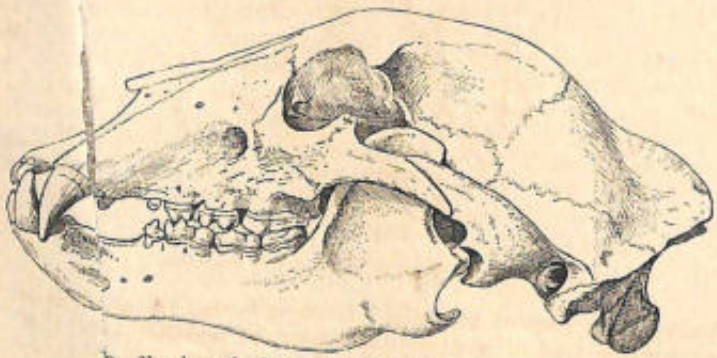
Although closely allied to the preceding, which it somewhat exceeds in size, and thus the largest living member of the group, the Bear of Kadiak Island, Alaska, is, I consider, rightly separated by Dr. Merriam. I have not seen a skull, but it appears, from his figures and description, that in adult males the frontal region is enormously elevated, highly arched, and relatively narrow; the zygomatic arches enormously wide, and the postzygomatic region very short. There appears to be no concavity at the root of the nasals; and the great elevation of the frontal region seems most conspicuous in sub-adult examples. Merriam gives a number of minor characters distinguishing the skulls of the two forms, which need not be recapitulated here. It is stated that in the adult female the skull is relatively more elongated and the frontal region less elevated than in the male. The front claws are long and considerably curved.

I presume that Dr. Merriam had definite knowledge of the sex of the skulls of the Kamschatkan Bear with which he makes comparison. Those in the British Museum are not determined, and if they be females a question might arise whether this form is really distinct from the preceding. The characters of the fourth lower premolar are not given.

7. URSUS ARCTUS YESOENSIS, subsp. nov.—*Yezo Brown Bear.*

My attention has been directed by Mr. Thomas to three skulls from Yezo, the northern island of Japan, in the British Museum, which differ so remarkably from any others I have seen as to

Fig. 3.

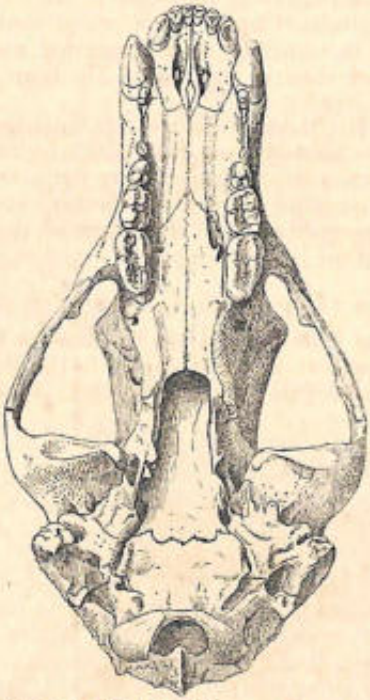


Profile view of sub-adult skull of *Ursus arctus yesoensis*.

indicate a distinct form. They comprise a half-grown, a sub-adult (no. 86.11.18.2), and a fully adult specimen (no. 96.4.27.1). Compared with skulls of similar age of the Kamschatkan form, which

they approach in size, these specimens differ very remarkably. Taking the half-grown and sub-adult specimens (the latter of which is here figured, figs. 3 & 4), it will be found that the profile forms a continuous convex arch, almost like that of *U. torquatus*, although the skull is much longer than in the latter. The difference is also observable in the fully adult specimen, in which there is no trace of the concavity at the root of the nasals so conspicuous in the Kamschatkan Bear. The palate (fig. 4) is also peculiar on account of its extreme elongation and narrowness, the pterygoid fossa being narrower and not extending so far forwards. The pterygoids themselves are also very different bones, being much larger and of a distinctly oblong form. The premaxillæ, too,

Fig. 4.



Palatal aspect of skull of *Ursus arctus yesoensis*.

extend farther back on the palate, reaching behind the alveolus of the canine, instead of stopping short near the middle line of that tooth. The fourth lower premolar is very short, with scarcely any inner tubercles, the hinder of which is well marked in the Kamschatkan Bear. So far as I can see, these peculiarities are constant in all three skulls.

Compared with Dr. Merriam's figure of the sub-adult skull of the

Kadiak Bear, the British Museum specimen appears larger, with less expansion of the zygomata, and the arching not so high or so sudden, but more regular.

This Bear is doubtless the *Ursus ferox* of Temminck's 'Fauna Japonica,' which was from the north island of Japan. *Ursus japonicus*, on the other hand, probably comes from the southern island, of which the fauna, Mr. Thomas tells me, is of an Oriental type, whereas that of Yezo is strictly Holarctic.

8. URSUS ARCTUS DALLI.—*Alaskan Brown Bear.*

Ursus dalli, Merriam, Proc. Biol. Soc. Washington, vol. x. p. 71 (1896).

Ursus sitkensis, Merriam, *op. cit.* p. 73.

This Bear, although very large, is slightly inferior in size to the one inhabiting Kadiak Island, and has the frontal region of the skull but slightly elevated and nearly flat. In the typical form, from Yakutat Bay, the upper carnassial is unusually large, with an additional internal tubercle, the lower carnassial has accessory tubercles on the inner side of the talon, and the fourth lower premolar has a well-developed postero-internal cusp. On the other hand, in the rather smaller form from Sitka the upper carnassial is normal (tricuspid), the lower carnassial has no accessory tubercles on the inner side of the talon, and the fourth premolar (if I understand the description rightly) has only the antero-internal cusp. Even if such differences prove constant (which I doubt), I should not be disposed to regard even them as of subspecific value, considering that both Bears come from districts so close to one another as are Yakutat Bay and Sitka. The front claws, as exemplified by a specimen in the British Museum, are long and much curved.

9. URSUS ARCTUS HORRIBILIS.—*Grizzly Bear.*

Ursus horribilis, Ord, in Guthrie's Geography, 2nd Amer. ed. vol. i. p. 291 (1815); Merriam, Proc. Biol. Soc. Washington, vol. x. p. 74 (1896).

Ursus cinereus, Desmarest, Mammalogie, vol. i. p. 164 (1820).

Ursus ferox, Desmarest (? *ex* Lewis & Clarke), *loc. cit.*

Ursus (*Danis*) *cinereus*, Gray, Cat. Carniv. Brit. Mus. p. 228 (1869).

The true Grizzly Bear, ranging from Norton Sound, Alaska, through the northern Rocky Mountains to Utah, is a smaller animal than either of the preceding forms. According to Busk, this Bear (probably in common with some of the preceding New World types) differs from *U. arctus typicus* in the following points:—The jugal arcade is less of a circle and more of an ellipse; the palate is flatter; the last upper molar is less narrowed behind; the inner tubercle of the upper carnassial is larger; and the fourth lower premolar is larger, and usually has two internal tubercles[1].

[1] As already mentioned, the second of these tubercles may be present in *U. a. typicus*, and both are constant in *U. a. isabellinus*.

Dr. Merriam describes the skull as relatively long, with the temporal impressions in the adult not turning in abruptly from the postorbital processes, and the frontal elevated and usually convex between the latter. The fore claws are longer and less curved than in any other member of the group.

The Sonoran Grizzly—the *U. horribilis horriæus* of Baird—which ranges from the Southern Rocky Mountains to Northern Mexico and California, has the frontal region flattened and concave between the postorbital processes. Whether this form should rank as a distinct subspecies (in my sense of that term) I am not prepared to say definitely, although I am inclined to think it should not. If a quadrinomial term were permissible, such would best express its relationship. It is not quite easy to understand what are Dr. Merriam's views on the subject, since on page 69 of his memoir he alludes to it as *U. horriæus*, and on page 75 as *U. horribilis horriæus*.

10. Ursus arctus richardsoni.—*Barren-Ground Bear.*

Ursus richardsoni, Swainson, Animals in Menageries (Lardner's Cabinet Cyclopædia), p. 54 (1838); Merriam, P. Biol. Soc. Washington, x. p. 77 (1896).

This Bear, according to Dr. Merriam, differs from the Grizzly in the shorter skull, in which the temporal impressions of the adult bend in suddenly from the postorbital processes so as to form nearly a right angle with the median line. The fourth lower premolar is stated to have no inner tubercles. In size this Bear is the smallest American member of the group. Its range includes the so-called Barren Grounds between Hudson Bay and the Mackenzie River.

11. Ursus arctus crowtheri.—*African Brown Bear.*

Ursus crowtheri, Schinz, Syn. Mamm. p. 302 (1842); Busk, Trans. Zool. Soc. vol. x. p. 73 (1877).

Helarctos (?) *crowtheri*, Gray, Proc. Zool. Soc. 1864, p. 698; Cat. Carniv. Brit. Mus. p. 236 (1869).

Ursus faidherbianus, Bourguignat, Ann. Sci. Nat. (Zool.) sér. 5, viii. p. 43 (1867).

Of this Bear I have no definite knowledge, and it is only on distributional grounds that I include it in the *U. arctus* group. Gray, who provisionally placed it in his genus *Helarctos*, describes it as follows:—"Fur long, shaggy, blackish brown, beneath orange-rufous; nose very short, acuminate, black; toes short; claws stout and straight."

The evidence of the existence of a Bear in North-western Africa is summarized by Busk in the passage quoted above. The types of the species were two specimens captured in 1834 at Tetuan, particulars of which were communicated to Blyth by Mr. Crowther. Busk writes that "according to Capt. Loche, author of several works on the mammalogy of Algeria, the Brown Bear would

appear to exist in the Atlantic [? Atlas] chain of mountains in Morocco, whence it often invades the French provinces." According to other information, "the bears in question were small, thick-set, of a brown colour, with a white spot under the throat." *U. faidherbianus*, with other nominal species, was founded on remains from a cavern in the province of Constantine, Algeria, and is probably not distinct from the existing African form.

II. Ursus pruinosus.—*Tibetan Blue Bear.*

Ursus pruinosus, Blyth, Journ. Asiat. Soc. Bengal, vol. xxii. p. 589 (1853); *nec* Blanford, *ibid.* xlvi. p. 318 (1877).
Ursus lagomyiarius, Prejevalsky, Cat. Zool. Collections of H. M. Prejevalsky, p. 9, no. 1 (St. Petersburg, 1887).

This Bear appears to be confined to Eastern Tibet, where it inhabits the neighbourhood of Lhasa. The claws and teeth are of the same type as in *U. arctus isabellinus*. Apparently it is always of small size; and is best characterized by the black and white pelage, which is quite different from that of any of the forms here included under *U. arctus*.

III. Ursus spelæus.—*Cave Bear.*

Ursus spelæus, Rosenmüller, Oss. Foss. Animal. p. 18 (1794).

The only other member of the *U. arctus* group, according to my idea, is the extinct European Cave-Bear, which is undoubtedly entitled to specific distinction. Apart from its huge size, which probably does not much exceed that of the Bear from Kadiak Island, this species is easily distinguished by the cheek-teeth. These are relatively very large, and the enamel of the molars is thrown into a number of fine corrugations or plications, producing a very complicated pattern. Even more distinctive is the last lower premolar (fig. 1, p. 419), which is relatively short, with the inner tubercles very large, and the first placed more on the inner side than in *U. arctus*. The frontal region rises very abruptly at the root of the nasals.

4. An Account of the Freshwater Fishes collected in Celebes by Drs. P. & F. Sarasin. By G. A. Boulenger, F.R.S.

[Received March 9, 1897.]

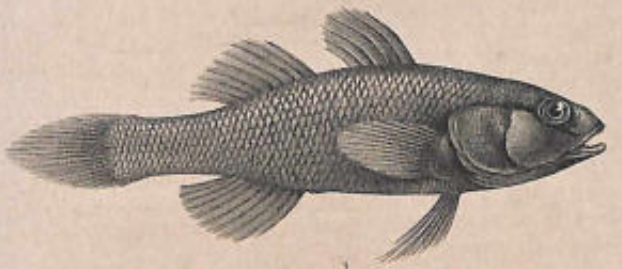
(Plate XXVIII.)

At a recent meeting of this Society[1] I had the honour of reading a paper on the Reptiles and Batrachians of Celebes, based chiefly on the collections formed in 1893–96 by the Drs. Sarasin, and gave a full list of the species known to inhabit that island, together with a discussion of their distribution. In the present paper I will limit myself to an enumeration of the Fishes obtained by the Doctors themselves, because the question of the ichthy-

[1] *Cf.* P. Z. S. 1897, p. 193.



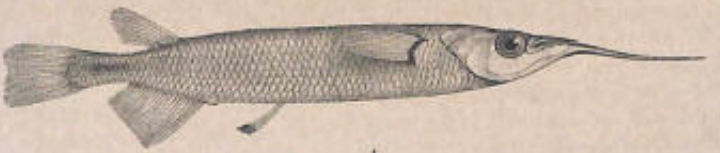
2.



1.



3.



4.

Mintern Bros. imp.

J.Green del. et lith.

1.GOBIUS SARASINORUM. 2.GOBIUS LATIFRONS.
3.TELMATHERINA CELEBENSIS. 4.HEMIRHAMPHUS WEBERI.

ological fauna of Celebes has been most ably dealt with, three years ago, by Prof. Max Weber[1]. Only about 80 specimens of Freshwater Fishes were collected, which are referable to 14 species, 4 being described as new. The localities are the same as enumerated in my previous paper, with the exception of the Lolak River, which runs a little to the west of the Dumoga River, in the kingdom of Bolang Mongondo, and Lake Labendang in Minahassa.

1. Gobius giuris, Ham. Buch.

N. Celebes: Lolak R.
S.E. Celebes: Lakes Matanna and Towuti.

2. Gobius sarasinorum, sp. n. (Plate XXVIII. fig. 1.)

No canine teeth. Depth of body 4 to 5 times in total length, length of head 3–3¼. Head as broad as deep, 1⅓ as long as broad; upper jaw not projecting beyond the lower, maxillary extending to below anterior border of eye; diameter of eye 4–4½ times in length of head, 1⅓ interorbital width; opercles and occiput scaled; rest of head naked, with the sensory lines very distinct. Dorsal VI, 9; first dorsal nearly equally distant from the end of the snout and the base of the caudal; longest rays of second dorsal half length of head or a little less. Anal 9, opposite to soft dorsal. Ventral reaching the vent, or narrowly separated from it. Caudal peduncle twice as long as deep; caudal obtusely pointed. Scales 48–50; 16–20 in a transverse series. Yellowish brown to dark brown above, without markings; fins brown to blackish; ventrals sometimes whitish.

Total length 80 millim.

14 specimens from L. Posso, C. Celebes.

3. Gobius latifrons, sp. n. (Plate XXVIII. fig. 2.)

No canine teeth. Depth of body 4½–5 times in total length, length of head 3⅓ to 3½. Head broader than deep, 1¼ as long as broad; upper jaw not projecting beyond the lower, maxillary extending to below anterior border of eye; diameter of eye 4 to 4½ times in length of head, as long as snout, equal to interorbital space, which is concave; opercles and occiput scaled, rest of head naked. Dorsal VI, 9; first dorsal nearly equally distant from the end of the snout and the base of the caudal; longest rays of second dorsal ½ to ⅔ length of head. Anal 8, opposite to soft dorsal. Ventral widely separated from vent. Caudal peduncle twice as long as deep; caudal rounded. Scales 34–35; 15 or 16 in a transverse series. Olive, with more or less distinct dark brown spots, which may form a zigzag on each side of the body; fins greyish or brown; a black spot on the first dorsal.

Total length 47 millim.

11 specimens from L. Matanna, S.E. Celebes, and one from the Kalaena River, C. Celebes.

[1] Zool. Ergebn. Reise Niederl. O.-Ind. iii. 1894, p. 429.

4. Sicydium cynocephalum, C. & V.

N. Celebes: Lolak R.

5. Eleotris aporos, Blkr.

N. Celebes: Minahassa.
C. Celebes: Kalaena R.

6. Eleotris fusca, Schn.

N. Celebes: Lolak R.
C. Celebes: Mapane.

7. Eleotris belobroncha, C. & V.

N. Celebes: Lolak R.

8. Anabas scandens, Dald.

N. Celebes: L. Lahendang.
C. Celebes: L. Posso.
S. Celebes: Macassar.

9. Ophiocephalus striatus, Bl.

N. Celebes: L. Lahendang.
C. Celebes: L. Posso.

Telmatherina, g. n.

Allied to *Atherina*, but distinguished by the more strongly compressed body, the absence of a silvery lateral band, and the smaller number of vertebræ (17+16)[1].

10. Telmatherina celebensis, sp. n. (Plate XXVIII. fig. 3.)

Body strongly compressed, its depth 3 to 3⅓ times in total length; length of head 3⅓ to 3½ times. Upper surface of head flat, or slightly concave between the eyes; snout not projecting beyond the lower jaw, as long as the diameter of the eye, which is nearly 3 times in length of head, and a little less than interorbital width; mouth not extending to below anterior border of eye; teeth very small, forming a narrow villiform band. Gill-rakers moderately stout, nearly as long as gill-fringes, 15 on lower part of anterior arch. Snout and sides of head naked; posterior frontal and occipital regions with 8 large scales. Dorsal VI–VII, 11–12; the first dorsal much shorter than, and well separated from, the second, with the rays flexible but not articulate, the first prolonged in a filament; origin of first dorsal equally distant from the end of the snout and the base of the tail. Anal I 12–14, corresponding to the soft dorsal. Pectoral 16, obtusely pointed, upper rays longest, as long as head less snout, inserted at equal distance from the upper and the lower profile. Ventral I 5, inserted far behind the base of pectoral, opposite to origin of first

[1] I am indebted to Mr. J. Green for a sciagraph by means of which I have been enabled to count the vertebræ without injuring the specimen.

dorsal, nearly reaching origin of anal. Caudal bifid, deeply cleft, the lobes obtuse. Scales large, cycloid, finely striated concentrically, 32–34 in a longitudinal and 8 in a transverse series; no lateral line. Pale olive above, yellowish beneath, most of the scales with fine black specks, more crowded towards the free border; three rather indistinct dark vertical bars may be present on the body; dorsal and anal fins grey or blackish; caudal grey or blackish at the base.

Total length 70 millim.

Three specimens from Lake Matanna, S.E. Celebes.

11. Hemirhamphus orientalis, M. Weber.

C. Celebes: Kalaena R., Toka R. near Paloppo, stream between Enrekang and Batulappa.

S. Celebes: Macassar.

I doubt whether this species is really distinct from *H. fluviatilis*, Blkr., of Java.

12. Hemirhamphus weberi, sp. n. (Plate XXVIII. fig. 4.)

Depth of body 7 times in total length without mental appendage, length of head 4 times. Mental appendage nearly as long as the head; intermaxillary part of upper jaw longer than broad; interorbital region flat; diameter of eye $\frac{2}{3}$ length of snout, and equal to interorbital width; nasal papilla much developed. Dorsal 9, commencing behind anterior third of anal. Anal 19, much longer than its distance from the caudal. Pectorals pointed, $\frac{2}{3}$ length of head. Ventrals midway between eye and base of caudal. Caudal rounded. Lat. line ca. 50. Blackish above, silvery on the sides and below; fins white, pectorals black at the base, ventrals black at the tip.

Total length 90 millim.

A single specimen from Lake Matanna, S.E. Celebes.

This species, which is named in honour of Prof. Max Weber, belongs to the subgenus *Dermatogenys*, v. Hass., and differs from the other described species in the longer anal fin with more numerous rays, viz. 19 instead of 14 to 16.

13. Haplochilus celebensis, M. Weber.

S. Celebes: Macassar.

14. Anguilla mauritiana, Benn.

N. Celebes: Minahassa.

EXPLANATION OF PLATE XXVIII.

Fig. 1. *Gobius sarasinorum*, Blgr., p. 427.
2. " *latifrons*, Blgr., p. 427.
3. *Telmatherina celebensis*, Blgr., p. 428.
4. *Hemirhamphus weberi*, Blgr., p. 429.

May 4, 1897.

HERBERT DRUCE, Esq., F.Z.S., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of April 1897 :—

The total number of registered additions to the Society's Menagerie during the month of April was 99, of which 40 were by presentation, 1 by exchange, 43 by purchase, 8 were received on deposit, and 7 were born in the Menagerie. The total number of departures during the same period, by death and removals, was 85.

Amongst these attention may be called to :—

1. A fine young male specimen of the Wild Ass of Somaliland (*Equus somalicus*), obtained by purchase on April 30th. This species was originally described in the Society's 'Proceedings' for 1884 (p. 540, pl. l.).

2. A pair of Smith's Bronze-winged Pigeons (*Geophaps smithi*) from Northern Queensland, purchased April 29th.

These are the first specimens of this beautiful Ground-Dove (figured by Gould, 'Birds of Australia,' vol. v. pl. 68) that have been exhibited in the Gardens.

Mr. Oldfield Thomas exhibited a selection of the small Mammals collected by Mr. Alexander Whyte during his expedition to the Nyika plateau and the Masuku mountains, N. Nyasa, and presented to the British Museum by Sir Harry Johnston, K.C.B.

Mr. Thomas stated that the collection contained the first specimens he had seen of several of the species obtained by the German traveller Dr. Böhm in Marungu, such as *Rhynchocyon reichardi*, "*Mus*" *kaiseri*, and *Gerbillus böhmi*.

There were also examples of several southern forms not previously recorded north of the Zambesi, such as *Lepus crassicaudatus* and *Xerus cepapi*, specimens of many S. Nyasa species already obtained by Mr. Whyte at and near Zomba, and, finally, examples of the following new species :—

XERUS[1] (PARAXERUS) LUCIFER, sp. n.

Size about as in the Common Squirrel. Fur soft, thick, and long. General colour brilliant rufous or orange-rufous all over, except a broad patch on the back, from the withers to the rump, which is shining black, with a few rufous hairs intermixed. Throughout the fur is blackish slaty at base, the tips being rufous. The rufous colour varies in intensity, being deepest and reddest on the head and hips, brightest and tending most to orange on the forearms, hands, and feet, while on the flanks and sides of the neck it is more or less suffused with olivaceous yellow. Belly

[1] For the reasons which have induced the use of the generic name *Xerus* for this animal and its allies, see Major, P. Z. S. 1893, p. 179.

mixed greyish and white, the hairs slaty grey basally, yellowish white terminally. Scrotum orange-yellow. No black markings on muzzle, round eyes, or on ears, all being equally rufous. The whiskers are, however, black. Tail brilliant rufous throughout, some of the hairs of the upper surface subterminally ringed with black.

Skull elongate, smoothly rounded, with short backwardly directed postorbital processes. Nasals much expanded behind, their posterior breadth greater than their anterior. Two upper premolars present.

Dimensions of the type, an adult male, in skin:—

Head and body 258 mm.; tail imperfect (of another specimen, without hairs (*c.*) 198, with hairs 260); hind foot, moistened, 52·5; ear 19·5.

Skull—greatest length 56; greatest breadth 31·7; nasals, length 15, breadth anteriorly 8, posteriorly 10·3; tip to tip of postorbital processes 23.

Hab. Kombe Forest, Masuku Range, 7000 feet.

Type. ♂. Collected by Mr. A. Whyte, July 1896.

This splendid Squirrel, beside which even *X. palliatus* looked almost dull, was really not closely allied to that animal, but by the general shape of its skull and the expansion of its nasals posteriorly seemed to show a nearer relationship to *X. cepapi* and *X. pyrrhopus*. In any case, however, the alliance was a very distant one, and no detailed comparison with these or other species was required to prove its entire distinctness from anything hitherto known.

Saccostomus elegans, sp. n.

Colour very much as in an Upper Shiré specimen of *S. campestris*, from which it differs in its much longer and narrower skull, slenderer muzzle, less widely open anteorbital foramina, narrower interorbital region, straight front edge of interparietal, and small palatal foramina, which do not reach to the front edge of m.[1].

In some of these cranial characters *S. elegans* agreed with *S. mashonæ*, De Wint., but differed from that species in its buffy or isabelline colour, instead of the slaty grey which is so peculiar in that form.

Dimensions of the type, in skin, female:—

Head and body 144 mm.; tail 38; hind foot 18·8; ear 15.

Skull—greatest length from tip of nasals to occiput 32·5: nasals 13·3 × 3·7; interorbital breadth 4·2; interparietal 3·2 × 6·4; diastema 10·1; palatal foramina 6 × 2·5; length of upper molar series 4·3.

Hab. Karonga, Lake Nyasa.

Mus nyikæ, sp. n.

Similar in size and proportions to *M. chrysophilus*, De Wint., which also occurs on the plateau, but the general colour much browner, duller, and less yellow. The back grizzled black and

buffy yellow, clearer on sides. Belly white, the bases of the hairs slaty. Ears larger and rounded. Upper surface of hands and feet whitish. Tail long, thinly haired, coarsely scaled (10 to the cm.), brown above, rather paler below.

Skull short and broad, with a large rounded brain-case. Muzzle broad and flat. Supraorbital ridges delicate, widely divergent behind. Palatal foramina very long, reaching to the middle of m.^{1}. Posterior palate reaching more than 1 mm. behind m.^{1}. Incisors narrow, very pale-coloured, nearly or quite white near their tips. Molars broad and rounded, their cusps well defined.

Dimensions of the type, in skin :—

Head and body 157 mm.; tail 151; hind foot 27; ear 18.

Skull—basilar length 30; greatest breadth 19; nasals $14 \times 4{\cdot}4$; interorbital breadth 5·2; interparietal $9 \times 3{\cdot}4$; palate-length from henselion 18; diastema 10·1; palatal foramina $10 \times 2{\cdot}1$; length of upper molar series 6·7.

Hab. Nyika plateau.

GEORYCHUS WHYTEI, sp. n.

Similar in size, character and colour of fur, and other external characters to *G. nimrodi*, De Wint., more silvery buff than *G. hottentottus*. No trace of a white frontal spot.

Skull heavy, particularly broad across the interorbital region, and with strong, very widely expanded zygomata. Nasals narrow in front, rapidly broadening to their middle, and then evenly narrowing again to a point posteriorly. Ascending processes of premaxillæ considerably surpassing nasals, unusually broad posteriorly, 3 mm. broad at the fronto-maxillary suture, and tending in old age to unite behind the nasals. Anteorbital foramen high. Other cranial characters much as in *G. hottentottus*.

Dimensions of type (♀), in skin :—

Head and body (stretched) 177 mm., hind foot (*c.*) 22.

Skull—basilar length 32·6; greatest breadth 30; nasals $13{\cdot}2 \times 4$; interorbital breadth 11·2; palate-length from henselion 23·2; diastema 14.

Hab. Karonga, Lake Nyasa (*A. Whyte*, July 1896). A Mole-rat, apparently of the same species, was also found up to the extreme top of the Nyika plateau.

THRYONOMYS[1] SCLATERI, sp. n.

Most nearly related to *T. gregorianus*, Thos., of which the external characters have not as yet been described. General colour very much as in *T. swinderenianus*, but the pelage, though more hispid than ordinary fur, is much softer and more flaccid than in the common form. Tail nearly twice the length of the hind foot. Posterior belly and axillary region whitish.

Skull rather smaller than the typical skull of *T. gregorianus*, although decidedly older. Nasals parallel-sided. Frontal pre-

[1] Attention may be again drawn to the fact that *Aulacodus*, Temm. (1827), was preoccupied by Eschscholz (1823), and therefore that the name *Thryonomys*, Fitz. (1867), should stand for this genus.

maxillary processes slender, surpassing the nasals by about 5 mm. Frontal narrow, flat, without the peculiar hollows just inwards of the postorbital processes found in the allied species. Postorbital processes well-developed, succeeded behind by a deep notch, following which there is a strongly developed supplementary process on the squamosal. Brain-case comparatively long, much narrower than in *gregorianus*. Anteorbital foramina high and open, the bony bridge over them comparatively slender; front edge of their outer wall nearly vertical. Malar less vertically produced than in *gregorianus*. Teeth apparently as in *gregorianus*, but too much worn for exact comparison. Posterior palate extending about 3 mm. behind the molars.

Dimensions of the type, an aged female, in skin:—

Head and body 420 mm.; tail (imperfect at tip) 110+?; hind foot 63.

Skull—basal length 69, basilar length 61; greatest breadth 53; nasals 28×14; interorbital breadth 25; tip to tip of postorbital processes 30; intertemporal breadth 24; least breadth across brain-case behind zygomata 28·5; greatest ditto 37; palate-length from henselion 34; diastema 17; length of upper molar series 14.

Hab. Nyika plateau, 6000–7000 ft.

Mr. Thomas had named this interesting animal in honour of Mr. Sclater, at whose instigation the Nyasa explorations had been begun, and to whose efforts so much of their continued success had been due.

T. sclateri was unquestionably most nearly allied to the species discovered by Dr. Gregory in Kikuyu, from which region Mr. Jackson had recently sent the skin of a young example. This skin had a yellow throat, yellow inner sides of both fore and hind limbs, and yellow groins, these parts being white in *T. sclateri*. Its fur was rather stiffer than in *T. sclateri*, and its tail was scarcely longer than the hind foot, a character which if constant in the adult would form a good external mark of distinction between the two forms.

With regard to *Gerbillus böhmi*, Noack, of which two specimens were in the collection, Mr. Thomas thought the difference in the character of the incisors from that found in typical *Gerbillus* rendered it convenient to form a special subgenus for the reception of the species, and this he proposed to call *Gerbilliscus*. As pointed out by Dr. Noack, the incisors had two very shallow and almost indistinguishable grooves on their faces, instead of the single deep groove found in all the true Gerbilles.

Mr. Thomas also stated that an examination of a *Petrodromus* from Zomba in the collection had convinced him that, instead of containing only a single species, the genus might be readily divided into three species—one from Mombasa, Mandera, and the neighbouring parts of E. Africa proper; one from the Rovuma River; and the third from the Zambesi and Shiré Rivers. The last named might be considered the typical form, as whatever Peters's

Boror specimens proved to be, Senna and Tette were the localities first named by him.

In a previous communication to the Society [1], Mr. Thomas had stated that in *Petrodromus* there was a considerable difference in size between the sexes; but this statement he had now to withdraw, as it proved to have been based on a confusion of species, and a careful comparison now showed that there was no essential difference in size or in other characters between the two sexes. In confirmation of this it might be noted that as regards the allied genus *Macroscelides*, of 15 skulls of *M. fuscus* from Mashonaland and Matabililand, there seemed no appreciable difference in size between the two sexes.

Similarly there appeared to be no differences between the sexes as regards the character of the hairs on the under surface of the tail, peculiarities which were first described by Dr. Günther [2] and then by Dr. Matschie [3]; and these had been, especially by the latter, regarded as in some way connected with sex. Now, however, it appeared that both sexes possessed tail-like bristles of the same nature, and that the structure of these formed very good specific characters.

The following were diagnoses of the three species recognized by Mr. Thomas:—

1. P. TETRADACTYLUS, Pet.

Tail well-haired, the hairs perfectly simple and normal, not swollen, but more numerous than in the other species, hiding the scales; terminal half of tail markedly black. A small part of the rump around and above the base of the tail naked.

Skull of medium size. Large and open posterior palatal vacuities present.

Hab. Zambesi and Shiré Rivers; Senna and Tette (*Peters*); Zomba and Milanje (*Whyte*).

2. P. ROVUMÆ, sp. n.

Tail much more thinly haired, the hairs not hiding the scales, and more uniformly coloured, brownish above, rather paler below. Along the middle of the underside there are a number of peculiar broadened bristles, about 2 mm. long, thin basally, thickened at their middle, and tapering terminally to a point. These thickened bristles are mostly white basally and black terminally. Rump largely naked, a space of half an inch laterally from the tail, the whole of the back of the hams, and a mesial extension halfway along the sacrum being entirely bare, or with a thin covering of fine silky white hairs, so fine as to be quite invisible without a lens.

Skull very similar to that of *P. tetradactylus*, but rather smaller and narrower across the brain-case.

[1] P. Z. S. 1890, p. 445.
[2] P. Z. S. 1881, p. 164.
[3] Säug. Deutsch-O.-Afr. p. 29 (1895).

Dimensions of the type, an adult female, in spirit:—

Head and body 156 mm.; tail 154; hind foot 49·7; ear 29·5.

Skull—basal length 43; greatest breadth 23; nasals, length 17·5; interorbital breadth 7·5; breadth of brain-case 17·8; palate-length 27·5; front of $i.^1$ to back of $m.^2$*, 26·8; combined lengths of $p.^3$, $p.^4$, $m.^1$, and $m.^2$, 12·1.

Hab. Rovuma River, 100 miles inland.

Type. B.M. 63. 10. 12. 2. Collected and presented by Dr. Livingstone.

Two further specimens, without exact histories, but probably from the same expedition and locality, had been presented to the British Museum by Sir John Kirk in 1864. One of these had been made into a skeleton on arrival, but its sex unfortunately not recorded; the other, like the type, was a female.

This species was intermediate between the other two in the character of its tail-bristles and in locality, but in size was rather smaller than either. It was just possible that Peters's Boror specimens might prove to belong to it, as its skull was very like that figured by him. However, as already stated, the typical locality of Peters's species should be taken as Senna.

3. P. SULTANI, sp. n.

Size largest. Tail very thinly haired, almost naked, coloured as in *P. rovumæ*; along the whole of its under surface were a large number of most peculiar bristles, from 2 to 5 mm. in length, as had been described by Dr. Günther; stiff but elastic, and with a round or oblong knob at their tip; the bristles themselves were whitish, with the knobs nearly black. Rump very little naked, even the comparatively small part that was bare in *P. tetradactylus* having a certain sprinkling of fine hairs visible with the naked eye. Sole-pads large, and the plantar reticulations particularly distinct.

Skull large and powerful, with squarely expanded zygomata and broad brain-case. Palate almost without vacuities, the large ones present in the other species opposite $p.^4$ and $m.^1$ almost or quite filled up.

Dimensions of the type, an adult male, in skin†:—

Head and body (*c.*) 198 mm.; tail (*c.*) 150; hind foot 53·5.

Skull—basal length 50; greatest breadth 29·8; nasals, length 20·5; interorbital breadth 9; breadth of brain-case 20; palate-length 31·2; front of $i.^1$ to back of $m.^2$, 29·2; combined lengths of $p.^3$, $p.^4$, $m.^1$, and $m.^2$, 13·5.

Hab. Mombasa (*Kirk and Taylor*), Mandera, inland of Bagamoyo, (*Langheld*); Masailand (*Jackson*).

Type. B.M. 80. 11. 30. 10. From Mombasa, collected by Sir J. Kirk.

No detailed comparison of this fine species with its allies was

* The last molar.

† Of another adult male, in spirit, from the Rabai Hills:—Head and body 178 mm.; tail 154; hind foot 55·5; ear 35.

necessary, for the moment the peculiar character of its caudal bristles was shown not to be sexual, it was evident that it could no longer be confounded with the more normal-tailed species. Adult examples of both sexes were present in the series, as was also the case with the Nyasan *P. tetradactylus*.

Mr. Howard Saunders, F.Z.S., exhibited on behalf of Mr. Henry Evans a series of instantaneous photographs, taken in the Outer Hebrides, of the Great Grey Seal (*Halichœrus gryphus*) in various attitudes.

The following papers were read :—

1. On the general Zoological Results of the Tanganyika Expedition. By J. E. S. Moore.

[Received April 4, 1897.]

The object of this expedition to Tanganyika was to collect materials sufficient for the more complete determination of certain special forms of animals. At the time I started our knowledge of the fauna of the great lakes was in a most imperfect condition. It had been ascertained by Boehm in 1883 that a Medusa inhabited Tanganyika; and through the examination of the empty shells of the various molluscs brought back by travellers from the Interior it had been determined that the great lakes contained examples not only of species and genera which are normal to fresh water, but of others which but for their known lacustrine habitat would certainly have been regarded as marine. It was impossible, however, with the material then at our disposal, to say whether the deviations from the usual characters of the freshwater faunas found in Central Africa were likely to be due to convergence of evolution, *i. e.* parallel development, or to the lakes having been actually contaminated by oceanic forms. Neither could it be determined, supposing the lakes to have been thus contaminated, whether the marine forms they exhibited were like anything at present existing in the sea, or whether they had persisted or become modified from a more ancient marine stock which has elsewhere disappeared. The probability of these forms having resulted from marine contamination is obviously greatly affected by the question whether they are locally or widely distributed as African freshwater forms. If they are widely distributed, it is quite likely that Africa possesses animals which are not at present known to inhabit lakes elsewhere. If, on the other hand, they are extremely limited in distribution, it is probable that the existence of these enigmatical animals has resulted through the contamination of the great lakes, either in the past or the present, by animals from the sea.

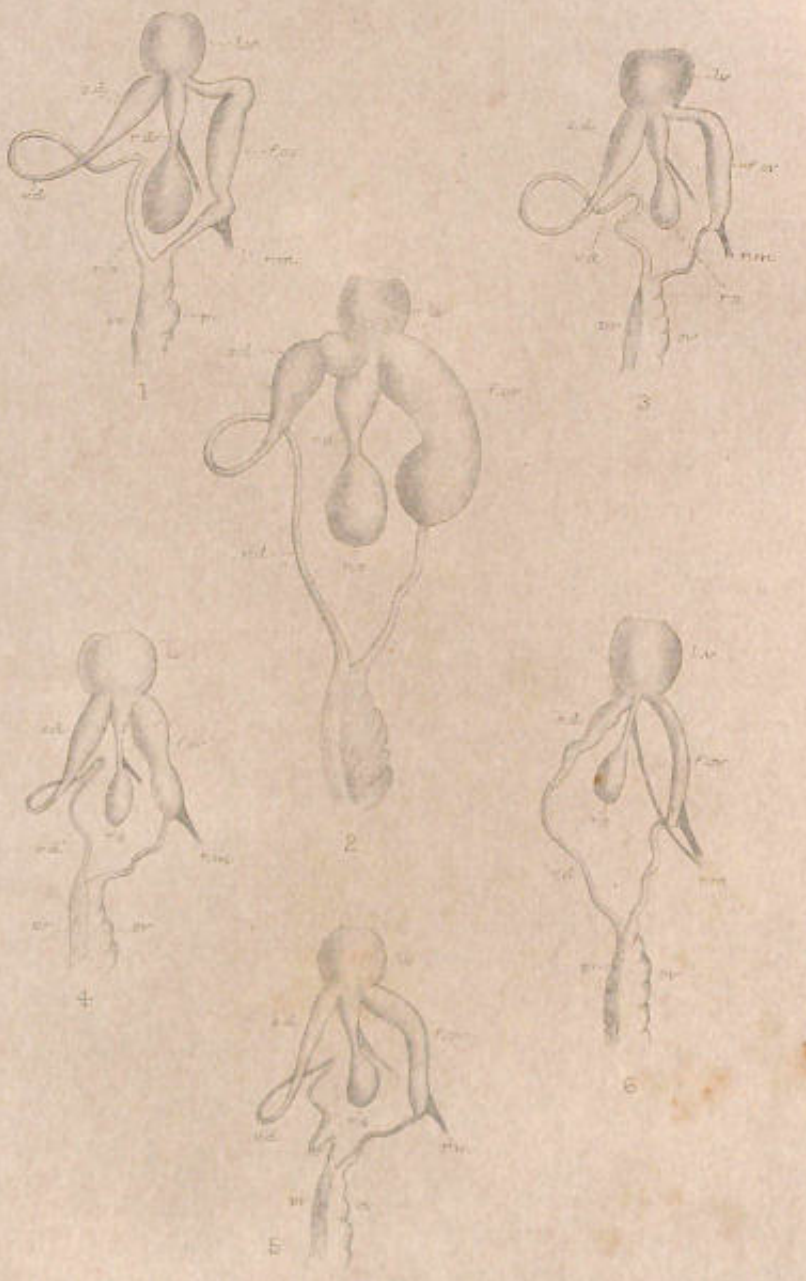
In the first place, it will be necessary to see if a widespread similarity in the African lake-faunas is in the nature of things possible, and, in order to ascertain this, it is essential to examine

the physiographical characters of the lakes themselves. We have, in the interior of the continent, a number of sheets of water at very different altitudes, displaying considerable variations in the climatic and other conditions which affect the faunas they contain. Some of them are salt, some brackish, and some fresh. Many of them are connected with each other by rivers, which flow from one to the other and find their way out of the lowest into some great channel towards the sea. The basins in which these lakes are contained are, moreover, readily divisible into two distinct kinds, some being broad and shallow, while others are long, narrow, and deep. The former appear to be filled by collections of rain-water in the depressions of an elevated plateau; but the latter have certainly been formed in quite a different way, their origin having attracted the attention of geologists for some time. It appears that the formation of these valleys is to be associated with a series of geological commotions which have affected an immense area of the African continent, their action having extended from Nyasa to the Red Sea, and even farther north. It is, moreover, not probable that all these depressions were formed simultaneously, and it is quite likely that some of them are as old as the sedimentary deposits of the Jurassic seas. They exist now as a series of long narrow valleys running north and south along the whole continent, and some of them are so deep that their bottoms are, like that of Nyasa, many hundreds of feet below the level of the sea. Such lakes, owing to their great depth, are not likely, as the superficial waters are, to be subject to much change; and we should therefore expect to find a greater abundance in the faunas they possess, and this in fact is found to be actually the case. There is, however, nothing in their surroundings, or in the climatic conditions by which they are affected, which could widely differentiate the faunas of the great deep lakes from those of the equally great shallow ones. There is nothing in the physiographical features of either class of lakes to suggest that the animals which inhabit them will exhibit any greater specific differences than those which would naturally be expected in sheets of water at different altitudes in different climates, and spread over an immense area of land.

Next to Tanganyika, restricting our attention at present to the Molluscs, we find that the fauna of Lake Nyasa is the most completely known. It is obvious from the first that we have, in this lake at least, nothing but what are in the strictest sense lacustrine forms. Turning to the other lakes, we find in Shirwa representatives of *Paludinæ* similar to those in Lake Nyasa, together with a small *Planorbis* near the shore. In the little Lake Keler, near the south end of Tanganyika, there are species of *Planorbis*, but the fauna of Lake Rukwa is unfortunately unknown. In Lake Bangweolo it has recently been reported that there are no shelled molluscs of any sort; but in Lake Mwero, which is not very far to the north, there are several examples of Nyasan genera of this group. The fauna of the small lakes north of Tanganyika is not known, but in the Albert Edward Nyanza there are a large number

of molluscs of genera all similar to those found in Nyasa. In the Victoria Nyanza, in Lake Baringo, and in several others it is the same. Thus it will be seen that Nyasa contains representatives of all the genera met with in the above enumerated lakes. Some of them contain more, some fewer, just as might have been anticipated from the sort of difference in their physiographical characters. Nyasa in fact contains a generalized series of the generic faunas of these other lakes, and an inspection of these forms is sufficient to show that they one and all belong to well-recognized lacustrine groups. If now, however, we turn our attention to Lake Tanganyika, we find not only the whole list of genera fully represented, but above and beyond this a number of quite new and strange forms: these constitute by themselves an isolated and an intensely interesting series, every member of which, with the probable exception of *Neothauma*, would, were not their habitat known, have been regarded without any hesitation as marine forms. But a somewhat closer examination of this group shows, in the first place, that the Mollusca themselves are not very similar to any forms now inhabiting the sea. *Typhobia* and certain other species seem to have certain points in common—their radulæ, although differing from every known form, are like each other. The little Gastropod which has been known as the *Lythoglyphus* of Tanganyika is certainly not related to that group, but approximates in anatomical characters as a whole to the group of the *Paramelaniæ*. This last group is certainly very distinct from that formed by *Typhobia* and its associates, but its members are quite as peculiar, isolated, and self-contained. A most remarkable variety of this group occurs in the deep waters of Tanganyika, where it is associated with *Typhobia*, *Limnotrocus*, and some new species. The true *Paramelaniæ* exist a little higher up, and the lesser forms of this species infest the barely submerged rocks. So far as I have yet been able to study the anatomy of these forms, they certainly seem to suggest a primitive, simple, or generalized condition of their parts. They do in fact bear much the same relation to the typical lacustrine and sea-molluscs that the Ganoids do to the typical freshwater and modern oceanic fishes. This incapacity they one and all exhibit of being associated directly with either the present lacustrine or oceanic faunas, seems to me to point most strongly to their being the persistent or modified representatives of a sea-fauna which must have contaminated Tanganyika long ago. The similarity of various forms of *Paramelania* to certain fossil shells is a fact which has been already independently recognized by White and Tausch, who have called attention to the strong resemblance of these shells to the *Perguliferæ* of the American and Southern European Chalk. I may here further point out how closely certain forms occurring in Tanganyika resemble the *Purpurinæ* of the Inferior Oolite.

The testimony of the geographical distribution of the fauna of the great lakes of Central Africa and of their morphological characters, so far as I have at the present time been able to go, seems



W.E.C. del. ad. nat.

West, Newman imp.

Slugs of the Genus Arion.



W.E.C. del. ad nat.

West, Newman imp.

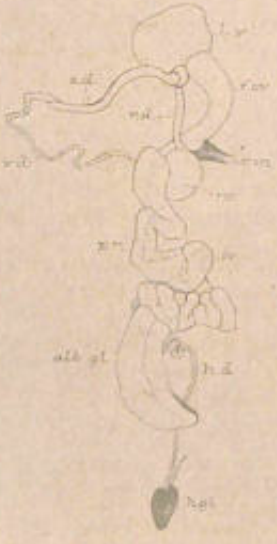
Slugs of the Genus Arion



14



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W.E.C. del. et lith.

West, Newman imp.

Slugs of the Genus Arion.

to point to the general conclusions that Tanganyika is unlike most of its sister lakes in having been contaminated by incursions of marine organisms at a rather remote period of time. It is certain that there are *two* distinct faunas in Tanganyika, but the ultimate determination of the nature of the more peculiar series which I have just described can only be attained by a thorough comparative study of the morphology of the selected specimens which I have brought home.

In the meantime, however, it may not be unprofitable to point out that there is nothing in the geology of the Tanganyika district which precludes the likelihood of that part of Africa having been occupied by an arm of the sea in ancient times. The massive sandstone formations of this district are probably of Jurassic age; and it is by no means improbable that the rift-valley in which Tanganyika now lies began to be formed shortly after these sandstone beds were raised.

2. On some European Slugs of the Genus *Arion*. By Walter E. Collinge, F.Z.S., Assistant Lecturer and Demonstrator in Zoology and Comparative Anatomy, Mason College, Birmingham.

[Received March 2, 1897.]

(Plates XXIX.–XXXI.)

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1. *Introduction.*

During the past five or six years I have been enabled, through the kindness of numerous malacologists and other naturalists, to examine exceedingly large series of the various species of European Slugs from numerous localities. Some of the results obtained are detailed in the following notes.

My best thanks are due to Mr. G. H. Carpenter, the able editor of the 'Irish Naturalist,' for the very kind manner in which he has helped me to obtain material from Ireland. My thanks are also due to the following ladies and gentlemen for material they have from time to time sent to me:—Misses M. J. Delap and Amy Warren, Messrs. A. W. Borthwick, J. Steele Elliot, W. A. Gain, A. Hartley, H. H. Macnabb, W. Moss, Jas. N. Milne,

R. A. Phillips, H. B. Rathbourne, R. F. Scharff, E. W. Swanton, J. Taunton, A. T. Wilson, B. B. Woodward, G. W. Wood, and Morris Young.

2. *The Constancy of Anatomical Characters.*

During the last ten years nearly all the new species of Slugs have been constituted upon differences in the form and position of the generative organs, as may be readily seen by a reference to the writings of Simroth, Lessona, Pollonera, Godwin-Austen, and others. The external characters of such a group are exceedingly unreliable, for the colour, markings, &c. are liable to a wide range of variation in each individual species. Mr. Cockerell (3) has very decidedly questioned—strange as it may seem—the validity of anatomical characters for generic or specific distinction. Writing in 1892 (3. p. 4) he says:—"Here there is undoubtedly danger of error, since it is difficult to find out in many cases what is the stability of the apparent anatomical distinction. . . . Nothing should be more strongly insisted upon than the impossibility of applying the same tests of specific validity throughout series of genera; for characters that are generic in one place may not be specific in another." Mr. Cockerell is, I fear, dogmatizing upon a subject which he has not taken the trouble to actually work out; for, so far as I am aware, there is not a single valid genus of European Slugs in which good anatomical features cannot be set forth as characteristic of this or that particular genus. As I have elsewhere stated (3), for the separation of genera the aggregate characters should be the basis for distinction; but for specific distinction the form and position of the generative organs is undoubtedly a reliable basis, provided that undue importance is not attached to minute variations due to age, season of the year, &c.

More recently Messrs. Cockerell & Larkin (4) have attempted to substantiate the statement concerning the stability, or, as I prefer to term it, the constancy, of the form of certain parts of the generative organs in *Veronicella*. A careful perusal of this paper only proves, to my mind, that the results obtained are of little or no value as regards the subject under discussion, for the authors are not certain whether they are dealing with variations in two, three, or four species[1]. Some of the specimens, I am of opinion, were not full-grown, while in others the variations noted are of the most trifling character. Where such investigations are undertaken, it is surely necessary, if the results are to be of any value, to be quite certain of the species; further, the number of specimens examined, and the proportion of variations found in each collection, if from more than one locality, should be stated.

With a view to proving how little important variation occurs in the form of the terminal ducts of the generative organs, I have during the past four or five years carried out a series of investi-

[1] In a footnote the authors state that Dr. Simroth considered some specimens submitted to him as distinct species.

gations upon two common and widely distributed species, viz., *Arion subfuscus*, Drap., and *A. hortensis*, Fér., which are detailed below.

ARION SUBFUSCUS, Drap.

The form and position of the generative organs in this species are illustrated on Pl. XXIX. fig. 1. Externally the species is one subject to a wide range of variation. I have myself noted some thirty minor colour-variations in addition to the fifty or sixty varieties which have been described by various authors. If this species assumes different colours, markings, &c. in different districts, which it undoubtedly does, in common with nearly all other species, the value of such as distinctive features is materially lessened, and one is led to ask "Does the form of the generative organs vary to a similar extent?"

I have examined 152 lots of this species, each from different localities in various parts of Europe, including in all 751 specimens. All of these were adult and collected during the months of July and August in 1892–3–4–5. Out of this large collection in only four of the lots were variations found, particulars of which are as follows:—

1. Four specimens collected at Southampton (Pl. XXIX. fig. 2). In three specimens the sperm-duct had a globose ring-like swelling at its commencement, and the free-oviduct showed the globose form figured. Professor Simroth, who examined a specimen, considered it "a very developed *A. subfuscus*."

2. Three specimens from Ireland (Pl. XXIX. fig. 3). All slightly smaller and darker than the typical form. All three specimens exhibited a slight difference in the form of the free-oviduct.

3. Five specimens collected near Knowle, Warwick (Pl. XXIX. fig. 4). All belonging to the variety *griseus*, Cllge. In one specimen the form of the free-oviduct was somewhat like that in No. 1 (fig. 2), only less globose and more constricted in the middle of the lower portion.

4. Five specimens collected in Northern Italy (precise locality uncertain). In two specimens both the sperm-duct and free-oviduct differed slightly (Pl. XXIX. fig. 5).

In all the above variations it will be seen, on comparing figures 2 to 5 with figure 1, that the distinction between the upper and lower portion of the free-oviduct was very sharply marked.

ARION HORTENSIS, Fér.

Only 83 lots of this species have been examined, each from a different locality, including in all 491 specimens. In 19 specimens the generative organs were found to be immature, thus leaving 472. Variations were found in six cases.

1. Two specimens from Tuxford, Newark (Pl. XXX. fig. 7). In one the free-oviduct was longer than usual and the sperm-duct more globose.

2. Ten specimens from Ireland (Pl. XXX. fig. 8). Three speci-

mens showed a peculiar series of constrictions in the sperm-duct, and slight constrictions in the free-oviduct.

3. Seven specimens from Northern Italy (precise locality uncertain). The difference from the typical form was very slight, the most marked character being the gradual tapering of the free-oviduct (Pl. XXX. fig. 9).

4. Nine specimens from St. Andrews, N.B. (Pl. XXX. fig. 10). In one example the sperm-duct had the peculiar form figured, and was sharply marked off from the vas deferens.

5. Twenty-seven specimens from Ireland (Pl. XXX. fig. 11). In two examples in this collection the vas deferens was sharply marked off from the sperm-duct, which approached in form that mentioned in the previous collection (*cf.* fig. 10).

6. Thirteen specimens collected at Bern, Switzerland (Pl. XXX. fig. 12). Three specimens showed the globose form of the lower portion of the sperm-duct, and differed somewhat from the type in the form of the free-oviduct.

It will thus be seen that out of 1223 specimens of *A. subfuscus*, Drap., and *A. hortensis*, Fér., from 235 localities, in only 26 specimens were variations discovered from 10 localities, and three of these were presumably not constant, being found only in individual specimens.

I am of opinion, therefore, from these and other investigations (9) that the form and position of the generative organs in these two species are of the greatest value, and exceedingly reliable for purposes of specific distinction. Further, wherever the form and position of these organs differed, and these differences were constant in a given number of specimens, I should unhesitatingly describe them as distinct species, irrespective of external colouring or markings.

Of course, to anyone acquainted only with the form of the generative organs in a very few species, or a small number of any given species, slight differences are apt to receive a wrong interpretation, and an undue importance is very often attached to such; but the experienced malacologist knows that slight differences due to age, season of the year, &c. are constantly found, and are just as worthless as permanent and well-marked differences are valuable. Until, therefore, the variations in any particular species or group of species are shown to be very great, I do not think we can do better than retain the form and position of the generative organs as our basis for specific distinction.

3. *A Reversion of a Colour Variation.*

A few years ago Mr. Gain described some very interesting observations upon the colour changes *Arion intermedius*, Normand, undergoes (12), and later I have noted similar colour variations in other species.

The present case is, I think, still more interesting than either of the above.

In the autumn of 1896 I received a specimen of the white

variety of *A. empiricorum*, Fér., from Roundhay near Leeds. It was of an almost pure white, not the creamy-yellow variety which is much commoner. For some months the specimen was kept alive beneath a bell-jar on a large flower-pot, and liberally supplied with leaves of lettuce, cabbage, &c. During this period I witnessed a complete reversion to the typical black form. After I had kept the animal for about five weeks, I noticed that it looked much dirtier than previously, and about the seventh week it was a very dirty white, which quickly changed into a faint sepia. About the ninth week it became very inactive, and for three weeks, whenever I examined it, it was drawn up in the peculiar arched form so characteristic of this and a few other species of *Arion*. During this time a large amount of thick dark yellow slime was exuded from the caudal mucous pore, and remained over the postero-dorsal region of the body. Little by little the colour deepened, and the animal became more active about the middle of the fourth month, by which time it was almost black: by the end of the fifth month it was impossible to distinguish it from the typical black forms.

I have previously seen examples of this Slug undergo slight changes in colour, such as the black forms becoming much lighter, a dark sepia; but I know of no instance of so complete a change as the one here described, viz., a complete reversion to the normal colour from a pure white.

4. *The Specific Validity of* Arion fuscus, *Müll.*

Through the kindness of Signor Pollonera, I was able in 1892 to examine specimens of this species, and from the slight differences I was able to detect in the form of the generative organs in these specimens, I was inclined to regard it as a variety of *A. subfuscus*, Drap. (7). Since then I have been able to make a more careful examination on some better material, for which I am indebted to the kindness of Herr Joseph F. Babor, of Prague University; and I am of now of opinion that, from the differences in the form of the generative organs, it must be regarded as a distinct species.

ARION FUSCUS, Müller, 1774.

Limax fuscus, Müller, Verm. Hist., 1774, vol. ii. p. 11.

Arion fuscus, Mörch, Vidensk. Medd. naturhist. For. Kjöbenhavn, 1863, p. 273.

Prolepis fuscus, Malm, Skand. Land-Sniglar, 1870, p. 43, pl. ii. fig. 4.

Arion rufus (partim), Westerl., Exposé critique Moll. Suède et Norv., 1871, p. 32.

Arion citrinus, Westerl., Exposé critique Moll. Suède et Norv., 1871, p. 35.

Arion stabilei, Poll., Atti Acc. Sci. Torino, 1885, p. 28.

Arion fuscus, Poll., Atti Acc. Sci. Torino, 1887.

This species is much smaller than *A. subfuscus*, with the bands on the mantle distinct; the lines on the foot-fringe vary from dark

brown to pale yellow, when of the latter colour they are usually more intense in the region of the caudal pore. Long. max. 40–55 millim.

There is a single vestibule, from which the sperm-duct opens in the form of an expanded tube; it is comparatively larger than in *A. subfuscus*, and is folded upon itself at the point where the vas deferens commences, which organ is also considerably longer than in *A. subfuscus* (Pls. XXX. & XXXI. figs. 13–14). The free-oviduct is a long, wide, and somewhat S-shaped tube. In none of the specimens I have examined does it approach the form so characteristic of *A. subfuscus* (Pl. XXIX. fig. 1, *f.ov.*). The retractor muscle is attached about the middle, whereas in *subfuscus* it is attached to the upper third. The receptacular duct is long and thin, expanding at its head into the spherical receptaculum seminis. The retractor muscle is attached to the duct just below the head. The common duct is thrown into a series of convolutions terminally, and shorter than in *subfuscus*. The hermaphrodite gland is a small, dark-coloured, ovoid or pyriform body with a long convoluted duct.

Babor's description of the reproductive organs of *A. citrinus*, Wester. (2), leaves no doubt as to it being Müller's *A. fuscus*. I have reproduced his careful figures of these organs (Pl. XXXI. figs. 15–16), and also those of the variety *boettgeri*, Poll. (Pl. XXXI. fig. 17), which according to this author is characterized anatomically by the short receptacular duct, a feature which I can confirm.

5. *Description of a new Species of* Arion.

In 1892 (5) I recorded a new variety of the well-known *Arion hortensis*, Fér., under the name of *cæruleus*. The specimens had been very kindly sent to me from Ireland by Dr. R. F. Scharff. I pointed out in the description of this variety that possibly, when further investigated, its anatomical characters might prove to be more permanent than I then supposed. Since that date specimens have been sent to me by Mr. B. B. Woodward from Ealing (10), by Mr. H. Horsman Macnabb from Heaton, Lancashire, and I have myself collected examples near Oxford and elsewhere. After having made a careful examination of this material, I feel convinced that this form is sufficiently distinct both externally and internally to be separated from *A. hortensis*, Fér., as a distinct species.

ARION CÆRULEUS, sp. nov.

Arion hortensis, Fér., var. *cæruleus*, Collinge, Conchologist, 1892, vol. ii. p. 26.

Body blue or greyish blue, with conspicuous dark blue lateral bands, and pale yellow ground-colour between these and the foot-fringe; mantle with dark bluish central patch, and darker bands at each side; head and tentacles bluish grey; foot-fringe white, usually without lineoles; foot-sole white or very pale yellow; rugæ flat, large, and elongated; sulci dark.

Length (in alcohol) 27–33 millim.; alive 43 millim.

Hab. Co. Dublin, Ireland; Berkshire, Lancashire, Oxford, and Middlesex, England.

Anatomy of the Generative Organs.—The organs are generally larger than those in *A. hortensis*, Fér. There are two vestibules, the lower one being considerably larger than the upper. The lower portion of the sperm-duct forms a globose swelling, above this a wide tube gradually tapering as it approaches the vas deferens, which is sharply marked off from the sperm-duct. The vas deferens is rather longer than in *A. hortensis*. The free-oviduct is very distinct from that in any form of *A. hortensis* which I have seen, and quite unlike any species of the *A. hortensis* group, in having the lower portion of the free-oviduct much larger and more globose than the upper, which is a narrow tube (Pl. XXXI. fig. 19). The retractor muscle is attached to the upper part of the lower division of the free-oviduct. The receptacular duct is short, expanding terminally into the spherical sac, the receptaculum seminis. The remaining parts of the generative organs are similar to those of *A. hortensis*, Fér.

A comparison of figures 18 and 19 with those numbered 6 to 12 will illustrate the more striking differences.

In fig. 6 we have the terminal ducts of the generative organs of a typical *A. hortensis*, and a variation (fig. 12) which is the nearest to *A. cæruleus*.

Alcoholic specimens of *A. hortensis*, Fér., and *A. cæruleus* are very readily distinguished from one another, even more so than when alive, although the external features of *A. cæruleus* are much more distinctly marked than in any other member of this group.

6. *Synopsis and Classification of the Genus.*

The genus *Arion* as now understood by malacologists was constituted by Férussac (**11**) in 1819. Brard (1815) divided Linné's genus *Limax* into two genera, retaining Linné's name for those species without a shell, and constituted the new genus *Limacella* for those species possessing a shell.

Jousseaume (**13**) is the only malacologist I know of who has adopted this classification. Hartman (1821) used the name of *Limacia* for the genus.

Moquin-Tandon in 1855 (**17**) divided the genus into the two following subgenera:—

Lochea, where the shell-plate was absent and represented only by small, unequal, isolated granulations.

Prolepis, where the shell-plate was present in the form of an aggregation of separate calcareous particles.

In 1868 Mabille (**15**) constituted the genus *Baudonia* for two species of Portuguese slugs, *B. timida* and *B. montana*, which were distinguished from *Arion* by being anteriorly enlarged and depressed, with an almost smooth mantle, the head well separated from the body, and the tentacles small. It is hardly necessary to say that such superficial differences are of very little value, and

certainly not sufficient to constitute either a new genus or subgenus.

In 1870 Mabille (16) gave the *Arion fasciatus* group, mentioned on p. 447 in this article, the name of *Carinella*, under the impression that all the species were keeled, which, however, is not the case, as I have elsewhere pointed out (6). Seibert in 1873 (Nachr. malak. Gesell. vol. v. p. 81) proposed the name *Kolbeltia* for the *A. hortensis* group. Later Simroth (22), 1885, divided the genus into two sections, the *Monatriidæ* and *Diatriidæ*. In the former division all species possessing a single vestibule were grouped, and in the latter all those in which the oviduct before opening into the lower vestibule dilates, thus forming as it were a second vestibule. Pollonera (19), 1887, has very clearly shown that such a character as the presence of either one or two vestibules cannot serve as a basis for classification, it not being a feature of sufficient importance. Further, he thinks that Simroth attached too much importance to such a character, through his having limited his study to the few Germanic forms. Pollonera showed that we not only find in the same groups species which are *Monatriidæ* and species which are *Diatriidæ*, but also that in the four groups into which he has divided *A. hortensis* two species are *Diatriidæ* (*A. hortensis* and *A. celticus*) and two are *Monatriidæ* (*A. alpinus* and *A. nilssoni*); further the *A. bavayi* belongs to the so-called *Monatriidæ*, while *A. rufus* and *A. ater* are the two species in which the *Diatriidæ* condition is most marked. In a later paper (21) this distinguished malacologist points out that the *A. hortensis* from the North of France are all *Monatriidæ*, whereas those from Germany are *Diatriidæ*, while those from the East of France are *intermediate between the two*. From these facts I think it will be evident that we can no longer separate the members of the genus *Arion* by the number of vestibules they possess into subgenera, groups, &c. The character is interesting and may possibly be of service in separating species, but as a feature for generic distinctions is useless.

Pollonera has suggested (19) the division of the genus into four groups, viz.:—

1. The *Arion empiricorum* group.
2. The *Arion subfuscus* group.
3. The *Arion hortensis* group.
4. The *Arion bourguignati* group.

I think this suggestion preferable to any yet proposed, and it is the one I have here followed, with some slight alterations, as shown in the following synopsis of the genus.

Synopsis of the Genus *Arion*.

1. The *Arion ater* group [1].

The animal is large and unicolour in the adult. Rarely banded

[1] I use the name *ater* for this group, as it is an older species than *A. empiricorum*.

or striped, excepting in young specimens. Mantle large. Adult never keeled. Free-oviduct of moderate length, with its terminal portion usually globose or expanded. Sperm-duct usually, but not always, opens into the vestibule by a thickened ring-like swelling. Retractor muscle of the free-oviduct always situated above the lower portion, and joins with that supplying the receptaculum seminis.

2. The *Arion subfuscus* group.

Usually banded, variable in colour. Varies in size from 35 to 75 millim. Mantle rather large. Adult never keeled. Free-oviduct generally sac-like or wide and long, without well-defined terminal swelling. Duct of receptaculum seminis usually long. Retractor muscles of the free-oviduct and receptaculum seminis usually distinct or only slenderly united.

3. The *Arion hortensis* group.

Nearly always banded, of dark colour. Varies in size from 30 to 55 millim. Mantle medium-sized, often small. Adult never keeled. Sperm-duct usually long and tapering, passing imperceptibly into the vas deferens. Free-oviduct gradually tapering. Retractor muscles usually united, but only slenderly.

4. The *Arion fasciatus* group.

Nearly always banded. In external appearance agrees very closely with the preceding group. Body sometimes keeled. Head of receptaculum seminis elongated, duct short.

5. The *Arion intermedius* group.

Animal usually of small size, varying from 15 to 27 millim. Mantle almost circular. Adult never keeled. Receptacular duct short and broad.

Lessona and Pollonera (14) are wrong in stating, as one of the characters of the genus, that the penis (=sperm-duct) and vas deferens are quite distinct, and do not pass imperceptibly into one another as in *Ariunculus*, for in numerous species there is no marked difference between the two.

The term penis cannot be used for the male organ in this genus; as has been pointed out by Simroth, it is not evertible, and has no retractor muscle, its function being for the storage of the spermatozoa. The free-oviduct assumes the function of the penis in this genus. It is evertible and provided with a retractor muscle. Messrs. Pilsbry and Vanatta (18) have suggested the term *epiphallus* for what I term sperm-duct, and *vagina* for what I term free-oviduct. I think it preferable, however, to retain the term epiphallus for the terminal portion of the vas deferens above the sperm-duct; the term vagina is not applicable to the genus *Arion*.

CLASSIFICATION.

Family ARIONIDÆ, Gray, 1840.

Subfam. ARIONINÆ, W. G. Binney, 1864.

Genus ARION, Férussac, 1819.

GROUP I.

1. **A. ater**, Linné, 1758. (Continent.)
2. **A. rufus**, Linné, 1758. (Continent.)
3. **A. empiricorum**, Férussac, 1819. (British Isles and Continent.)
4. **A. lusitanicus**, Mabille, 1868. (British Isles and Continent.)
5. **A. brevièrei**, Pollonera, 1887. (Continent.)
6. **A. dasilvæ**, Pollonera, 1887. (Continent.)
7. **A. *aggericola***, Mabille, 1870[1]. (Continent.)
8. **A. flagellus**, Collinge, 1893. (Ireland and Continent.)

GROUP II.

9. **A. subfuscus**, Draparnaud, 1805. (British Isles and Continent.)
10. **A. fuscus**, Müller, 1774. (Continent.)
11. **A. bavayi**, Pollonera, 1887. (Continent.)
12. **A. pegorarii**, Lessona & Pollonera, 1882. (Continent.)
13. **A. flavus**, Nilsson, 1822. (Continent.)

GROUP III.

14. **A. hortensis**, Férussac, 1819. (British Isles and Continent.)
15. **A. anthracius**, Bourguignat, 1866. (Continent.)
16. **A. cæruleus**, Collinge, 1897. (British Isles.)
17. **A. cottianus**, Pollonera, 1887. (British Isles ? a Continent.)
18. **A. nilssoni**, Pollonera, 1887. (Continent.)
19. **A. alpinus**, Pollonera, 1887. (Continent.)
20. **A. hessei**, Simroth, 1894. (Continent.)
21. **A. elongatus**, Collinge, 1894. (British Isles.)

GROUP IV.

22. **A. fasciatus**, Nilsson, 1822. (British Isles and Continent.)
23. **A. subcarinatus**, Pollonera, 1885. (Continent.)

[1] At present this must be regarded as a doubtful species. Mabille placed it in the *A. subfuscus* group (**16**), but Pollonera (**21**) states that from the radula it belongs to the *A. ater* group, being a form allied to *A. brevièrei*, Poll., from which it differs by its smaller size, brighter colour, small receptaculum seminis, shorter receptacular duct, and by the great length of the sperm-duct.

GROUP V.

24. **A. intermedius**, Normand, 1852. (British Isles and Continent.)
25. **A. molleri**, Pollonera, 1889. (Continent.)
26. **A. pascalianus**, Mabille, 1868. (Continent.)
27. **A. vejdovskijii**, Babor & Kostal, 1893. (Continent.)

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EXPLANATION OF PLATES XXIX.–XXXI.

Fig. 1. The terminal ducts of the generative organs of *Arion subfuscus*, Drap.
Fig. 2. The same, showing variation in the form of the free-oviduct.
Figs. 3, 4, & 5. The same, showing variations in the form of the terminal ducts.
Fig. 6. The terminal ducts of the generative organs of *Arion hortensis*, Fér.
Figs. 7, 8, 9, 10, 11, & 12. The same, showing variations in the form of the terminal ducts.
Fig. 13. The generative organs of *Arion fuscus*, Müll.
Fig. 14. The terminal ducts of the same in natural position.
Fig. 15. The terminal ducts of the generative organs of *Arion citrinus* Westerl. (After Babor.)
Fig. 16. The generative organs of *A. citrinus*. (After Babor.)
Fig. 17. The terminal ducts of the generative organs of *Arion fuscus*, var. *boettgeri*, Poll. (After Babor.)
Figs. 18, 19. The terminal ducts of the generative organs of *Arion cærulcus*, Cllge.

Lettering.

alb.gl. Albumen-gland.
f.ov. Free-oviduct.
h.d. Hermaphrodite duct.
h.gl. Hermaphrodite gland.
l.v. Lower vestibule.
ov. Oviduct.
pr. Prostate.
rd. Receptacular duct.
r.m. Retractor muscles.
r.s. Receptaculum seminis.
s.d. Sperm-duct.
u.v. Upper vestibule.
v.d. Vas deferens.

3. Field-Notes on the Antelopes of the Mau District, British East Africa. By Frederick J. Jackson, F.Z.S. With Remarks by P. L. Sclater.

[Received February 15, 1897.]

[Mr. Jackson, who is now in command of 'Ravine Station' at the edge of the Mau Plateau on the main route from Mombasa to Lake Victoria, has, in reply to some enquiries, kindly favoured me with the subjoined field-notes on the Antelopes of the district in which he is resident.—P. L. S.]

1. Bubalis cokei (Günth.).

I am doing my best to ascertain the ranges of the various Antelopes, but find it somewhat difficult. I thought I had quite

fixed the northern range of *Bubalis cokei* at the southern shores of Lake Naivasha, but only the other day Lt. G. E. Smith, R.E., shot a bull at Lake Elmenteita some 25 miles farther north. It was one of three. Of course there are sure to be a few stragglers of almost every species found wandering beyond the limits of their usual ranges, but so far, I believe, the southern shores of Lake Naivasha may be taken as the approximate limit of the northern range of Coke's Hartebeest.

2. Bubalis jacksoni, Thos.

In the same way the northern end of Lake Elmenteita may be considered as the limit of the southern range of *B. jacksoni*. How far west and north it extends I am unable to say, but I know that it is found in Uganda and Turkwel.

3. Damaliscus jimela (Matsch.).

D. jimela is found in fair numbers on the Mau plateau (at 8000 feet alt.) S.W. of this station on the borders of Lumbwa. In August, on my way to Elgeya, I saw one of these antelopes in a herd of *Bubalis jacksoni* on the Mau plateau at 7000 feet. It is also found in the Nyando Valley in South Kavirondo. In 1890 I saw a few, and got one, a fine bull, in Turkwel. It is very plentiful in Buddu, one of the large provinces of Uganda. The so-called 'Senegal Hartebeest' of the Tana river and Galla country, though doubtless the same species, appears to me, from memory, to be very much smaller.

4. Connochætes taurinus (Burch.).

The Wildebeest is not found anywhere near this Station, and does not occur north of the Athi plains.

5. Cephalophus grimmi (Linn.).

The Duyker is almost ubiquitous. Here it is more plentiful than anywhere I know of. I consider that 25 lbs. is about an average weight for both males and females.

6. Ourebia haggardi (Thos.).

7. Ourebia montana (Cretzschm.).

With regard to these Antelopes, I fear I can do nothing for you in the matter of procuring skins of the East African Oribi, as I am far away from its range, which I believe does not extend far inland from the coast, and I know no one who is sufficiently energetic or keen on shooting to apply to on your behalf. Personally I have never seen it west of a place called 'Maji chumvi' (salt water), the third up-country camp from Rabai. On the mainland near Lamu (*i. e.* in the former Witu Protectorate now merged into the E. A. P.) it is very plentiful, particularly so at a

place called Taka, opposite the island of Patta. It appears to be very partial to the vicinity of cultivations, and particularly to ground formerly under cultivation but from time to time lying fallow, where I suppose it finds better feeding and also good covert. The Abyssinian Oribi, on the contrary, appears to avoid the proximity of mankind, and prefers for the most part the open valley 'downs' far away from habitations, though I have seen them quite close to cultivations in Nandi.

To my knowledge the latter antelope is not found east of the Mau plateau. It ranges from the borders of Lumbwa (possibly farther south) to Turkwel, and west to Lake Victoria. I have lately sent some skins and skulls of this beast to Dr. Bowdler Sharpe, all procured by myself between the Sio river, in Kavirondo, and on the Mau plateau up to 8000 feet. A very noticable peculiarity of both the species is that when disturbed and retreating they jump high into the air, and when 'landing' do so on their hind legs, and not, as other antelopes do, on their fore legs.

8. RAPHICERUS CAMPESTRIS (Thunb.).

The Steinbuck is found throughout Masailand, but does not range to the west of Mau.

9. COBUS ELLIPSIPRYMNUS (Ogilby).

I believe that the Common Waterbuck (*C. ellipsiprymnus*) does not occur north of the Athi plains and west of Mount Kenia. Lake Naivasha is about the southern limit of *C. defassa*.

10. COBUS DEFASSA (Rüpp.).

The only Waterbuck found in this district is *C. defassa*. I see in the list of mammals at the end of Gregory's book there is a '*C. ellipsiprymnus*' mentioned from Njemps! I think this must be a mistake, as I have lately returned from Njemps, where I saw many herds of Waterbucks, *all* of which were *Cobus defassa*. Again, all the Waterbucks I have seen at Lakes Naivasha and Elmenteita were also *C. defassa*. There is no mistaking the conspicuous white rump of this beast.

11. COBUS THOMASI, Neumann.

This antelope does not, I think, range east of Kabras in Kavirondo. It is plentiful in Kavirondo, along the banks of the Nzoia and Sio rivers, and is also very numerous in Uganda and Toru, but how far west and north it extends I am not in a position to state.

I believe that this beast is never found far from water. Personally I have seen a good many, and they were never more than a few hundred yards from water. It was this fact that led me to believe formerly that they were *C. vardoni*, as I remembered what Selous had said about Vardon's Antelope being always found near water.

12. Cervicapra bohor (Rüpp.).

13. Cervicapra chanleri, Rothsch.

I have also sent home some skins and skulls of two species (I say species as I believe them to be distinct and not merely varieties) of Reedbucks. The 'stony-grey' species is much less plentiful than the yellowish-fawn species, and does not extend down into the plains, but appears confined to the higher ground on the hill-sides near this station, where there are no swamps. The Wanderobbo, who live almost entirely by hunting, recognize them as two distinct species, and have two names for them. I am hoping to get a fully adult buck of the former, as the one I have sent is, judging from the soft base of the horns, not quite adult.

14. Æpyceros melampus (Licht.).

The Impala does not, to my knowledge, occur west of Mau Escarpment, but farther north it ranges west into Turkwel. The bucks about here, *i. e.* within a radius of 80 miles S.E. and N., carry far finer horns than anywhere else I know of. A short time ago I killed two bucks with horns 23 inches and 22 inches respectively (from base to tip in a straight line), and lost, through the stupidity of one of my men, another which I believe would have beaten both of them.

15. Gazella granti, Brooke.

Grant's Gazelle ranges north into Turkwel and the Sak country, but is not found on the Mau plateau. At Njemps and Baringo, and in Turkwel this gazelle is considerably smaller than those found further south at Naivasha and the Athi plains. At Njemps I shot the largest buck out of a herd of 30, in which there were 3 or 4 other bucks. It was an old beast, in good condition, but only weighed 135 lbs. with horns 20 inches. To show you the differences in size, I append some measurements for comparison:—

	G. granti, ♂. Njemps (21.9.96).	*G. granti*, ♂ (two). Gil-Gil river, Lake Naivasha (2.1.96).		*G. granti*, ♂. Gil-Gil river, Lake Naivasha (4.4.96).
	ft. in.	ft. in.	ft. in.	ft. in.
Total length	5 3	5 8	5 7	5 7
Height at shoulder	2 11	3 1½	3 2½	3 0½
Depth of chest	1 1½	1 3	1 4	1 3
Circumference of chest...	2 9	3 1	3 3	3 1
„ haunch	3 0	...	...	3 5
„ loins...	2 3	2 9	2 10	2 7½
„ throat.	1 6	1 8	1 8	1 6
„ neck...	1 8	2 0½	2 1	1 10½
Tail	10½	11	10	10
Horns	20	28¼	27	24
Weight	135 lbs.	158 lbs.	167 lbs.	166 lbs.

16. GAZELLA THOMSONI.

Thomson's Gazelle does not, I believe, extend beyond a few miles north of Lake Nakuru. The average weight of a buck is 52 lbs.

The females *are horned*, whatever others may say to the contrary. The horns run up to about 6 inches, but are for the most part malformed and uneven.

17. HIPPOTRAGUS BAKERI, Heuglin.

Captain F. S. Dugmore, now in Kikuyu, killed a bull of this species on the Athi plains. He appears to be quite positive that it is a Roan of some sort. In April last, two marches from here, I saw a herd of 7 antelopes much resembling the Roan. They were about 800 yards off, and I had a good look at them with a powerful telescope before commencing a stalk, which, I regret to say, was unsuccessful through one of them, that I did not notice, seeing me. There were four cows, one bull, and two half-grown calves. In colour they were like an Oryx, and not unlike it in shape, though larger and longer on the leg. The back of the neck was arched, like a Sable, and appeared to have a short dark zebra-like mane. The ears were very long and tufted, and the horns of both the bull and cows were thick in proportion to their length, the bull's perhaps 20 inches or more, and curved backwards like a Roan. With the exception of one calf they were all standing under a big tree in the shade, and as they were all broadside on to me I could not make out what the facial markings were like. As the calf stood facing me, its ears stood out almost at right angles to its head, with a slight droop towards the tips. They appeared to me to be not large enough for Roan (I have only seen those in the Natural History Museum), and I believe that they are more likely to be *H. bakeri*. I feel sure that they are of the same species as that I saw on the northern slopes of Mount Elgon in 1890.

18. ORYX BEISA.

This is a new find for me. It ranges as far south as a point due east of this Station, *i. e.* about on the Equator. Lt. G. E. Smith, R.E., saw a herd of 8 a few days ago. At Baringo I shot 7 in September. There is no doubt whatever about their being true *O. beisa*. I do not believe the *O. callotis* ranges even so far north as the Athi plains. Three bulls that I killed weighed (whole with a scale up to 1000 lbs.) 383 lbs., 355 lbs., and 458 lbs., and a cow weighed 380 lbs.

19. STREPSICEROS KUDU.

The Kudu is found here on Mau, but is very scarce.

20. STREPSICEROS IMBERBIS, Blyth.

The Lesser Kudu, though found on Kilimanjaro, does not, I think, range much farther north, excepting along the coast, and I do not believe that it extends west of Mount Kenia.

21. TRAGELAPHUS sp. inc.



Horns of *Tragelaphus* sp. inc.

There is a species of large *Tragelaphus* found in the forest here. I have a pair of horns brought in by the Wanderobbo. They are respectively $20\frac{3}{4}$ in. and $21\frac{1}{2}$ in. long and $6\frac{3}{4}$ in. and $6\frac{5}{8}$ in. in circumference at the base. The man who brought them in has lived all his life in the forest, and he assures me that they are the horns of *a female* which he killed about 5 months ago. He says that the beast had long hair with black stripes, that it was one of five, that the males have much longer horns, and that they only live in thick forest and dense bush. He says that the animal is red in colour, and as big as a Hartebeest. Needless to say I shall do my utmost to procure a specimen; and since I have promised the very large reward of a *cow*, I may succeed.

Though these Wanderobbo are very accurate in their information, I cannot quite believe these horns belong to a *female*. I will, however, send them to you for examination and perhaps identification.

[I exhibit the two horns in question, which have lately reached me (see figure). They appear to me to indicate the existence in the Mau District of a *Tragelaphus*, possibly the same as *T. angasi* (which we know is found in Nyasaland), but probably distinct.—P. L. S.]

22. TRAGELAPHUS SYLVATICUS.

I have also sent home some skins and skulls of the Bush-buck which is plentiful round here. The male strikes me as particularly dark, though I expect it is nothing more than a local variety. The body-skin of the specimen of which I have sent the skull and neck-skin was inadvertently omitted. It is much darker than the one marked no. 1 and has not the vestige of a stripe or spot. I have seen one or two other old males, which appeared to me to be much darker still, almost black.

23. OREAS CANNA LIVINGSTONII.

The Eland is very scarce here since the cattle-plague of 1890. Capt. Sclater, R.E., tells me he saw a small herd on the southern slopes of Wonga (=Mt.) Longonot near Naivasha. I observed the fresh spoor of a single Eland near Njemps in September last.

4. Descriptions of new Species of Coleoptera of the Family *Endomychidæ* from the Eastern Hemisphere. By the Rev. H. S. GORHAM, F.Z.S.

[Received March 4, 1897.]

(Plate XXXII.)

The specimens of Coleoptera of the family Endomychidæ, of which it is the object of this paper to give some account, are contained in various collections. A good many are due to the persistent collecting of Mr. Doherty in the East. Some have been known to me for many years, but the material was not sufficient for their description. Among the more interesting, I may call attention to a new *Cymbachus*, two new and very distinct *Eucteani*, and the very curious *Amphisterni*. All the species here described are Oriental; and the descriptions may be regarded as supplemental to my papers on the Erotylidæ and Endomychidæ collected by Signor Fea in Burma, published in the Annals of the Genoa Museum.

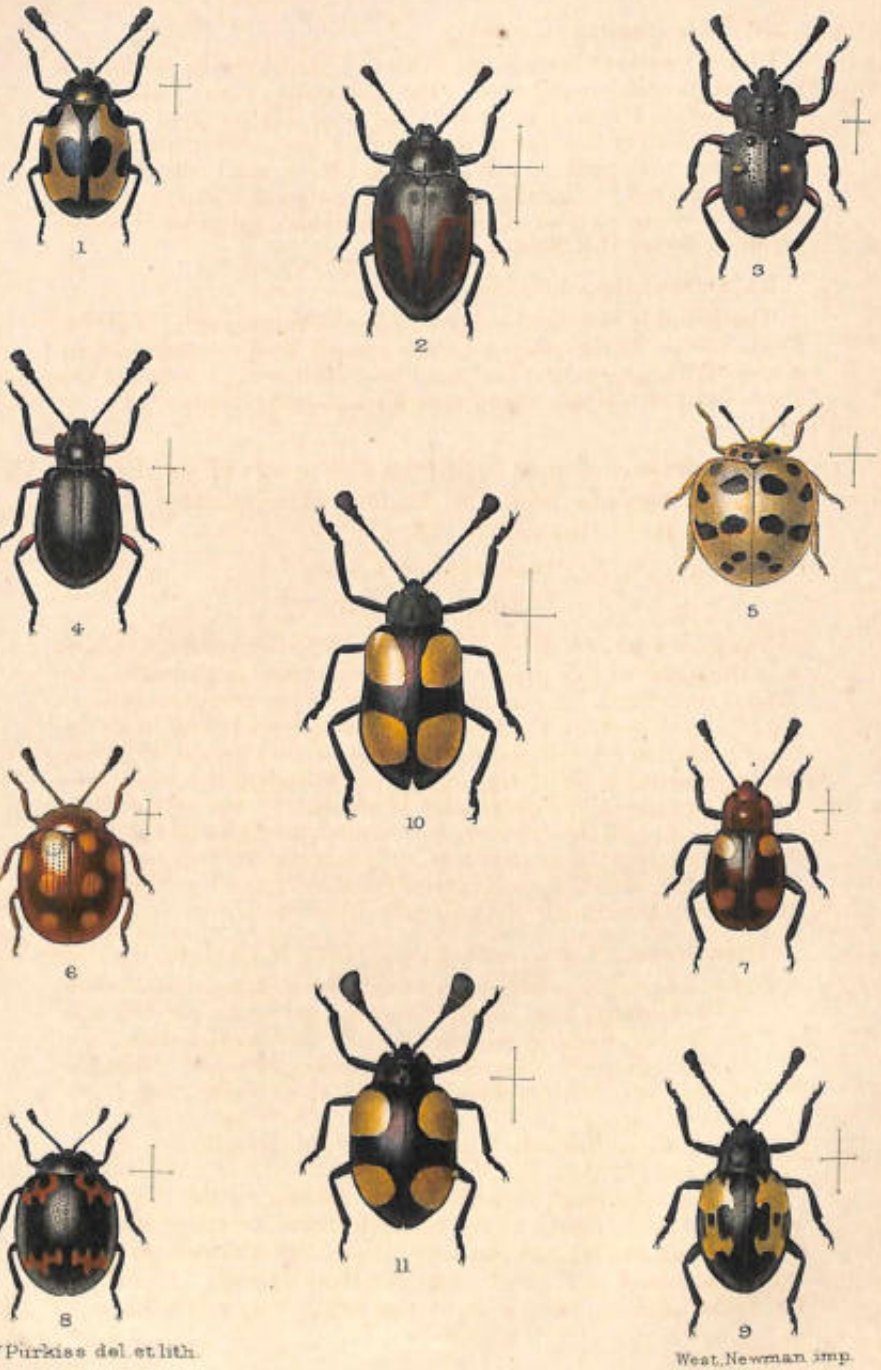
AMPHISTERNUS VERRUCOSUS, n. sp. (Plate XXXII. fig. 3.)

Niger, subopacus, prothorace transverso subcordato, medio bituberculato; elytris depressiusculis humeris late carinatis, grosse et confluenter punctatis, singulis tuberculis duobus subcarinatis, uno basali picescenti, uno discoidali piceo, punctoque subapicali lucido, læte flavo, ornatis; femorum clava rufa. Long. 7·5 *millim.* ♂ ♀.

Mas: tibiis anticis infra medium dente valido armatis.

Hab. JAVA (*Frühstorfer, Mus. Brussels*).

Antennæ very stout, their third joint as long as the two basal joints united, the fourth to the eighth fusiform, becoming shorter, the club long and lax, the two apical joints a little wider than long; eyes compressed and kidney-shaped. Head opaque. Thorax at the widest part twice as wide as the length, very much widened



W.Purkiss del. et lith.

West, Newman imp.

New Eastern Coleoptera (Endomychidæ).

below the acute and prominent front angles, and contracted from the middle to the hind angles, which (as the base is sinuate) are also acute; the basal sulci are parallel to the oblique and contracted sides, and are continued as a kind of depression above the middle; the sides are neatly margined and a little reflexed; the disk has two blunt tubercles, one on each side of an obsolete central channel. The elytra are shining near the suture, rather opaque at the shoulders and sides, with large irregularly dispersed punctures, in twos and threes, and become roughly seriate near the suture. The humeral callus is elevated into an arcuate ridge which projects beyond the margin; the basal tubercle is slightly ridged and is faintly pitchy at its summit; the discoidal one is nearer the base than the apex and is pitchy red in the middle, it is gradually and not suddenly elevated. The apical yellow pustule has just a trace of one or two obsolete punctures, it is translucid. The elytra are a little expanded at the margins and pointed at the apex; their texture is pitchy black, and may be likened to caoutchouc. On the underside the only part which exhibits punctures is the intercoxal process of the first abdominal segment, which is deeply and coarsely punctured. The prosternum is coarsely formed, its process bluntly bimucronate. Mesosternum with the raised and margined intercoxal part transversely pentagonal [1].

I have described this species at some length, as with *A. rudepunctatus*, here described, it belongs to a section of *Amphisternus* little known, and which I believe forms the genus *Haplomorphus*, Guérin.

AMPHISTERNUS RUDEPUNCTATUS, n. sp.

Brevior, prothorace lato, elytris breviter ovatis gibbosis; niger, subopacus, prothorace lato lateribus rotundatis postice parum angustatis, angulis anticis parum prominulis; elytris subcordatis, gibbosis, grosse seriatim punctatis, antennarum articulo apicali, palpis tarsisque rufo-piceis. Long. 7·5 millim. ♀.

Hab. ASSAM, Patkai Mountains (*Doherty*).

Thorax very wide, the sides much rounded, the front cut out in an arc, but not so deeply or widely as in *A. verrucosus*, the surface very uneven and very obsoletely punctate; the base very wide, a little sinuous, not margined; the sulci and central channel very obsolete, the transverse basal line very distinct. Elytra much wider than the thorax, without tubercles, a little expanded towards the margins; the apex and humerus nearly free from punctures but opaque. Underside shining, glabrous; epipleuræ very wide at their bases.

A single female example of this rather extraordinary *Amphisternus* is in Mr. Fry's collection; it is entirely black, with

[1] *Obs.*—This portion is generally but incorrectly referred to by authors as though it were the mesosternum. There is a considerable part forming two branches, and partly enclosing the coxæ, in front of this; and this portion is carinate in *Amphisterni*, the carina being received between the points of the divided prosternal process.

the exception of the tarsi, trophi, and small transverse apical joint of the antennæ.

SPATHOMELES ELEGANS, Gorham, Endom. Recit. p. 32.

Island of Marang, Sumatra (*Doherty*).

There is a female of this rare insect in Mr. Fry's collection. It is apt to be overlooked as perhaps an abnormal *Eumorphus*, but the male, with its extraordinary plate on the hind tibia and spines from the elytra, would not be so. I have seen several female examples, but only the male type in the British Museum.

TRYCHERUS ANGOLENSIS, n. sp. (Plate XXXII. fig. 2.)

Ovalis, niger, nitidus; abdominis apice, tarsis, palpis antennarumque apice summo piceis; elytris singulis lineis duabus, una submarginali, altera versus suturam, paulo ante medium per fasciam conjunctis, ante apicem desinentibus rufis. Long. 13 *millim.*

Hab. ANGOLA.

The antennæ in this insect are about half as long again as the head and thorax; the front angles of the latter are acute and project as far as the bases of the antennæ; the sides are a little thickened, and are sinuate, narrowed in front, widening behind to the hind angles, which are acute. It is in the middle twice as wide as long (excluding the front angles); the basal sulci are almost obsolete, and there is a very short and evanescent central channel, scarcely more than a linear point, near the base; punctation is not visible, either on the thorax or elytra. The design on the latter is two narrow red vittæ in the apical half, united at their basal end rather before the middle, but quite free towards the apex; the vittæ are produced a little backwards beyond the fascia. Very close fine puncturing is visible on the base of the abdomen.

This species seems to be near *T. josephus*, Duvivier (Comptes-rendus Soc. Ent. Belg. 1891), but to differ from it in the elytral pattern, and by the abdomen being pitchy only at the apex, &c.

Two examples.

TRYCHERUS RAFFRAYI, Gorh. Ann. Mus. Genov. ii. p. 4 (1885).

Ovatus, niger, nitidus, fere glaber; corpore infra rufo-piceo, prothoracis disco (medio piceo) fasciisque duabus elytrorum abbreviatis, anteriore juxta suturam recurvata, sanguineo-rufis; prothorace transverso, duplo latiore quam longo. Long. 7 *millim.* ♀.

Hab. ZANZIBAR (*Raffray*).

The head is pitchy black, finely punctured, as is the whole of the upper surface, as in *T. senegalensis*; the antennæ have all the joints shorter than in that species, but similar, they are black, the mouth and palpi pitchy red. The thorax is much more transverse than that of *T. senegalensis*, and is blood-red except in the middle, and the margins narrowly. The elytra are rather less ovate, and have the first fascia more arcuate and much less distinctly dentate

on the apical side, and the posterior fascia is also less sharply indented than those in *T. senegalensis*. This is the smallest *Trycherus* I have yet seen.

A single female example.

ENCYMON CINCTIPES, n. sp. (Plate XXXII. fig. 4.)

Niger, nitidus, fere glaber; prothorace transverso, lateribus leviter sinuatis, angulis posticis rectis; femoribus juxta apicem rufo-cinctis. Long. 9 *millim.* ♂ ♀.

Mas: abdominis segmentum apicale leviter emarginatum.

Hab. BURMA, Ruby Mines (*Doherty*).

Head smooth but uneven, owing to the raised antennal ridges: antennæ rather long, their basal joint as long as the third, the fourth to eighth gradually decreasing, about half the length of the third. Thorax not twice as wide as long, smooth, with deep basal sulci, which reach half the length; the width in front, across the prominent angles, is about equal to that of the base, but the sides widen a little. The elytra are decidedly oblong, not so convex nor so much rounded on their sides as in *E. immaculatus* or *E. ferialis*; the sutural stria is distinct, but nearly vanishes at the apex, their margins are but narrowly expanded. The underside is black, the abdomen rather dull, the apical segments are a little pubescent and the apex punctured, and this appears to me more so in those examples which have a slight notch, and which from analogy I assume to be the males. I can see no difference in the tibiæ. The femora are rather distinctly clubbed, and are red for about a third of their length over the thickest part. This species is perfectly distinct from *E. ferialis*. The thorax is wider, and the form is more oblong and not so convex as other species allied to it.

There are seven examples before me from Fry's collection.

ENCYMON VIOLACEUS, Gerst.

Perak (*Doherty*).

This insect has a wider range than I should have expected. I have lately seen examples from the Karen Mountains (*Fea*); and it varies in the colour of the elytra, the one before me from Perak having them nearly black with a faint green reflection.

ENCYMON REGALIS, Gorham, Trans. Ent. Soc. 1874, p. 440.

Var. *pedibus totis nigris.*

Mas: tibiis anticis et intermediis intus infra medium minute denticulatis; abdominis segmento apicali angulatim emarginato, basi medio subelevato.

Perak, low country (*Doherty*).

Two specimens, a male and a female, in Mr. Fry's collection present the characters of the insect described by me from the Philippine Islands, with the exception of the colour of the hinder legs. One being a male, I am able to give the sexual distinction. The emargination of the last segment will be found useful in other species in which the tibiæ are simple or nearly so in both sexes.

ENCYMON RESINATUS, Gorham, End. Recit. p. 40.

Perak (*Doherty*).

Nine specimens in Mr. Fry's collection are certainly identical with what I described in 1873, but are better matured, and enable me to supplement that account by stating that while the thorax and body, and sometimes the head, are pitchy red but dark, the elytra vary from dark blue, almost black, to violaceous. A somewhat less matured specimen has the suture and margins of the elytra rufous. The insect seems to occur indifferently on the mountains and in the low country about Perak.

CYMBACHUS FORMOSUS, n. sp. (Plate XXXII. fig. 1.)

Nigro-viridis; ore, antennis, palpis pedibusque nigris; elytris flavis, humeris macula magna discoidali communi, alteraque marginali magis posteriore, apice, epipleuris, sutura tenuiter et regione circumscutellari cæruleis, creberrime minute distincte punctatis. Long. 6·75 *millim.* ♀.

Hab. BURMA, Ruby Mines (*Doherty*).

The punctation in this species is a little more distinct than in *C. pulchellus*, ♂, so that that of the thorax is just visible; in size and form it very closely resembles that insect, but diverges in the green colour of the body and in the blue markings of the elytra. The prothorax and femora have a blue tint; the humeral callus is decidedly more elevated, and is covered by the blue spot, which is wanting in *C. pulchellus*. The latter insect is very rare, having apparently always been obtained in single specimens; the example in my present collection is a male from Java. By comparison with this the single example of *C. formosus*, obtained by Mr. Doherty, is a female. The discovery of a second species of this scarce and beautiful genus is among the many most interesting features of Mr. Doherty's travels.

EUMORPHUS WESTWOODI, Gorham, Endom. Recit. p. 35.

BORNEO, Banjarmassan (*German Mission*), Pengaron, Martapura (*Doherty*); PERAK (*Doherty*).

I have now seen a series of specimens of an insect which I can only refer to this. The males have (in addition to the toothed front tibiæ) the middle tibiæ strongly sinuous, and with several minute denticulations on the inner side, while the females have nearly simple tibiæ, but are otherwise like the males. The examples (in my own collection) from Martapura, S.E. Borneo, have the spots suffused, reaching quite to the margins and suture. The club of the antenna is very wide, and the joints connate or nearly so.

EUCTEANUS CRUCIGER, n. sp. (Plate XXXII. fig. 10.)

Oblongus, nigro-subviolaceus; capite prothoraceque creberrime subrugosepunctatis, opacis; elytris fere lævibus, minute punctatis violaceis, maculis quatuor permagnis dilute aurantiacis, lateribus subparallelis. Long. 11–15 *millim.* ♂ ♀.

Mas : abdomine medio late depresso, utrinque alte carinato, segmento quinto ventrali arcuatim emarginato.

Hab. India, N.E. Manipur (*Doherty*), Dunsiri Valley (*H. H. Godwin-Austen, Mus. Calcutta*).

This species is nearly allied to *E. hardwickii* (*cœlestinus*, Gerst.), from which it is distinguished by the more shining elytra, which have the yellow spots larger and more nearly united, leaving a much narrower fascia across the middle, the two posterior touch the margin and leave the suture only very narrowly violet. The elytra are of a different form, being more parallel and narrower, especially in the male. The spots do not pass the limb of the margin, the epipleuræ being dark. I have been acquainted with this insect for some years from very old examples from the Calcutta Museum. Mr. Doherty has, however, sent half a dozen beautiful specimens from Manipur.

Eucteanus dohertyi, n. sp. (Plate XXXII. fig. 11.)

E. marseuli, *Gorham, similis et affinis ; breviter oblongus, nigro-cæruleus, violaceo-micans, nitidus, crebre, minute, sed distincte punctatus ; antennarum capitulo late dilatato ; elytris maculis quatuor magnis, dilute aurantiacis, posteriore pleramque transversa. Long.* 8·5–9·5 *millim.* ♀ ?

Hab. India, Manipur (*Doherty*). Burma, Ruby Mines (*Doherty*).

The head and thorax are shining, thickly but distinctly punctured ; the latter has an oblique transverse fovea on each side, the front is also transversely impressed, and there is an irregular fovea in the middle of the base. The elytra are thickly punctured, the punctures often confluent in lines. The antennæ have the third, fourth, and fifth joints subequal, but gradually decreasing in length to the eighth ; the ninth is as long as the third and only a little widened ; the tenth is obconic, nearly equilateral, the apical joint enormously enlarged and spathulate. The eyes are but moderately, but under a quarter-inch focus distinctly granulate. The underside is closely and very finely punctured, shining and black. The shoulders are ridged but not projecting, nor is the ridge sharp, it in fact runs on to beyond the middle and forms a sort of false epipleura ; the true epipleuræ are black and defined at the shoulder by an indented line. This character will distinguish *E. dohertyi* from *E. marseuli*, where the ridge is acute and does not extend beyond the yellow shoulder-spot.

Although there are eight specimens of this in Mr. Fry's collection, I do not find any sexual distinction, and therefore possibly all are females ; but of several examples of *E. marseuli* that I have had the opportunity of examining, and of all the specimens of *Bolbomorphi* to which they are allied, the same remark applies.

Bolbomorphus theryi, n. sp. (Plate XXXII. fig. 9.)

Oblongus, elytris ovatis, niger, nitidus, crebre ac distincte punctatus ; elytris singulis signatura flava e fasciis duabus denticulatis per

lineas duas conjunctis, maculam nigram in medio includentibus, ornatis. Long. 8·5 *millim.*

Hab. China, Ho-chan (*Thery*).

This pretty insect may be best described by comparison with *B. gibbosus* (Gorham, P. Z. S. 1887, p. 647, t. 53. f. 4), from Japan. It is much less convex, the thorax is narrower and more deeply and thickly punctured. The antennæ have a similarly lax and not much widened club. The pattern of the elytra is very distinct but hard to describe. The black part would, in short, if the middle arms were not divided, form what in heraldry is termed a "cross-crosslet," with a broad square in the middle. I hope, with the aid of the figure now given, this description will be sufficiently clear.

Bolbomorphus seems closely allied to, and in China and Japan to take the place of, *Eucteanus*. The coarser eyes, lax and not much widened club of the antennæ, which are also more coarsely built, perhaps, too, the absence of male characters, separate it. The latter, however, have not yet been found in the two smaller *Eucteani*. I have great pleasure in dedicating this species to M. André Thery, of St. Charles par Philippeville, Algeria, who sent me two examples.

Indalmus luzonicus, n. sp. (Plate XXXII. fig. 7.)

Rufo-piceus, nitidus, glaber: antennis, palpis, pedibus elytrisque nigro-piceis, his singulis maculis duabus subquadratis rufis. Long. 6·5 *millim.* ♂.

Mas: tibiis anticis infra medium dente obtuso parvo armatis.

Hab. Philippine Islands, N.E. Luzon (*Whitehead*).

This species is, by the male character, more nearly allied to *I. kirbyanus* than to *I. angusticollis*, not having any denticulation at all on the middle tibiæ. Head, thorax, and body beneath bright blood-red, inclining to be pitchy in parts, as at the base of the thorax; the latter is rather wider than long, formed as in *I. kirbyanus*, but wider at the base, the sides sinuate, narrower at the front angles than behind, the disk smooth and impunctate, the basal sulci sharp and distinct. The elytra are very minutely punctured and have a sutural stria; the spots are rather indefinite, the anterior one occupies the humerus and callus, but does not quite reach the base; the elytral margin is rather expanded from below the shoulder to the apex. The middle tibiæ are bent inwards near their apices.

Two male specimens.

Panomœa sumatrensis, Gorham, Notes from Leyden Museum, x. p. 152 (1888).

Sumatra, Merang (*Doherty*).

One small example about five millimetres long.

Sinkip Island (Motira), one from Calcutta Museum.

These both appear to be female examples.

Panomœa indiana, n. sp. (Plate XXXII. fig. 5.)

P. coccinellinæ *affinis, et statura æqualis, testacea, nitida; elytris subtiliter, creberrime, minute punctatis; prothorace brevi, valde*

arcuato, angulis anticis et posticis rotundatis, maculis quatuor nigris; elytris singulis maculis septem, fere ut in P. coccinellina *dispositis; antennarum clava et scutello nigris. Long.* 7 *millim.*

Hab. N.E. India, Manipur (*Doherty*). Burma, Toungoo.

This species is allied to *P. coccinellina*, Gerst., but may be at once distinguished by the four large round black dots on the thorax which extend transversely and at even distances across its arcuate disk. The thorax is at the same time more arcuate and with all its angles more obtuse and round; it is, indeed, very similar in shape to that of many Coccinellidæ. The spots on the elytra are more transverse and in general larger than the corresponding ones in *P. coccinellina*; this is especially true of the intermediate pair, which nearly form a fascia; the exterior spot of these is straight on its outer margin, and even produced a little as if to join the outer subterminal one, but it does not touch the reflexed edge.

The seven species of *Ptonomœa* which have been described up to the present time are readily distinguished by their markings. The present species with *P. pardalina* and *P. coccinellina* have each seven spots on each elytron, *P. borneensis* has six, *P. undecimnotata*, Frivaldsky, and *P. cinghalensis*, Gorh., have five spots, but the latter has but ten joints to its antennæ. *P. sumatrensis*, Gorh., has no spots.

These insects appear to me to be true mimics of the Coccinellidæ, and that the resemblance is not merely accidental. *P. indiana* so well resembles some species of *Leis* or *Caria*, that it would easily deceive a very good naturalist. Indeed in this insect the whole body, especially the prothorax, has become completely Coccinellid. It is true that those points of structure which are not so obvious, *e. g.* the form of the antennæ and prosternum, the absence of abdominal fossæ from the hind femora, &c., maintain their Endomychid type.

Beccaria, Gorham, Ann. Mus. Genova, ii. p. 5 (1886).

Beccaria wallacei, n. sp. (Plate XXXII. fig. 6.)

Picea, nitida, prothorace transverso minute punctato, æquali, sulcis basalibus concinne impressis, lateribus haud marginatis antice angustatis, angulis anticis et posticis acutis, basi sinuato; elytris convexis, sparsim punctulatis, punctis discoidalibus in seriebus quinque haud regulariter digestis, ad apicem evanescentibus, externe confusis, singulis maculis quatuor aurantiacis, una basali, una subhumerali, una pone medium prope suturam, una subapicali; antennis dilute piceis, clava fusca. Long. 5·5 *millim.*

Hab. Aru Islands (*Wallace*).

Rather larger and rounder and more convex than *B. papuensis*; the thorax more narrowed in front and wider behind, and so forming a more even outline with the elytra than is the case in *B. papuensis*; the antennæ are similar to those of that species, but are thinner, with more linear joints, the apical joint is longer.

The eyes in both species are coarse and wide, but the head is almost sunk in the thorax. The elytra have four distinct rows of large punctures, and one irregular row bordering the confused large punctures which cover the sides, but vanish towards the apex; the striæ are geminate, the external pair pass over the central yellow spot. The legs are pitchy or pale fuscous.

I have great pleasure in calling attention to a second species of this genus, which I found among some undetermined Coccinellidæ obtained by the late W. W. Saunders from Mr. Wallace's collections, which has thus lain nearly forty years undetected.

A single example.

BECCARIA CARDONI, n. sp. (Plate XXXII. fig. 8.)

Late orbiculari-ovata, nigro-picea, capite prothoraceque subtiliter, elytris distinctius fortius punctatis; his annulo irregulari, extus denticulato, callum humeralem subcingente, et fascia tenui utrinque denticulata, ante apicem, saturate flavis, ornatis. Long. 7, *lat.* 6 *millim.*

Hab. INDIA, Barway (*P. Cardon*).

The thorax in this species is at its base about twice as wide as the length; the base is sinuate, and both it and the sides are finely margined but not at all raised or thickened; the basal foveæ are very obsolete; the sides narrow very much to the front angles, the head being very small and received almost entirely into the thorax. The antennæ are as long as the width of the thorax, or nearly so, their club is lax, the intermediate joints a little longer than wide, the third joint twice as long as those succeeding it. The punctuation of the elytra is strong and distinct, that of the thorax distinct but closer; there is no sign of striation. The pattern of the elytra is like that of *Engonius lunularis*, but the posterior fascia does not quite reach either the suture or the margin; both it and the humeral annulus are narrow and ornamented with long denticular projections, which form on the upper side of the fascia three, and on the lower side two sinuses.

I have only seen one example of this insect, and it was in too bad a condition to allow of the underside, trophi, &c. being examined, so that the genus is doubtful; but although larger and differently marked from the other two species I assign to *Beccaria*, it is more in accordance with them in form than with any other Eastern genus known to me.

EXPLANATION OF PLATE XXXII.

Fig. 1. *Cymbachus formosus*, p. 460.
2. *Trycherus angolensis*, p. 458.
3. *Amphisternus verrucosus*, p. 456.
4. *Eucymon cinctipes*, p. 459.
5. *Panomæa indiana*, p. 462.
6. *Beccaria wallacei*, p. 463.
7. *Indalmus luzonicus*, p. 462.
8. *Beccaria cardoni*, p. 464.
9. *Bolbomorphus theryi*, p. 461.
10. *Eucteanus cruciger*, p. 460.
11. —— *doherty*, p. 461.

5. Note upon Intercentra in the Vertebral Column of Birds.

By Frank E. Beddard, M.A., F.R.S., Prosector to the Society.

[Received April 23, 1897.]

The existence of intercentra in the caudal region of the bird's vertebral column has not been much insisted upon. The late Prof. Parker, in the course of some remarks on the intercentra of birds[1], observes that they are to be met with in the posterior half of the caudal series in the Cygnet, and in the Cormorant where they are not so numerous. Dr. Gadow, who has said the last published word on this matter, states, in the 'Dictionary of Birds'[2], of the caudal vertebræ that "they articulate almost entirely by the centrum, which has slightly heterocœlous or concave facets, with the interposition of a fibro-cartilaginous disk, the ventral side of which frequently displays in embryos, but rarely in the adult, a median osseous nodule, the last remnant of the basi-ventral elements commonly called the intercentrum." Prof. T. J. Parker[3] refers to two intercentra in the vertebral column of the adult *Apteryx* in the caudal region, and there are a few scatterd references to the same structures in the writings of Shufeldt[4] and others. Thus Prof. Parker[5] refers to their existence in *Opisthocomus*.

My experience is directly contrary to that of Dr. Gadow; I find intercentra plentiful in the adult skeletons of many birds, belonging to different groups, in the caudal region[6]. It may be useful to state briefly the main facts which the collection of birds at my disposal in the Society's Gardens has enabled me to ascertain. A few previous records of the facts I refer to in footnotes. A few general remarks, which are in effect an abstract of those facts, may perhaps be made first. I use in the following pages the two terms "intercentra" and "hypocentra." By the former is to be understood free nodules or pieces of bone lying between the centra and only (at most) articulated with the adjoining centra. By the latter expression the hypophyses, hypapophyses, or hæmapophyses of authors, which are apparently downward processes of a given vertebra (apparently, but not really) like those which are so often, particularly among diving birds, found upon the cervical and dorsal vertebræ. It is necessary to use two words for these structures, because they are not in every case absolutely the same.

[1] "On the Vertebral Chain of Birds," Proc. Roy. Soc. 1888, p. 474.

[2] Article "Skeleton," p. 856.

[3] "Observations on the Anatomy and Development of Apteryx," Phil. Trans. 1891.

[4] "Comparative Osteology of Arctic and Subarctic Water-Birds," J. Anat. Phys. 1889, p. 20.

[5] "On the Morphology of a Reptilian Bird, *Opisthocomus cristatus*," Tr. Z. S. vol. xiii. (1891) p. 63.

[6] Marshall, "Beobachtungen über den Vogelschwanz," Nederl. Arch. f. Zool. i. p. 194, describes and figures intercentra in the caudal region of the young of several birds.

The hypocentra—as may be seen in various species with free intercentra—are intercentra which are attached to the summit of short outgrowths of the centra. Thus the coalesced hypapophysis is really intercentrum *plus* this median central outgrowth. In several cases where there are no free intercentra, but only the hypocentra, it would be difficult to assert that the latter are really, as has been stated, partly produced by the intercentral discs of bone. They appear to belong so entirely to the centrum. But that this is not the case can be readily seen from such examples as that shown in the drawing (woodcut, fig. 1), where the free intercentra gradually come to be more and more thoroughly articulated with the centrum behind.

The intercentra when present as free structures appear invariably to increase in size from before backwards. They often begin as little more than mere granules of bone, which, as they are often easily detachable, may have been missed, though really present. They are especially loosely attached, and therefore liable to be lost, in the Auks.

So far as can be judged from the facts which are briefly stated in the following pages, the existence of free intercentra is not universal but very general among birds. There are, however, groups, such as the Cuckoos and Columbæ, in which these structures are not present as independent bonelets. There are also some birds in which they do not appear to exist at all; in which, indeed, there are no hypapophyses which may be presumed to be these structures, but this is rare.

They are obviously most prevalent in water-birds, including, however, the land Limicolæ, which are so nearly akin to the Gulls and Auks. They are rarest among arboreal birds, such as Parrots, Pigeons, Picarian and Passerine birds; but occur in the possibly archaic *Opisthocomus*. In the reduced tail of the Struthiones intercentra do not occur plentifully. Parker, as has been already mentioned, finds two in *Apteryx*. But Mivart [1], in his elaborate description of the axial skeleton of the Struthiones, does not appear to have met with them. There does not appear to be a very definite connection between the presence of intercentra and the lowness of the place of the bird in the series; but, on the other hand, there does, with some exceptions, seem to be some relationship between the length of the tail and the existence of free intercentra. It is not known to what extent these structures existed in most of the important types of extinct birds; but Marsh found two free intercentra in *Hesperornis* [2].

Anseres.

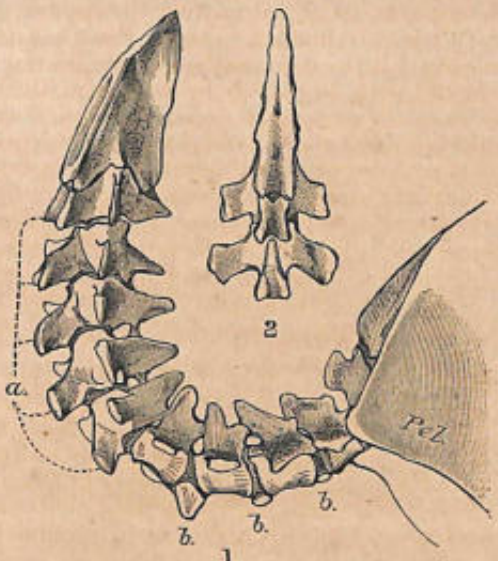
In *Biziura lobata* (fig. 1) the intercentra are especially well developed. There is a small oval nodule 3 mm. long between the last sacral and the first free caudal, a rather larger one between this and the following vertebra, and in the next interval a large

[1] "On the Axial Skeleton of the Ostrich," Zool. Trans. viii.; and "On the Axial Skeleton of the Struthionidæ," *ibid.* x.

[2] See his great work upon the "Odontornithes." Washington, 1880.

somewhat conical intercentrum. The five following intercentra are "hypocentra"—that is to say, they are completely ankylosed

Fig. 1.



Caudal vertebræ of *Biziura lobata*. 1, lateral view; 2, from below. *Pel.*, pelvis; *a*, hypocentra; *b*, free intercentra.

with the centra; a lateral notch only remains to prove their distinctness from the centra.

In *Tachyeres cinerea* there is a granule of bone only to represent the first intercentrum of *Biziura*; the two next vertebræ have short hypocentra, these increase in the three next; between the 6th and the 7th is a free conical intercentrum mainly attached to but not ankylosed with the last free caudal.

Sarcidiornis carunculata, which has five free vertebræ behind the last, which has acquired an attachment to the pelvis, has two free conical intercentra lying between nos. 3/4 and 4/5.

In *Fuligula rufina* there is an ankylosed hypocentrum on the fourth free caudal. In the two remaining free vertebræ in front of the pygostyle the intercentra are not ankylosed.

Plectropterus gambensis has a minute nodule between the first and second free caudals, and four hypocentra upon the remaining vertebræ, ankylosed.

In *Bernicla brenta* there are minute nodules between C. 1 and C. 2 and between C. 2 and C. 3, but no hypocentra beyond.

Palamedeæ.

In *Chauna derbiana* there are four free caudals. There are four intercentra which increase in size.

Tubinares.

So far as my experience goes, all the Tubinares possess free intercentra in the caudal region; but my experience is not of many species.

In *Diomedea melanophrys* there are 6 free caudal vertebræ. There is a minute osseous granule in front of the first of these. Then follow four intercentra increasing in size, and a single hypocentrum; the latter is perforated, and is thus a chevron-bone, while the last intercentrum is nearly perforated. In *Procellaria glacialis* there are the same number of intercentra, save that the first (the small bony granule) of *Diomedea* is absent, and that the last two (possibly three) have become hypocentra. The 2nd to the 4th are distinctly bifid, with a tendency for the ends to meet, and thus complete the chevron. *Fregetta* and *Thalassidroma* have also intercentra.

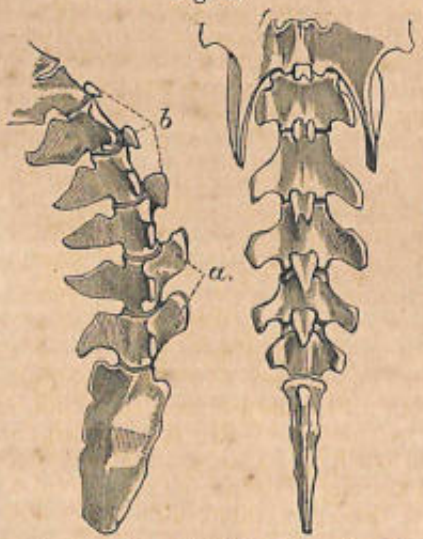
Steganopodes.

The only Steganopode in which I have found free intercentra is *Phaethon*. There are here three, gradually increasing in size and lying between the first and fourth free caudals. They are followed by three hypocentra, bifid at the apices.

Colymbi.

In *Colymbus septentrionalis* (fig. 2) there are five vertebræ between

Fig. 2.



Colymbus septentrionalis. Lateral (left-hand figure) and ventral aspects of caudal vertebræ.
(Lettering as in fig. 1.)

the last which is embraced by the ilia and the pygostyle. There are good-sized intercentra, increasing in size between the last sacral and the first three of these. The last two free caudals have fused hypocentra.

Æchmophorus major has six such vertebræ. There is a minute intercentrum between 1 and 2, and three larger intercentra between the following ones.

Herodiones.

Among the Herodiones free intercentra are not at all general.

In *Dissura maguari* I only found one lying between the 3rd and 4th free caudals. The skeleton, however, was incomplete, though I feel sure that there were no intercentra in front of this point.

In *Platalea leucorodia* there are large intercentra between the 4th and the 5th, and between the 5th and the last free caudals. In *Pl. ajaja* the last of these was alone present and partly fused with the 6th vertebra. But one in front may have been lost, as they are easily detachable.

Ardea cinerea has no free intercentra, but three progressively increasing hypocentra on the last three free vertebræ. *Butorides cyanurus* has the same and, in addition, a minute free intercentrum. *Cancroma* has three intercentra, increasing in size from a very minute nodule, and a single hypocentrum.

In *Xenorhynchus senegalensis* I found no intercentra at all; in *X. australis* there was a large flattened (compressed) intercentrum between the last two free caudals; this is in contact, but not fused, with the hypocentra of the pygostyle. There are five free caudals in *Tantalus leucocephalus*; between the 2nd and 3rd and the 3rd and 4th are free intercentra; the 5th has a hypocentrum. *Scopus umbretta* has no free intercentra; the last two vertebræ have hypocentra[1].

Grues.

Neither in the Cranes proper nor in *Psophia*, *Rhinochetus*, and *Eurypyga* are there any free intercentra. But in *Chunga burmeisteri* there are two pairs of small nodules of bone underlying the small pygostyle, which are possibly the equivalents of those structures.

Limicolæ.

Contrary to what we find among the Grues, the Limicolæ have constantly free intercentra. In *Numenius femoralis* there are 8 caudal vertebræ; a minute nodule of bone lies between the centra of the first two of these vertebræ, a slightly larger one between the third and fourth, and a larger one still between the two following. The remaining vertebræ have hypocentra. In *Hæmatopus* there are also three free intercentra. *Œdicnemus grallarius* has

[1] In *Balæniceps* (Parker, "On the Osteology of *Balæniceps*," Tr. Zool. Soc. iv. p. 335) there is "a small distinct 'sesamoid' bone ..... lying between the second and third centrum."

two fair-sized free intercentra followed by two hypocentra. I found exactly the same number of intercentra and hypocentra in *Rhinocorus rumicivorus*. In *Chionis alba* there are 8 free caudal vertebræ, the fifth bears a small hypocentrum; then follow two free good-sized intercentra, of which the last is divided by a suture into two parts. Finally, there is a large bifid hypocentrum.

Intercentra are also present in the Laridæ. In *Stercorarius antarcticus* there are three small round button-shaped intercentra increasing in size from before backwards, followed by two large bifid hypocentra.

Ralli; Otides.

So far as I have been able to ascertain, neither the Ralli (including *Heliornis*) nor the Otides possess free intercentra.

Columbæ.

The same remark may be made concerning the Pigeons.

Accipitres.

In *Dryotriorchis spectabilis* there is one free nodule of an intercentrum lying between the first two free caudals; the remaining vertebræ have strong hypocentra, which are bifid at the tip. In other Hawks there are no free intercentra, but always hypocentra, which are constantly bifid at the tip and sometimes chevrons.

Psittaci.

I have found no free intercentra in any Parrot, but always a certain number of hypocentra, which may or may not be bifid at the tip.

Opisthocomi.

In a skeleton of the Hoatzin there are three free intercentra gradually increasing in size, and two hypocentra following them.

Galli.

Intercentra appear to be rare in this group of birds. I found no free intercentra anywhere, and only hypocentra on the last two caudals of *Aburria carunculata*[1].

Cuculi.

In no Cuckoo that I have examined have I found any free intercentra. But in all there are two or three hypocentra on the last free caudals; one or more is usually a chevron-bone, *i. e.* perforated.

[1] In *Crax globicera*, however (Parker, "On the Osteology of Gallinaceous Birds, &c.," Tr. Zool. Soc. v. p. 169), there are two free intercentra ("hypophyses").

Tinami.

Among the Tinamous I have not seen free intercentra.

Alcæ.

Among the Auks intercentra are quite as general as among their near allies the Limicolæ.

In *Uria troile* there are no less than 6 free intercentra, which lie well below the level of the centra and are but loosely attached, so that they would be very readily detachable. There are two of these bony nodules lying side by side between the ultimate and

Fig. 3.



Fratercula arctica. Ventral aspect of caudal vertebræ, showing free intercentra.

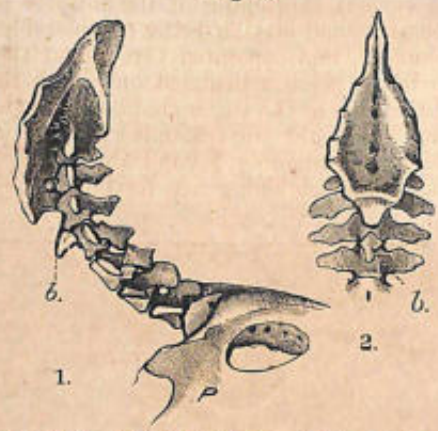
penultimate free caudal. In *Fratercula arctica* (fig. 3) there are 6 very distinct and rather larger intercentra, which are not so loosely attached as are those of *Uria*; in *F. corniculata* I found only five.

Pico-Passeres.

In this extensive group of Birds free intercentra are infrequent and, when present, not numerous. There are, however, frequently hypocentra, which may have the form of chevron-bones. In *Triponax feddeni*, for example, the last four free caudals bear double hypocentra, the free ends of which become fused in the last two, thus forming chevrons. In *Hylomanes gularis* there is one free intercentrum followed by two hypocentra. *Dacelo gaudichaudi* has two free intercentra and five hypocentra. I could not find intercentra in *Coracias*, *Upupa*, *Megalæma*, *Halcyon*, *Merops*, *Rhamphastos*, *Colius*. In *Momotus lessoni* there are two distinct intercentra and two hypocentra. Among Hornbills, on the other

hand, free intercentra appear to be the rule. I have found one

Fig. 4.



Toccus erythrorhynchus. Caudal vertebræ. 1, lateral view; 2, ventral view. *P*, pelvis; *b*, free intercentrum.

or two of considerable size. In the Passeres I have never yet met with these structures.

May 18, 1897.

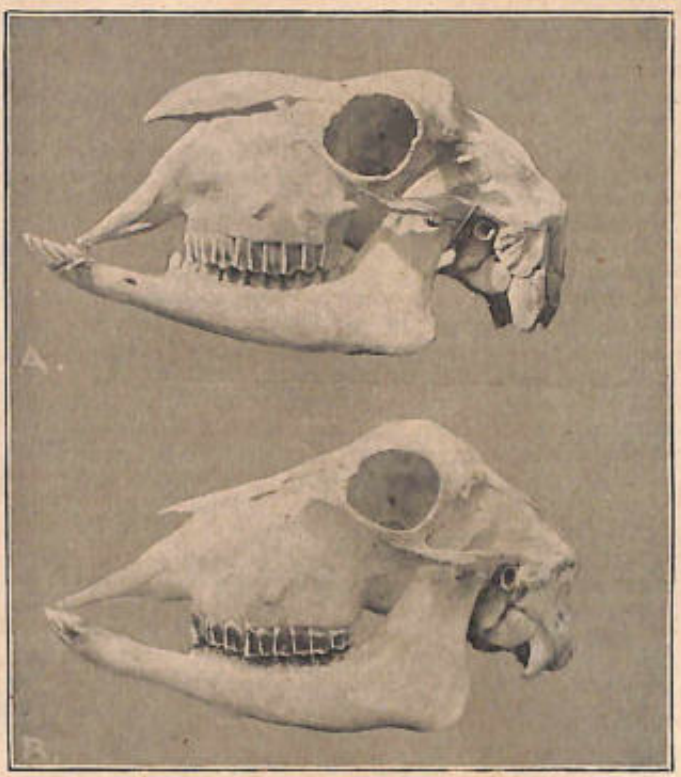
Prof. G. B. Howes, F.Z.S., in the Chair.

Mr. Sclater exhibited a plan of the new Zoological Garden attached to the "Museu Paraense de Historia Natural e Ethnographia" at Pará, in Brazil, of which Dr. Emil Goeldi, C.M.Z.S., was Director; and called attention to the description of it and its contents recently published in the 'Zoologische Garten' (Jahrg. xxxviii. No. 4, April 1897), by Herr Meerwarth, Assistant in the Pará Museum.

Mr. Sclater exhibited a skin of a Penguin received by him in exchange from the Musée d'Histoire Naturelle of Paris as an example of *Microdyptes serresianus* (Oust.), and read the following note from Mr. Ogilvie-Grant on the subject:—

"I have carefully examined the specimen of so-called *Microdyptes serresianus*, and find it is without any doubt the young of *Eudyptes chrysocome* (Forst.). The shape of the bill and soft downy grey feathers of the throat point at once to its being an immature bird. In the Rothschild Museum at Tring there is a fine series of young *E. chrysocome* in different stages, and with some of these *M. serresianus* is identical."

Mr. R. E. Holding exhibited and made remarks upon a skull of the Theban Goat, *Capra hircus*, var. *thebaica*, a hornless variety of the domesticated Goat peculiar to North Africa and Egypt, which presented a curious shortening of the anterior portion of the skull, the premaxilla and maxilla being considerably reduced. The nasal bones, curved, and separated throughout their entire length from these bones, were articulated only with the frontal bone, and exposed the base of the turbinated bones in the interior of the nasal cavity. The lower jaw remaining the normal length, the incisors projected considerably beyond the premaxilla, preventing the animal from obtaining its food by the ordinary method of grazing.



A. Theban Goat. B. English Goat.

Mr. Holding also exhibited a fine Bulldog's skull and the skull of a Pig which indicated a similar arrest in the development of the anterior portion of the skull, due directly to selective influences.

Mr. Tegetmeier and others took part in a short discussion on this subject.

The following papers were read :—

1. A Revision of the Lizards of the Genus *Sceloporus*.

By G. A. Boulenger, F.R.S.

[Received March 29, 1897.]

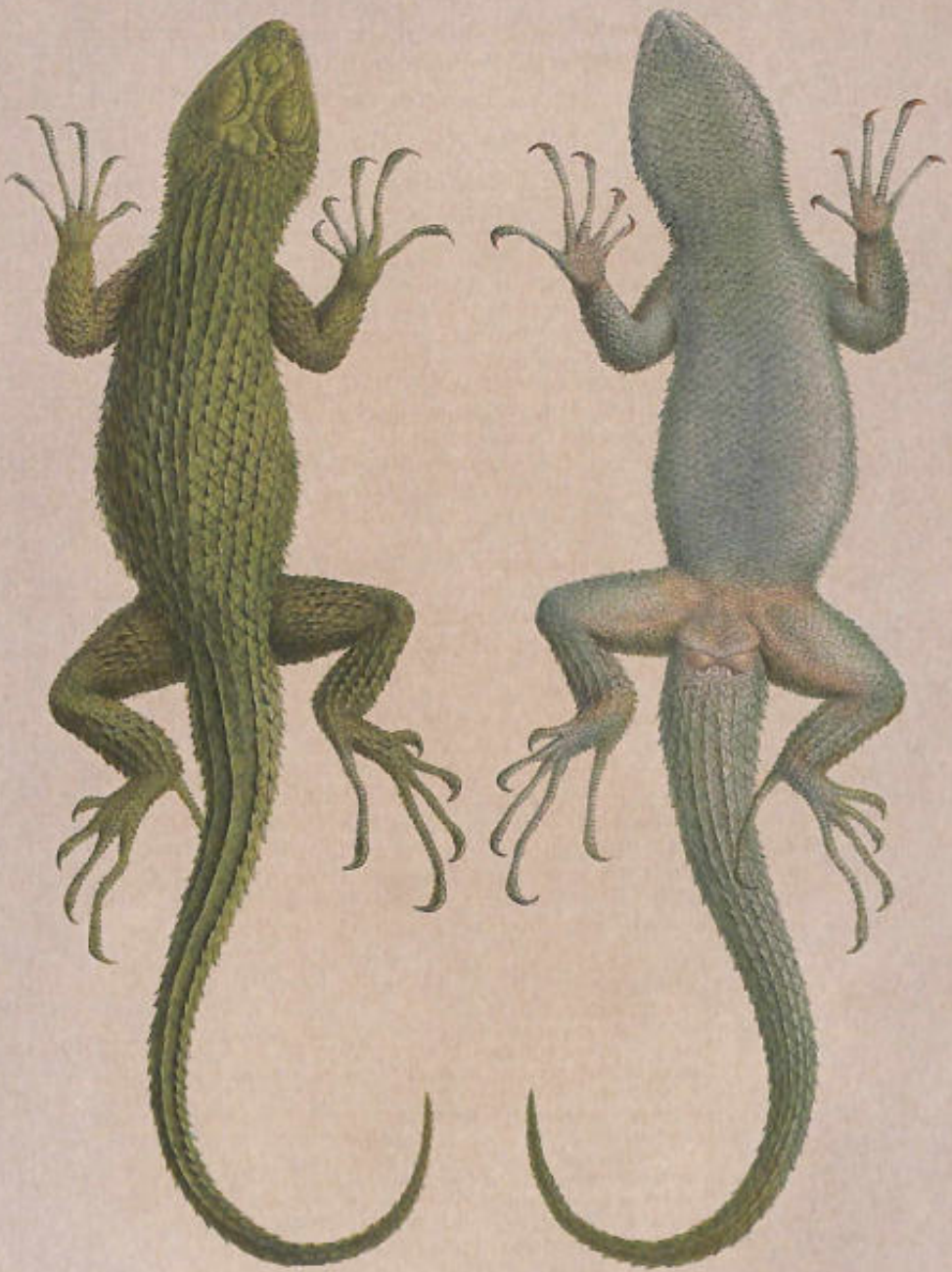
(Plate XXXIII.)

The discrimination of species in the genus *Sceloporus* is beset with great difficulties. Cope has justly recommended it as "an excellent *pièce de résistance* for those persons who do not believe in the doctrine of derivation of species." The discrepancies observable on comparing the revisions published about the same time by Cope[1], myself[2], and Günther[3] show to what extent opinions may differ on the delimitation of species. I have therefore considered it useful to undertake a renewed study of the genus, embracing the whole material in the British Museum, which has been greatly increased since the publication of the second volume of the Catalogue of Lizards, thanks chiefly to the donations of Messrs. Salvin and Godman, Mr. W. Taylor, Dr. A. Dugès, Mr. Van Denburgh, and the collections made by Dr. A. C. Buller in Western Mexico and by Profs. Gilbert and Eigenmann in California.

I have not restricted my work to framing diagnoses, but have drawn up tables of measurements and records of numbers of scales and femoral pores[4] of nearly all the specimens, with the exception of very young ones. These tables, I trust, will prove of more lasting value than systematic conceptions, and be of service to future workers in the same field as well as to those who might wish to test the constancy of the characters on which species have hitherto been established.

Coloration, even the most conspicuous markings, I find generally inconstant as a specific character, and liable more often to deceive than to help in identifying specimens if considered previously to the structural characters. Therefore, whilst paying to coloration the attention which it deserves, I have abstained from introducing any allusion to it in the key preceding the descriptions of the species, all of which are based on structural characters.

[1] Proc. Amer. Philos. Soc. xxii. 1885.
[2] Cat. of Lizards, ii. 1885.
[3] Biol. C.-Amer., Rept., 1890.
[4] These tables read as follows :—
1. Length from snout to vent (in millimetres).
2. Length of shielded part of head (from end of snout to posterior border of interparietal shield).
3. Length of head to ear-opening.
4. Length of tibia.
5. Distance between base of fifth toe and extremity of fourth.
6. Number of scales from occiput to base of tail.
7. Number of scales corresponding to length of shielded part of head.
8. Number of scales round middle of body.
9. Number of femoral pores (right and left).



R.Mintern del. et lith.

Mintern Bros. Chromo.

SCELOPORUS ASPER.

Synopsis of the Species.

I. Lateral scales directed obliquely upwards and backwards, and passing gradually into the dorsals; series of femoral pores usually widely separated, not meeting on the præanal region.

A. Tail cylindrical; hind limb not reaching the eye; head-shields smooth or slightly rugose.

1. The distance between the base of the fifth toe and the extremity of the fourth not exceeding the distance between the end of the snout and the ear; tibia nearly as long as, or a little shorter than, the shielded part of the head; 26–39 scales between the interparietal shield and the base of the tail.

a. None of the enlarged supraoculars in contact with the shields of the crown.

27–37 scales between the interparietal shield and the base of the tail, 5–7 corresponding to the length of the shielded part of the head, forming parallel series on the back ..... 1. *S. torquatus*, Wiegm.

33–39 scales between the interparietal shield and the base of the tail, 8–9 corresponding to the length of the shielded part of the head, forming oblique series converging towards the median line of the back. 2. *S. bulleri*, Blgr.

b. Fourth supraocular in contact with the parietal shields; 26–27 scales between the interparietal shield and the base of the tail, 6–7 corresponding to the length of the shielded part of the head, forming parallel series on the back ..... 3. *S. melanorhinus*, Bocourt.

2. The distance between the base of the fifth toe and the extremity of the fourth not or but slightly exceeding the distance between the end of the snout and the posterior border of the ear; 38–64 feebly keeled scales between the interparietal shield and the base of the tail.

a. Dorsal scales forming parallel longitudinal series.

38–46 scales between the interparietal shield and the base of the tail, 8–11 corresponding to the length of the shielded part of the head. 4. *S. yarrovii*, Cope.

60–64 scales between the interparietal shield and the base of the tail, 15–16 corresponding to the length of the shielded part of the head. 5. *S. ornatus*, Baird.

b. Dorsal scales forming oblique series converging towards the middle line posteriorly, 44–48 between the interparietal shield and the base of the tail, 9–10 corresponding to the length of the shielded part of the head .... 6. *S. dugesii*, Bocourt.

3. The distance between the base of the fifth toe and the extremity of the fourth equalling or somewhat exceeding the distance between the end of the snout and the posterior border of the ear; dorsal scales strongly keeled, slightly mucronate, 38–47 between the interparietal shield and the base of the tail, 7–10 corresponding to the length of the shielded part of the head; tibia slightly shorter than the shielded part of the head ..... 7. *S. consobrinus*, B. & G.

4. The distance between the base of the fifth toe and the extremity of the fourth exceeding the distance between the end of the snout and the posterior border of the ear.

a. Dorsal scales equal in size.

a. The distance between the base of the fifth toe and the extremity of the fourth equalling the distance between the nostril and the arm; 35 strongly keeled and strongly mucronate scales between the interparietal shield and the base of the tail, 10 corresponding to the length of the shielded part of the head. 8. *S. serrifer*, Cope.

β. The distance between the base of the fifth toe and the extremity of the fourth less than that between the nostril and the arm.

* Dorsal scales feebly keeled, not or but shortly mucronate, 30–35 between the interparietal shield and the base of the tail, 6–7 corresponding to the length of the shielded part of the head; tibia longer than the shielded part of the head.
9. *S. orcutti*, Stejn.

** Dorsal scales strongly keeled and mucronate, not more than 45 between the interparietal shield and the base of the tail.

† 25–32 scales between the interparietal shield and the base of the tail, 5–7 corresponding to the length of the shielded part of the head.

‡ Tibia not or but little longer than the shielded part of the head.

Dorsal scales moderately or strongly mucronate; femoral pores 2–16 on each side ..... 10. *S. spinosus*, Wiegm.
Dorsal scales very strongly mucronate; femoral pores 13–17.
11. *S. acanthinus*, Bocourt.
Dorsal scales strongly mucronate, forming more or less oblique series converging towards the middle line; femoral pores 17–21.
12. *S. asper*, Blgr.

‡‡ Tibia about one-fourth longer than the shielded part of the head; femoral pores 17–22 on each side.
13. *S. zosteromus*, Cope.

†† 32–45 scales between the interparietal shield and the base of the tail, 7–10 corresponding to the length of the shielded part of the head.

Upper head-shields smooth; dorsal scales very strongly mucronate and denticulate; tibia longer than the shielded part of the head; scales on back of thighs large ..... 14. *S. lickii*, Van Denb.
Upper head-shields smooth; dorsal scales moderately or shortly mucronate; tibia as long as or slightly longer than the shielded part of the head.
15. *S. formosus*, Wiegm.
Upper head-shields more or less distinctly rugose, rarely smooth; dorsal scales rather strongly mucronate; tibia as long as or longer than the shielded part of the head ..... 16. *S. undulatus*, Daud.

*** 46–56 scales between the interparietal shield and the base of the tail.

Dorsal scales rather feebly keeled, forming parallel longitudinal series, 47–51 between interparietal shield and base of tail, 9–11 corresponding to the length of the shielded part of the head ..... 17. *S. elongatus*, Stejn.
Dorsal scales strongly keeled, forming parallel longitudinal series, 52–56 between interparietal shield and base of tail, 11–16 corresponding to the length of the shielded part of the head ..... 18. *S. gratiosus*, B. & G.
Dorsal scales strongly keeled, forming oblique series converging towards the middle line, 46–50 between interparietal shield and base of tail, 12–15 corresponding to the length of the shielded part of the head.
19. *S. grammicus*, Wiegm.

**** 60–83 scales between the interparietal shield and the base of the tail, strongly keeled, forming oblique series converging towards the median line, 12–20 corresponding to the length of the shielded part of the head... 20. *S. microlepidotus*, Wiegm.

b. Dorsal scales very unequal in size ... 21. *S. heterolepis*, Blgr.

B. Tail strongly compressed; head-shields smooth.
22. *S. pyrrhocephalus*, Cope.

C. Tail cylindrical; hind limb reaching beyond the eye; head-shields keeled or striated ..... 23. *S. chrysostictus*, Cope.

II. Lateral scales longitudinal or nearly so; series of femoral pores more or less narrowly separated, often meeting on the præanal region; head-shields keeled or striated.

Tibia shorter than the shielded part of the head. 24. *S. æneus*, Wiegm.
Tibia at least as long as the shielded part of the head.
25. *S. scalaris*, Wiegm.

III. Lateral scales much smaller than, and abruptly differentiated from, the dorsals.

A. Lateral scales squamous, imbricate.

1. 9–16 femoral pores on each side.

46–65 scales between the interparietal shield and the base of the tail, 10–17 corresponding to the length of the shielded part of the head.
26. *S. variabilis*, Wiegm.
39–43 scales between the interparietal shield and the base of the tail, 8–9 corresponding to the length of the shielded part of the head.
27. *S. cupreus*, Bocourt.

2. 3–8 femoral pores on each side; 30–40 scales between the interparietal shield and the base of the tail.

Two canthal scales; ventral scales smooth; male without enlarged postanal scales..... 28. *S. siniferus*, Cope.
One canthal scale; ventral scales obtusely keeled; male without enlarged postanal scales ..... 29. *S. fulvus*, Bocourt.
One canthal scale; ventral scales smooth; male with enlarged postanal scales.
30. *S. squamosus*, Bocourt.

B. Lateral scales minute, granular.

Head-shields keeled or striated; 40 scales between the interparietal shield and the base of the tail; 13–14 femoral pores on each side.
31. *S. utiformis*, Cope.
Head-shields smooth; 82 scales between the interparietal shield and the base of the tail; 17–25 femoral pores on each side ... 32. *S. couchii*, Baird.

1. Sceloporus torquatus.

Sceloporus torquatus, Wiegm. Isis, 1828, p. 369, and Herp. Mex. p. 49, pl. vii. fig. 1 (1834); Bocourt, Miss. Sc. Mex., Rept. p. 171, pl. xviii. fig. 9 (1874); Cope, Proc. Amer. Philos. Soc. xxii. 1885, pp. 169 & 401; Bouleng. Cat. Liz. ii. p. 219 (1885); Dugès, La Naturaleza, (2) i. 1888, p. 113; Günth. Biol. C.-Am., Rept. p. 66 (1890).

Agama torquata, Green & Peale, Journ. Ac. Philad. vi. 1830, p. 231.

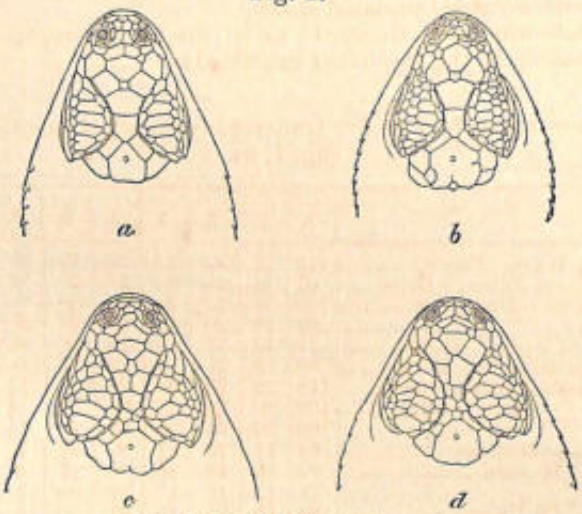
Tropidolepis torquatus, Gray, Griff. A. K. ix. Syn. p. 43 (1831), and Zool. Beechey's Voy. p. 95, pl. xxx. fig. 2 (1839); Dum. & Bibr. Erp. Gén. iv. p. 301 (1837); Gray, Cat. Liz. p. 208 (1845).

Sceloporus poinsettii, Baird & Gir. Proc. Ac. Philad. 1852, p. 126, and U.S. Mex. Bound. Surv., Rept. pl. xxix. figs. 1–3 (1859); Günth. l. c. p. 65.

Sceloporus torquatus poinsettii, Cope, l. c. p. 402.
Sceloporus torquatus cyanogenys, Cope, l. c.
Sceloporus torquatus mucronatus, Cope, l. c.
Sceloporus ferrariperezii, Cope, l. c. p. 400.
Sceloporus melanogaster, Cope, l. c.; Dugès, l. c. p. 114, pl. xii. fig. 7.
Sceloporus omiltemanus, Günth. l. c. p. 66, pl. xxxii. fig. A.

Head-shields smooth or nearly so [1]; frontal transversely divided and in contact with the interparietal or separated from it by a small azygous shield or by the frontoparietals, sometimes broken up into several small shields; interparietal as long as broad or slightly longer than broad, much larger than the parietals, which are sometimes divided into two pairs; supraoculars variable, forming a series of four or five tranversely enlarged shields bordered internally by a series of moderate-sized scales (fig. 1, *a*), or broken up and forming two or three longitudinal series (fig. 1, *d*); one or two

Fig. 1.



Head-shields of *Sceloporus torquatus*.

series of small scales separating the enlarged supraoculars from the supraciliaries; two canthal scales, both often in contact with the subnarial [2]; anterior border of ear with a strong denticulation formed by three or four pointed scales, which are as large as or a little larger than those preceding.

[1] Dugès observes "En algunos individuos las he visto como puntuadas y casi rugosas."

[2] Such specimens appear to have been described by Cope as with a single canthal. A specimen from Hac. del Bobo has one canthal on one side and two on the other.

Dorsal scales much larger than ventrals, as broad as long or a little broader than long, moderately or strongly keeled, with more or less distinctly denticulated posterior border, simply pointed or more or less strongly mucronate; the keels of the dorsal scales forming parallel longitudinal series; 27 to 37 scales between the interparietal shield and the base of the tail; 5 to 7 scales, taken in the middle of the back, correspond to the length of the shielded part of the head. Lateral scales keeled, directed obliquely upwards and backwards, as large as or a little smaller than the dorsals. Ventral scales small, smooth, entire or bi- or tricuspid. 34 to 44 scales round the middle of the body.

The adpressed hind limb reaches the shoulder, the cervical fold, or the ear; tibia as long or nearly as long as the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth equals or slightly exceeds the distance between the end of the snout and the ear. 9 to 20 femoral pores on each side.

Caudal scales about as large as dorsals, strongly mucronate. Males with enlarged postanal scales.

The following table shows the variations in the proportions and in the scaling in the specimens examined:—

A. A series of four or five transversely enlarged supraoculars (fig. 1, *a*).

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. El Paso, Texas. Forrer	113	22	25	23	26	27	5	36	18–17
♀. Guadalajara, Jalisco. Buller	61	14	15	13	16	28	6	39	17–17
♂. Guanajuato. Dugès	106	20	22	21	23	29	5	38	16–18
♂. „ „	97	18	20	18	20	28	5	38	19–17
♀. Plateau of Mexico. Geddes	71	15	16	15	18	28	6	40	15–16
♂. Hacienda del Bobo. Hoege	89	19	21	18	22	31	6	42	20–20
♂. R. Santiago, Jalisco. Smith	118	22	25	22	24	28	5½	36	17–18
♂. „ „ „	103	20	24	21	24	27	5½	40	20–19
♂. „ „ „	100	20	23	20	22	28	5½	36	15–14
♂. S. Mexico. Godman	84	17	20	17	20	29	7	40	16–18
♂. Mexico. Boucard	79	16	19	16	20	27	6	38	16–16
♂. „ „	70	15	16	15	17	28	7	40	19–19
♂. „ De Moore	98	19	21	19	21	30	5	40	16–18
♂. ——?	130	24	28	24	27	27	5	36	18–18

B. Supraoculars intermediate between A and C (fig. 1, *b*, *c*).

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. Duval Co., Texas. Taylor	113	22	26	22	24	28	6	38	10–10
♀. Mexico	75	15	18	15	19	30	6	42	17–17

C. Enlarged supraoculars broken up, forming two or three longitudinal series (fig. 1, *d*).

		1.	2.	3.	4.	5.	6.	7.	8.	9.
♂	Duval Co., Texas. Taylor	117	22	28	23	29	37	7	42	13–14
♂	" " "	116	23	27	24	28	34	7	42	13–14
♂	" " "	85	16	19	17	19	30	6	40	10–9
♂	Ciudad, Durango. Forrer	102	19	22	20	21	29	6	36	11–12
♂	" " "	32	17	20	18	20	27	6	37	12–11
♂	" " "	67	15	16	14	16	27	6	34	12–12
♂	Jalapa. Hoege	61	13	14	13	15	28	6	38	12–14
♂	Omilteme, Guerrero. Smith	96	19	22	20	24	30	6	36	14–14
♂	" " "	92	18	21	18	22	30	5	35	12–12
♂	" " "	78	16	18	15	20	29	6	38	14–13
♂	Mexico	89	16	18	16	20	31	6	38	14–13
♂	—— ?	112	22	24	23	24	33	6	40	15–12

Males bronzy, olive, or dark green above, uniform or with yellowish or pale greenish spots, which may be confluent into crossbars; usually a broad black nuchal collar edged with yellow or pale green behind or both in front and behind; this collar is sometimes interrupted on the back, or reduced to an oblique black band on the shoulder. There is every passage between specimens with and without the collar. Throat and sides of belly cobalt-blue; breast and middle of belly and groin black or white, or black with some white spots; groin black.

Females often more brownish above and yellowish-white beneath, uniform or the throat marked with olive and the sides greenish. In some specimens (Omilteme) the throat and the sides of the belly blue.

The variations of this species, both in scaling and coloration, have given rise to a number of nominal species and subspecies, which I feel unable to accept.

The best-defined form is the *S. poinsettii* of Baird and Girard, in which the supraoculars, often also the frontal, are broken up and the femoral pores fewer (9–15) than is usually the case in the typical *S. torquatus*. But, following Bocourt and Cope, I can only regard it as a variety or subspecies of *S. torquatus*, because specimens occur showing an intermediate form of supraoculars, such as are tabulated in division B of my list, and because I find similar variations occur in *S. spinosus*; and as the number of femoral pores varies in the typical form from 14 to 20 the second character also is not in all cases a distinctive one. Günther accepts *S. poinsettii* as a distinct species, overlooking the intermediate specimens with regard to the supraoculars, and stating the number of femoral pores to be 11 or 12 in *S. poinsettii* and 15 to 20 in *S. torquatus*, notwithstanding that he had access to specimens of the former (from Texas) with as many as 14 pores. The character derived from the coloration he himself admits to pertain only to the specimens from

Durango[1]. Günther's *S. omiltemanus* I would regard as a strict synonym of *S. poinsettii*, but for the blue throat of the female; it is at most a colour variety. Cope's *S. torquatus cyanogenys* and *S. torquatus mucronatus* I also regard as synonyms of the var. *poinsettii*, as I find the degree of mucronation of the dorsal scales and the development of the nuchal collar to be subject to individual variation.

S. melanogaster, Cope, certainly, and *S. ferrariperezi*, Cope, probably, cannot be separated from the typical form. I have recently received from Dr. Dugès two specimens from Guanajuato, sent as *S. melanogaster*. One has the complete collar of the typical *S. torquatus*, the other has it broadly interrupted as in the specimen (without locality) previously referred by me to this form. I have carefully compared the two latter specimens and find the agreement absolute, both in coloration and in scaling. I specially mention this on account of Günther's statement that "Boulenger's *Sceloporus melanogaster* is certainly a different form."

All the specimens in division A of my table, and the second in division B should be referred to the *forma typica*, all those in division C, and the first specimen in division B to the var. *poinsettii*.

The definition of the two forms may be given thus:—

Forma typica. A series of transversely enlarged supraoculars: interparietal usually in contact with the posterior frontal; femoral pores 14 to 20.

Var. *poinsettii*, B. & G. Supraoculars (and often frontals) more or less broken up; interparietal usually separated from the posterior frontal, if this be distinct; femoral pores 9 to 15.

Hab. The range of this species extends over the greater part of Mexico, west of the Isthmus of Tehuantepec and east of Sonora and Sinaloa. The typical form is not known north of Laredo and El Paso in Texas, both localities on the Rio Grande, whilst the var. *poinsettii* penetrates farther into Texas.

2. SCELOPORUS BULLERI.

Sceloporus bulleri, Bouleng. Proc. Zool. Soc. 1894, p. 729, pl. xlviii. fig. 3.

Head-shields smooth; frontal transversely divided, sometimes in contact with the interparietal, but more usually separated from it by the frontoparietals; interparietal as long as broad or a little longer than broad, much larger than the parietals; a series of four transversely enlarged supraoculars, bordered inwards by one series of scales and separated from the supraciliaries by one or two series of small scales; two canthal scales; four or five pointed scales, a little larger than those in front of them, form a denticulation on the anterior border of the ear.

Dorsal scales much larger than ventrals, a little broader than long, keeled, mucronate and denticulate, the keels converging

[1] It is not present in the type specimen figured by Baird and Girard, but I find indications of it in specimens from Duval Co., Texas.

towards the median line; 33 to 39 scales between the interparietal shield and the base of the tail; 8 or 9 scales, taken in the middle of the back, correspond to the length of the shielded part of the head. Lateral scales keeled, graduating into the dorsals and ventrals, directed obliquely upwards and backwards. Ventral scales small, smooth, bi- or tricuspid. 40 to 44 scales round the middle of the body.

The adpressed hind limb reaches the shoulder or the ear; tibia nearly as long as the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth equals the distance between the end of the snout and the ear. 14 to 18 femoral pores on each side.

Caudal scales as large as dorsals, strongly mucronate. Males with enlarged postanal scales.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. Colonia Brizuela. Buller	96	21	25	21	25	39	9	44	18–18
♂. La Cumbre de los Arrastrados. Buller.	96	22	25	21	24	34	8	40	17–18
♀. " " " ...	79	17	19	16	20	38	8	44	15–15
♀. " " " ...	91	19	21	18	21	36	8	42	15–15
♀. " " " ...	70	15	17	15	17	35	8	44	15–15
♀. " " " ...	69	15	17	14	17	35	8	41	15–15
♀. Hacienda de Jalisco. Buller ...	95	22	25	21	25	33	8	42	15–14
♀. " " " ...	74	17	19	16	20	33	8	44	15–14

Dark olive above, with a black uninterrupted nuchal collar, which may be more or less distinctly edged with yellowish or greenish; sides of belly dark-blue, black-edged in both sexes; middle line of belly white; a patch of blue may be present on the throat, the greater part of which is black or dark olive.

Hab. This species is only known from the mountains of the State of Jalisco, at 4400 to 8500 feet altitude, where it was discovered by Dr. A. C. Buller.

3. SCELOPORUS MELANORHINUS.

Sceloporus melanorhinus, Bocourt, Journ. de Zool. v. 1876, p. 401; Sumichrast, Bull. Soc. Zool. France, 1880, p. 176; Bouleng. Proc. Zool. Soc. 1894, p. 730.

Snout much flattened. Head-shields large and smooth; frontal transversely divided and separated from the interparietal by the frontoparietals or by a small azygous shield; interparietal a little broader than long, as broad as or broader than the parietals, which are large and broader than long; a series of four large transverse supraoculars, separated from the frontal and from the supraciliaries by one series of small scales, the fourth in contact with the parietal; two canthal scales; ear-opening nearly hidden under the large pointed scales in front of it.

Dorsal scales much larger than ventrals, as broad as long, strongly keeled and mucronate, entire or feebly denticulate,

forming parallel longitudinal series; 26 or 27 scales between the interparietal shield and the base of the tail; 6 or 7 scales correspond to the length of the shielded part of the head. Lateral scales keeled, directed upwards and backwards, graduating into the dorsals and ventrals. Ventral scales smooth, bicuspid. 36 to 40 scales round the middle of the body.

The adpressed hind limb reaches the shoulder or the ear; tibia a little shorter than the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth equals the distance between the end of the snout or the nostril and the ear. 18 to 21 femoral pores on each side.

Caudal scales nearly as large as dorsals, strongly mucronate. Males with enlarged postanal scales.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. S. Domingo de Guzman. Buller...	98	23	25	20	23	26	6	36	20–19
♂. " " " ...	66	15	17	13	18	27	7	36	21–21
♀. " " " ...	98	23	27	21	23	27	6	40	20–19

Yellowish or greyish olive above; a yellowish, black-edged cross-bar between the eyes; upper surface of snout sometimes blackish; a yellowish band on each side from behind the eye to above the axilla, between which a blackish blotch or bar extends across the scapular region; some less distinct dark cross-bars may follow on the back. Male with the lower surface of the head black-and-white in front, pale blue behind, yellowish green on the sides; the breast and median line of belly salmon-red; the belly pale blue near the median line, yellowish green on the sides. Female yellowish white beneath, with some chevron-shaped brown markings, pointing backwards, on the throat.

Hab. Isthmus of Tehuantepec.

Bocourt states that the single male specimen examined by him lacks the enlarged postanal scales. Notwithstanding this disagreement with the specimens before me, I do not entertain any doubt as to the correctness of their identification.

4. SCELOPORUS YARROVII.

Sceloporus jarrovii, Cope, in Wheeler's Rep. Explor. W. 100th Mer. v. p. 569, pl. xxiii. fig. 2 (1875), and Proc. Am. Philos. Soc. xxii. 1885, p. 396.

Sceloporus yarrovii, Bouleng. Cat. Liz. ii. p. 223 (1885); Günth. Biol. C.-Am., Rept. p. 69 (1890).

Sceloporus pleurolepis, Günth. l. c. p. 74, pl. xxxii. fig. B.

Head-shields smooth or slightly rugose; frontal transversely divided, rarely broken up into scales, in contact with the interparietal or separated from it by a small agygous shield, rarely by the frontoparietals; interparietal as long as broad or longer than broad, much larger than the parietals, which may be divided; a

series of four to six transversely enlarged supraoculars, sometimes broken up, bordered inwards by one series of scales and separated from the supraciliaries by two or three; two canthal scales; three or four more or less enlarged scales form a denticulation on the anterior border of the ear.

Dorsal scales much larger than ventrals, as broad as long or broader than long, obtuse or truncate, not or but very shortly mucronate, feebly keeled, sometimes nearly smooth, forming parallel longitudinal series; 38 to 46 scales between the interparietal shield and the base of the tail, 8 to 11 corresponding to the length of the shielded part of the head. Lateral scales keeled, directed obliquely upwards and backwards, as large as or larger than the dorsals. Ventral scales small, smooth, entire or bicuspid. 46 to 54 scales round the middle of the body.

The adpressed hind limb reaches the axilla, the shoulder, or the cervical fold; tibia nearly as long as the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth equals or slightly exceeds the distance between the end of the snout and the ear. 8 to 17 femoral pores on each side.

Caudal scales larger than dorsals, more or less strongly keeled, pointed or shortly mucronate, spinose on the sides. Males with enlarged postanal scales.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. Huahuca Mts., Arizona. Gilbert...	85	18	21	20	20	39	10	50	16–17
♂. " " " ...	69	15	17	16	19	40	10	50	16–15
♂. " " " ...	64	14	15	14	17	38	10	48	16–15
♂. " " " ...	76	16	18	17	19	40	8	48	14–15
♂. Duval Co., Texas. Taylor	82	16	18	18	20	42	9	48	13–13
♂. Catorce, S. Luis Potosi. Taylor.	77	16	18	18	19	38	8	46	13–13
♂. " " " ...	74	15	17	17	19	40	10	46	13–13
♀. Ciudad, Durango. Forrer	66	15	17	15	18	42	10	50	17–17
♀. N. of Rio de Santiago, Jalisco. Smith.	72	17	19	17	19	39	11	54	16–15
♂. " " " (1)	65	14	15	15	16	43	9	46	11–12
♂. La Cumbre de los Arrastrados, Jalisco. Buller.	74	16	18	18	19	45	11	50	11–12
♀. Ixtlan, Jalisco. Buller.....	63	14	15	14	15	46	10	50	8–9
♂. La Venta, Guadalajara. Buller.	84	17	19	18	18	45	8	48	13–13
♂. " " " ...	83	17	19	17	18	42	9	48	14–14
♂. " " " ...	70	14	15	15	16	41	9	50	13–12
♂. " " " ...	66	14	15	15	15	39	9	54	11–11
♂. " " " ...	66	14	15	15	15	40	10	52	12–11
♂. " " " ...	61	14	15	15	15	41	11	54	11–11
♂. " " " ...	71	14	15	15	14	43	8	46	11–11
♂. " " " ...	67	14	15	14	15	41	8	54	10–11
♂. " " " ...	64	14	15	15	14	40	8	48	10–9
♂. " " " ...	67	13	15	14	14	42	8	48	12–10
♂. " " " ...	65	13	14	14	14	44	8	48	9–8
♀. " " " ...	59	13	14	13	13	43	9	54	11–10
♀. " " " ...	59	13	14	13	13	40	10	50	11–12
♀. " " " ...	57	13	14	13	14	40	9	48	10–10

(1) Type of *S. pleurolepis*, Gthr.

Olive above; a more or less distinct, black, light-edged collar; frequently two light bands on the side of the neck, the upper from the eye and continuous with the anterior border of the collar, the lower commencing at the tip of the snout and passing through the ear; some specimens with the dorsal scales yellowish or pale greenish, edged with black. Males with the throat and the sides of the belly dark blue, edged with black. Females whitish beneath, the throat blue or marbled with grey-blue, often with the sides of the belly blue or greenish blue.

Hab. Arizona, Texas, Mexico (Durango, San Luis Potosi, Jalisco). In the State of Jalisco it occurs at altitudes varying between 3484 and 8500 feet.

5. SCELOPORUS ORNATUS.

Sceloporus ornatus, Baird, Proc. Ac. Philad. 1858, p. 254; Cope, Proc. Am. Philos. Soc. xxii. 1885, p. 396; Bouleng. Cat. Liz. ii. p. 224 (1885); Günth. Biol. C.-Amer., Rept. p. 72 (1890).

Head-shields smooth; frontal broken up into three or four shields; interparietal as long as broad or a little broader than long, much broader than the parietals; a series of four or five feebly enlarged transverse supraoculars, bordered inwards by one series of scales and separated from the supraciliaries by two or three; two canthal scales; four feebly enlarged scales form a denticulation on the anterior border of the ear.

Dorsal scales little larger than ventrals, as broad as long or broader than long, rounded behind, feebly keeled, forming parallel longitudinal series; 60 to 64 scales between the interparietal shield and the base of the tail, 15 or 16 corresponding to the length of the shielded part of the head. Lateral scales feebly keeled, directed upwards and backwards, larger than the dorsals. Ventral scales small, smooth, entire. 60 to 64 scales round the middle of the body.

The adpressed hind limb reaches the ear; tibia nearly as long as the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth equals the distance between the end of the snout and the ear. 12–17 femoral pores on each side.

Caudal scales much larger than dorsals, feebly keeled, pointed or shortly mucronate, spinose on the sides. Males with enlarged postanal scales.

I have examined only two specimens:—

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. Nuevo Leon. Taylor.....	55	12	14	12	14	60	60	16	16–17
♀. Duval Co., Texas. Taylor	46	11	12	10	12	63	64	15	16–17

Olive above, uniform or with darker and lighter spots; a black or blackish collar, edged with greenish white, not extending across

the throat. Male with the throat blue, and the sides of the belly blue, edged with blackish on the inner side. Female whitish beneath, the throat bluish.

Hab. North Mexico and Texas. The type is from Coahuila, North Mexico.

6. SCELOPORUS DUGESI.

Sceloporus dugesii, Bocourt, Miss. Sc. Mex., Rept. p. 188, pl. xviii. fig. 7 (1874); Cope, Proc. Am. Philos. Soc. xxii. 1885, p. 396; Bouleng. Cat. Liz. ii. p. 224 (1885).

Sceloporus intermedius, Dugès, Naturaleza, iv. 1876, p. 29, pl. i. figs. 21–32.

Head-shields smooth; frontal transversely divided, in contact with the interparietal, which is as long as broad and much larger than the parietals; a series of four or five feebly enlarged transverse supraoculars, bordered inwards by one series of scales and separated from the supraciliaries by one series of large scales and one or two of small ones; two canthal scales; four pointed scales, not much larger than those before them, form a denticulation on the anterior border of the ear.

Dorsal scales a little larger than ventrals, broader than long, feebly keeled, obtuse, not denticulated, converging towards the middle line posteriorly; 44–48 scales between the interparietal shield and the base of the tail, 9 or 10 corresponding to the length of the shielded part of the head. Lateral scales a little larger, keeled, pointed, directed upwards and backwards. Ventral scales smooth, entire or bicuspid. 52–55 scales round the middle of the body.

The adpressed hind limb reaches the collar-fold; tibia as long as the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth equals the distance between the end of the snout and the ear. 12–15 femoral pores on each side.

Caudal scales larger than dorsals, strongly keeled. Males with enlarged postanal scales.

Brownish olive above, with interrupted dark cross-bands or a double series of narrow dark brown spots on the vertebral region; sides with oblique light lines; a broad, dark, light-edged scapular collar; limbs and tail with brown cross-bands. Lower surfaces yellowish in the female, the throat striped with bluish. Male with the throat bluish, with concentric darker lines, and the sides of the belly blue, black-edged internally.

A small species, measuring 65 millim. from snout to vent.

Hab. Colima and Michoacan, Mexico.

I have examined but two specimens, from La Noria, Michoacan, presented to the British Museum by Dr. A. Dugès.

7. SCELOPORUS CONSOBRINUS.

Sceloporus consobrinus, Baird & Gir. in Marcy's Explor. Red River, p. 237, pl. x. figs. 5–12 (1853); Cope, in Hayden's Rep.

U.S. Geol. Surv. Montana, p. 468 (1872); Yarrow, in Wheeler's Rep. Explor. W. 100th Mer. v. p. 574 (1875); Cope, Proc. Amer. Philos. Soc. xxii. 1885, p. 395; Bouleng. Cat. Liz. ii. p. 229 (1885); Günth. Biol. C.-Am., Rept. p. 69 (1890); Van Denburgh, Proc. Cal. Ac. (2) v. 1895, p. 113.

Sceloporus tristichus, Cope, in Wheeler's Rep. Explor. W. 100th Mer. v. p. 571.

Sceloporus garmani, Bouleng. Proc. Zool. Soc. 1882, p. 761, pl. lvi.

Head-shields smooth; frontal transversely divided, in contact with the interparietal or separated from it by a small azygous shield; interparietal as long as broad or a little longer than broad, larger than the parietals; a series of four or five transversely enlarged supraoculars, the widest not measuring more than half the width of the supraocular region, bordered inwards by one series of scales and separated from the supraciliaries by two or three; two canthal scales; three to five pointed scales, longer than those in front of them, form a denticulation on the anterior border of the ear.

Dorsal scales much larger than ventrals, as long as broad, strongly keeled, slightly mucronate, tricuspid, the keels forming parallel lines; 38–47 scales between the interparietal shield and the base of the tail; 7 to 10 scales, taken in the middle of the back, correspond to the length of the shielded part of the head. Lateral scales graduating into dorsals and ventrals, keeled, pointing upwards and backwards. Ventral scales smooth, bi- or tricuspid. 42–46 scales round the middle of the body.

The adpressed hind limb reaches the axilla or the cervical fold; tibia slightly shorter than the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth equals the distance between the end of the snout and the posterior border of the ear. 12–18 femoral pores on each side.

Caudal scales as large as or a little larger than dorsals, strongly keeled and shortly mucronate. Males with enlarged postanal scales.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. Dakota, Garman.....	57	12	13	11	14	42	9	42	13–12
♀. " "	64	12	13	11	13·5	43	9	46	15–14
♀. " "	64	12	13	11	13	41	9	44	12–12

Reddish brown above, with a greyish vertebral band and one or two yellowish lateral bands on each side; dark brown spots between the longitudinal bands; a blackish streak at base of humerus. Lower parts yellowish white, uniform in the female; male with a small blue spot on each side of the throat, and an elongate black-margined blue blotch on each side of the belly, the white interspace between them measuring twice their width.

Hab. This species was originally described from the Red River

of Louisiana. It has since been recorded from Montana, Nebraska, Utah, Nevada, Arizona, and New Mexico. In addition to the three specimens from Dakota, tabulated above, the British Museum possesses one from Putla, Mexico.

8. SCELOPORUS SERRIFER.

Sceloporus serrifer, Cope, Proc. Ac. Philad. 1866, p. 124, and Proc. Am. Philos. Soc. xxii. 1885, p. 395.

The following is the original description of the species:—"A stout species, near the *S. spinosus*, but differing in its fewer and larger scales, with more serrate margins, and in its coloration. It belongs therefore to the section with large lateral scales and only one row of large supraorbitals. In this species the latter are bounded by a complete series of inner and outer marginals. Scales from nape to rump in 23 cross series, each with a long mucro, and two and three lesser ones on each side of it. Interparietal broader than long; frontal narrow, only transversely divided, posterior portion very small. Internasal longer than broad, elevated, sometimes sharply keeled. Lores deeply grooved. Claws of extended hind limb nearly to ear; femoral pores 9–10. Auricular marginal scales thin, not so large as those just preceding. Median abdominal scales once, gulars twice or thrice emarginate. Tail rather short. Length of end of muzzle to vent, 4 in. 1 l. Colour above greyish or brighter green, with a complete pea-green bordered black collar, which is narrower on the gular region. Throat and sides of male blue, the latter broadly black-bordered behind and medially. A yellow bar across præfrontals, one between orbits and one across occiput, all separated by brown or blackish, the posterior green-bordered behind. Younger specimens have the back brown, cross-banded." Yucatan.

To this description Cope has added a few notes in 1885:—

"Of four adult specimens, three have the collar interrupted, and one has it continuous over the nape. In three young specimens the collar is uninterrupted. In none of the adults are there more than ten femoral pores."

A single female specimen, from Mexico, which I have referred to *S. serrifer*, perhaps belongs to a distinct species, as suspected by Günther. It has 35 scales between the interparietal shield and the base of the tail, 10 corresponding to the length of the shielded part of the head. Tibia as long as the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth equals the distance between the nostril and the arm. 10–11 femoral pores. Olive above, brown-spotted; a dark brown nuchal collar, interrupted in the middle.

From snout to vent 72 millim.

9. SCELOPORUS ORCUTTI.

Sceloporus orcutti, Stejneger, N. Amer. Faun. no. 7, 1893, p. 181, pl. i. fig. 4.

Head-shields smooth; frontal transversely divided, in contact

with the interparietal or separated from it by the frontoparietals; interparietal as long as broad, a little longer than broad, or a little broader than long, broader than the parietals, which are divided into two; a series of four large transverse supraoculars, bordered inwards by an incomplete series of scales, the last two shields being in contact with the frontoparietals and parietals, and separated from the supraciliaries by one or two series of scales; two canthal scales; three to six long pointed scales on the anterior border of the ear.

Dorsal scales much larger than ventrals, as long as broad or broader than long, feebly keeled, not or but very shortly mucronate, strongly denticulate, the keels forming parallel series or very slightly converging towards the median line; 30 to 35 scales between the interparietal shield and the base of the tail; 6 or 7 scales, taken in the middle of the back, correspond to the length of the shielded part of the head. Lateral scales nearly as large as dorsals and more strongly keeled, directed obliquely upwards and backwards. Ventral scales small, smooth, bi- or tricuspid. 36 to 38 scales round the middle of the body.

The adpressed hind limb reaches the shoulder or the ear; tibia longer than the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth exceeds the distance between the end of the snout and the ear. 11 to 15 femoral pores on each side.

Caudal scales as large as dorsals, strongly mucronate. Males with enlarged postanal scales.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. Coahuilla Valley, S. Diego Co. Gilbert.	98	19	21	22	25	30	6	36	11–12
♀. " " " ...	95	18	20	20	25	35	7	36	14–15
♂. S. Jacintho, S. Diego Co. Gilbert.	95	19	20	20	23	32	7	37	14–15
♂. " " " ...	92	18	20	22	24	31	7	38	14–14
♂. Arizona. Wright	72	15	16	17	19	32	7	36	14–13

Dark bronzy brown above, uniform or the scales pale olive in the centre, or pale brown with dark brown cross-bands, the dark bands broader than the pale interspaces. Lower parts leaden grey in females, pale blue in young males, blackish blue in adult males.

Hab. San Diego Co., California. The British Museum has also received a specimen among a collection of Reptiles from Arizona, presented by Dr. W. G. Wright.

10. SCELOPORUS SPINOSUS.

Sceloporus spinosus, Wiegm. Isis, 1828, p. 370, and Herp. Mex. p. 50, pl. vii. fig. 3 (1834); Baird, U.S. Mex. Bound. Surv., Rept. p. 5, pl. xxix. figs. 4–6 (1859); Bocourt, Miss. Sc. Mex., Rept. p. 174, pl. xviii. fig. 2 (1874); Cope, Proc. Amer. Philos. Soc.

xxii. 1885, p. 395; Bouleng. Cat. Liz. ii. p. 226 (1885); Dugès, La Naturaleza, (2) i. 1889, p. 205.

Tropidolepis spinosus, Gray, Griff. A. K. ix. Syn. p. 43 (1831); Dum. & Bibr. Erp. Gén. iv. p. 304 (1837); Gray, Cat. Liz. p. 209 (1845).

Sceloporus horridus, Wiegm. Herp. Mex. p. 50; Bocourt, l. c. p. 178, pl. xviii. fig. 8; Cope, l. c. p. 394.

Tropidolepis horridus, Dum. & Bibr. t. c. p. 306; Gray, Cat. p. 209.

Sceloporus clarkii, Baird & Gir. Proc. Ac. Philad. 1852, p. 127, and U.S. Mex. Bound. Surv., Rept. p. 5; Yarrow, Wheeler's Rep. Explor. W. 100th Mer. v. p. 575, pl. xxiii. fig. 1 (1875); Stejneger, N. Amer. Faun. no. 3, 1890, p. 110, and no. 7, 1893, p. 178, pl. i. fig. 1.

Sceloporus magister, Hallow. Proc. Ac. Philad. 1854, p. 93, and Rep. U.S. Explor. Surv. R. R. x. pt. iv. p. 5 (1859); Stejneger, N. Am. Faun. no. 7, 1893, p. 178, pl. i. fig. 2.

Sceloporus floridanus, Baird, Proc. Ac. Philad. 1858, p. 254; Stejneger, l. c. p. 181, pl. i. fig. 6.

Sceloporus oligoporus, Cope, Proc. Ac. Philad. 1864, p. 177.

Sceloporus thayerii (non B. & G.), Bocourt, l. c. p. 175, pl. xviii. fig. 5.

Sceloporus spinosus, part., Günth. Biol. C.-Am., Rept. p. 63 (1890).

Sceloporus boulengeri, Stejneger, l. c. p. 180, pl. i. fig. 5.

Head-shields smooth; frontal transversely divided (exceptionally single), usually in contact with the interparietal, sometimes separated from it by the frontoparietals or by a small azygous shield; interparietal as long as broad, a little longer than broad, or a little broader than long, nearly as broad as or broader than the parietals; a series of three to five large, transverse supraoculars, which are rarely broken up into two series as in *S. torquatus* v. *poinsetti*[1]; a complete or incomplete series of scales on the inner side of the enlarged supraoculars, the last or last two of which are sometimes in contact with the frontoparietals or frontoparietals and parietals; one or two series of small scales between the large supraoculars and the supraciliaries; two canthal scales (exceptionally one); three to six pointed scales on the anterior border of the ear, in some specimens not larger than those in front of them, in others larger and sometimes much longer than broad.

Dorsal scales much larger than ventrals, as long as broad, strongly keeled, mucronate, and usually denticulate, the keels forming parallel series or, rarely, slightly converging towards the median line; 25 to 32 scales between the interparietal shield and the base of the tail; 5 to 7 scales, taken in the middle of the back, correspond to the length of the shielded part of the head. Lateral scales graduating into dorsals and ventrals, strongly keeled, directed obliquely upwards and backwards. Ventral scales small, smooth, bi- or tricuspid. 34 to 40 scales round the middle of the body.

[1] This is particularly marked in a specimen from Puebla.

The adpressed hind limb reaches the shoulder or the ear; tibia, in the adult, a little longer than the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth exceeds the distance between the end of the snout and the ear. 2 to 17 femoral pores on each side.

Caudal scales as large as dorsals, strongly mucronate. Males with enlarged postanal scales.

A. Femoral pores 2–5 on each side; auricular scales not much longer than broad.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. Ixtlan, Jalisco. Buller	87	18	20	19	23	27	5	35	2–3
♂. Puentillo de Acatan, Jalisco. Buller	80	16	19	18	23	29	6	36	3–2
♀. Cuernavaca. Boucard	87	17	18	18	23	28	6	36	4–4
♀. ,, ,,	67	14	15	15	21	28	7	36	4–5
♀. N. of Rio de Santiago. Smith	102	19	21	24	26	30	6	36	2–2
♀. ,, ,, ,,	82	16	18	18	22	30	6	34	2–2
♂. Iguala, Guerrero. Smith	64	14	15	14	18	29	7	34	4–4
Yg. Ventanas, Durango. Forrer	45	11	12	11	15	29	7	32	3–4

B. Femoral pores 7–10; auricular scales not much longer than broad.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. Presidio, Sinaloa. Forrer	106	21	24	23	29	30	5½	36	9–8
♀. ,, ,,	102	21	24	22	28	28	6	36	8–8
♀. ,, ,,	83	18	20	19	24	27	6	34	9–10
♀. ,, ,,	89	19	21	20	24	27	6	36	10–10
♀. ,, ,,	77	17	19	18	22	30	6	36	9–9
♀. ,, ,,	77	17	19	18	22	29	6	36	10–10
♀. ,, ,,	70	16	18	16	21	27	6	37	9–10
♀. Guanajuato. Dugès	78	16	18	18	23	29	5½	36	9–9
♀. ,, ,,	96	18	20	21	25	30	5	40	10–7
♀. ,, ,,	82	16	18	19	21	28	5	35	9–9
♀. Altisco. Boucard	59	13	14	13	16	29	6	40	10–10
♀. Puebla. ,,	99	18	20	20	24	28	5	40	10–10
♀. Mexico. ,,	85	16	18	19	23	29	5	38	8–8
♀. S. Mexico. Godman	73	15	16	16	21	28	6	36	8–7
♀. California (?)	95	18	19	20	25	29	6	38	9–10

C. Femoral pores 11–13; auricular scales not much longer than broad.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. Fort Lowell, Arizona. Gilbert	103	20	23	22	26	30	6	40	12–12
♀. ,, ,, ,,	86	17	19	18	22	32	7	40	11–11
♂. Mexico	99	18	21	20	24	30	6	38	12–13
♀. California (?)	74	14	16	16	20	30	6	38	13–12

D. Femoral pores 11–17; auricular scales usually much longer than broad.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. Waco, Texas	86	18	20	19	24	27	6	38	14–16
♂. "	79	16	18	18	23	27	6	36	14–12
♂. "	83	16	18	18	24	29	5	36	16–15
♂. San Antonio, Texas	78	16	18	19	26	30	6	36	16–17
♂. Duval Co., Texas. Taylor	83	16	18	19	27	28	5	36	13–12
♂. " " "	80	16	17	18	25	28	6	38	13–14
♂. " " "	73	15	16	17	23	28	6	36	13–11
♀. " " "	113	22	24	24	29	30	5	38	14–11
♀. " " "	102	20	22	24	29	28	5	38	14–14
♀. " " "	102	20	22	24	30	31	5½	36	13–13
♀. " " "	77	16	17	18	22	30	6	40	11–11
♂. Fort Lowell, Arizona. Gilbert...	108	21	25	26	29	29	7	40	14–12
♂. " " " ...	93	19	21	22	27	26	6	38	14–15
♀. " " " ...	62	14	15	16	19	25	6	36	12–11
♂. Colorado Bottom. Smiths. Inst.	113	20	23	25	29	30	6	36	13–12
♂. Tampico, Jalisco. Richardson...	96	18	20	21	28	29	5	34	12–13
♂. " " " ...	67	15	16	17	23	28	6	38	13–13

Brown, greyish, or olive above, usually with a more or less distinct light stripe along each side of the back; more or less regular dark brown or blackish bands may be present across the back; these bands may be broken up into spots or so extend as to obscure the ground-colour. Dark bars are usually present across the digits, but may be absent, irrespective of the structural characters or the localities. The type of *S. clarkii*, from Arizona, is described as uniform yellowish green above, and we possess a uniform greenish specimen from Fort Lowell, recently received from the Stanford University through Prof. Gilbert as *S. clarkii*, with which it agrees in its ear-scales; whilst a second specimen from the same locality, received under the same name, and agreeing in the ear-scales, has the dorsal cross-bars of *S. spinosus* and barred toes. *S. magister* is described by Hallowell (from Fort Yuma and Tucson, Arizona) as "straw-colour above, without spots or blotches." Our specimens from Arizona, answering to the definition of *S. magister* given by Stejneger, vary much in coloration and cannot be distinguished in this respect from specimens from Mexico, referred to the typical *S. spinosus*, and Texas, the latter being considered by Stejneger as a distinct species, *S. floridanus*, Baird. This is described by Baird as "greenish yellow, with two broad yellow stripes, five scales apart; back with distinct transverse blackish bars." A black blotch is usually present in front of the arm, and may ascend up the sides to form an incomplete nuchal collar. This is best marked in some specimens from Arizona, Colorado, and Presidio near Mazatlan.

I am unable to reconcile the differences in the coloration of the upper parts with any structural characters. The same may be said of the coloration of the lower parts.

Males are usually distinguished from females by the presence of blue on the throat and on the sides of the belly; but this character should not be exclusively relied upon for distinguishing the sexes, since a female from Presidio has the throat as blue as some males collected at the same time in the same locality; whilst, on the other hand, an adult male specimen of the var. *horridus* from Puentillo de Acatan entirely agrees with normal females in the coloration of the lower surfaces. The intensity of the blue varies much, probably according to seasons. The male of the typical *S. spinosus* is described as with a blue throat striped with darker, the sides of the belly blue, the breast and the middle line of the belly white; a large black blotch in front of the arm: such specimens we possess from Guanajuato, Puebla, and Presidio (*f. typica*) and from Ixtlan (var. *horridus*). In *S. horridus* the blue of the belly may extend on the anterior face of the thigh, as in our specimen from N. of Rio de Santiago, and in one from Mexico referred by me to the var. *clarkii*. The type of *S. clarkii* is described as with "a bluish abdomen, indistinctly black along the middle region; the lower surface of the head is blue, on the middle region surrounded with black." This description might have been penned from one of our specimens from Presidio, near Mazatlan, and agrees well with the male from Fort Lowell which I regard as a typical *S. clarkii*. Hallowell's *S. magister* has "two large bluish-green blotches upon the abdomen, one on each side, and one upon the neck; the rest of the under surface light straw-yellow." Specimens answering to this description I have only seen from Mexico (*f. typica*). Specimens from Arizona, referred to *S. magister*, have the throat blue posteriorly, with a black cross-band, and the sides of the belly of a deep blue edged with black within; groin black. Specimens (not full-grown) from Texas and Tampico have the sides of the belly greenish blue and a small spot of the same colour on each side of the throat.

The systematic treatment of the *Sceloporı* here grouped under *S. spinosus* is a subject on which recent authors have shown great divergence of opinion.

In his Synopsis of 1885, Cope attaches undue importance to the number of femoral pores, a character which he regards as "not subject to such variations as to be embarrassing:" and he forthwith makes a bold primary division into species with 2–6 pores and with 10 and more. The *S. horridus* (with 2–6 pores) is therefore placed quite apart from *S. spinosus* (believed to have 10 or more). This shows that the author cannot have counted the pores in a very large number of specimens, for the series in the British Museum alone, which I daresay is far less important in numbers than that to which he had access, contains not only specimens with 7, 8, or 9 pores, which therefore would not fit in either division of the synopsis, but there is even a specimen, from Guanajuato, with 7 pores on one side and 10 on the other. *S. clarkii*, usually accepted as a distinct species, or subspecies, by Cope and other American authors, is not even mentioned in this synopsis.

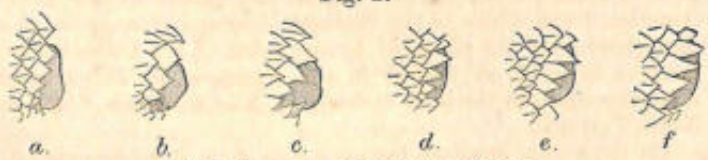
In the same year, I had to deal with the genus *Sceloporus* in the second volume of the 'Catalogue of Lizards,' and, notwithstanding the small material at my command, felt justified in uniting under one species *S. spinosus*, *horridus*, and *clarkii*, which seemed to agree in all respects save the number of femoral pores, viz., 7 to 10 in the first, 2 to 5 in the second, and 12 to 15 in the third; and this character served me in dividing the species into three forms or varieties.

Günther, in 1890, went even further, and refused to accept the varieties on the ground of a "want of agreement between the number of pores and the distribution of the species." This is partly due to his having mixed up two species under his *S. spinosus* (see *S. acanthinus*, p. 497). As a matter of fact, Günther never examined a Mexican specimen of *S. spinosus* with more than 13 pores, and the only two that possess more than 10 come from a locality (Tampico) which is not physically separable from Arizona and Sonora, the home of *S. magister*, to which form they undoubtedly belong.

In 1893, Stejneger discovered differences in the scales in front of the ear by which he proceeded to divide the *S. spinosus* with 7 or more pores into as many as five species, viz., *S. spinosus*, *S. boulengeri*, *S. clarkii*, *S. floridanus*, and *S. magister*. I will now examine the value of these supposed species.

1. *S. boulengeri* is based on specimens from Presidio, near Mazatlan, believed to be distinguished by small, comparatively short and broad auricular scales, and a very broad interparietal. As the British Museum possesses 7 specimens from the same locality and collector, I am in a position to dispose at once of this supposed species by figuring (fig. 2) the ears of two specimens, one of which (*a*) agrees with Stejneger's figure, the other (*b*) approaching the type of *S. spinosus* as figured by Bocourt (*c*), and

Fig. 2.



Auricular scales of *Sceloporus spinosus*.

by giving the following measurements of the interparietal in four specimens each of *S. spinosus*, *S. boulengeri*, and *S. clarkii*; the first figure indicates the length, the second the width:—

S. spinosus ..... 5 : 4, 5 : 5, 4 : 4½, 4 : 4.
S. boulengeri .... 5 : 5, 5 : 5, 4 : 5, 4½ : 5.
S. clarkii..... 4½ : 4½, 4 : 4½, 4 : 4, 4 : 4.

There is no difference whatever, in structure or coloration, by which *S. boulengeri* may be distinguished from *S. spinosus*.

2. *S. clarkii* differs from *S. spinosus* in having a greater number of femoral pores (11 to 13 instead of 7 to 10). But as this is the only difference I can perceive, and as I have no doubt an examination of a larger material would reveal greater variation than that with which we are at present acquainted, resulting in an overlapping of the two numbers, I consider this species merely as a form of *S. spinosus*, which "seems confined to South-eastern Arizona, whence it is found southward into Mexico for an unknown distance, probably confined to the western slope of the Sierra Madre."

3. *S. magister* and *S. floridanus* ("or *S. spinosus floridanus* if the number of femoral pores should be found to intergrade") are both distinguished by longer ear-scales, as may be seen from the figures annexed to Stejneger's paper, and the pores number 11 to 16. The character of the auricular scales is, however, much more variable than one would infer on the authority of Stejneger. On comparing his figures with mine (p. 494, *d*, *e*, *f*) and with Bocourt's (pl. xviii. fig. 5), it will be seen that such a character is too inconstant for specific distinction[1], in the absence of any others, which I am unable to find and which Stejneger has, so far, not given. I have carefully compared specimens from Texas (*S. floridanus*) with some from Arizona (*S. magister*), and I am quite unable to separate them. There is absolute identity between specimens from Waco and from Tampico. I believe geographical considerations have influenced Stejneger in separating the western from the eastern form,—*S. magister* being found, according to him, in S.W. Utah, the Grand Cañon of Colorado, S. Nevada, the desert region of California, and Arizona[2]; *S. floridanus* from Pensacola to Southern Texas. But I would not allow such considerations to weigh in the distinction of species or even varieties, as they must vitiate any ultimate deductions in the study of geographical distribution. We know that gaps may occur in the distribution of a species. To mention one example taken from the European fauna, the Reptiles of which are certainly better known than those of any part of America, I will allude to the common Adder, *Vipera berus*, which disappears from the plains of France south of the Loire, where it becomes replaced, as well as in the Pyrenees, by *V. aspis*, and reappears again in the hilly districts of North-western Spain and North Portugal.

On the whole, however, the ear-scales of *S. floridanus* (fig. 2, *e*) and *S. magister* (fig. 2, *f*), which I unite as one form, are more elongate than in *S. clarkii* and *S. spinosus*, though they intergrade in Texan specimens (fig. 2, *d*), and I therefore believe it best to separate *S. magister* as a variety.

The arrangement proposed is the following:—

1. Var. *horridus*, Wiegm. Femoral pores 2–6 on each side; auricular scales usually not or but slightly longer than broad.

[1] In *S. undulatus* we meet with a similar amount of variation, and I am unable to avail myself of the character for defining varieties, in spite of repeated efforts to do so.

[2] Has since been recorded from New Mexico.

2. *Forma typica*. Femoral pores 7–10; auricular scales usually not or but slightly longer than broad.

3. Var. *clarkii*, B. & G. Femoral pores 11–13; auricular scales not longer than broad.

4. Var. *magister*, Hallow. Femoral pores 11–17; auricular scales usually much longer than broad.

Hab. Mexico west of the Isthmus of Tehuantepec; northwards to Nevada, Utah, Colorado, Texas, and Western Florida.

11. SCELOPORUS ACANTHINUS.

Sceloporus acanthinus, Bocourt, Miss. Sc. Mex., Rept. p. 180, pl. xviii. fig. 10, & pl. xix. fig. 4 (1874); Cope, Proc. Amer. Philos. Soc. xxii. 1885, p. 396; Bouleng. Cat. Liz. ii. p. 221 (1885); Günth. Biol. C.-Am., Rept. p. 65 (1890).

Sceloporus spinosus, part., Günth. l. c. p. 63.

Sceloporus viviparus (non Cope), Günth. l. c. p. 64.

Head-shields smooth; frontal transversely divided, rarely single, in contact with the interparietal; latter as long as broad or a little longer than broad, broader than the parietals; a series of four or five large transverse supraoculars, bordered inwards by a complete or incomplete series of scales, the last two plates rarely in contact with the frontoparietals and parietals; one or two series of scales between the large supraoculars and the supraciliaries; two canthal scales; four or five pointed scales, not or but little larger than those before them, form a denticulation in front of the ear.

Dorsal scales much larger than ventrals, as long as broad or longer than broad, strongly keeled and mucronate, denticulate, the keels forming parallel or slightly oblique series; 26–32 scales between the interparietal shield and the base of the tail; 6 or 7 scales, taken in the middle of the back, correspond to the length of the shielded part of the head (8 in some young, owing to the proportionally larger head). Lateral scales graduating into dorsals and ventrals, strongly keeled, directed obliquely upwards and backwards. Ventral scales small, smooth, bi- or tricuspid; 35–40 scales round the middle of the body.

The adpressed hind limb reaches the collar-fold or the ear; tibia as long as or slightly longer than the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth exceeds the distance between the end of the snout and the posterior border of the ear. 14–16 (exceptionally 13 or 17) femoral pores on each side.

Caudal scales as large as or a little smaller than dorsals, strongly keeled, mucronate, and denticulate like the dorsals. Males with enlarged postanal scales.

I have examined a good number of specimens, which show the following variations in the proportions, the lepidosis, and the number of femoral pores:—

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. Omilteme, Guerrero. Smith (1)	82	17	19	18	22	27	7	36	15–15
♂. " " " ...	72	15	17	16	21	29	7	40	15–15
♂. " " " ...	66	14	15	14	19	32	7	36	16–16
♂. " " " ...	61	13	15	14	17	29	7	35	14–15
♂. " " " ...	58	13	15	14	18	31	8	36	15–16
♂. " " " ...	56	12	14	13	17	30	8	36	14–14
♂. " " " ...	72	14	16	15	19	30	7	36	16–16
♂. " " " ...	63	13	14	14	18	29	7	38	16–15
♂. Amula, Guerrero. Smith (2) ...	64	13	15	14	18	30	7	38	14–15
♂. Jalapa. Hoege	71	14	16	14	19	28	6	36	14–15
♂. S. Mexico. Godman (3)	59	13	14	13	18	27	7	38	14–14
♂. " "	83	17	20	19	23	26	6	36	16–17
♂. Hac. Rosa de Jericho, Nicaragua. Rothschuh.	73	15	17	16	21	29	6	36	14–14
♂. Bebedero, Costa Rica. Underwood.	68	14	16	14	20	29	7	36	14–13

(1) The specimens from Omilteme have been referred by Günther to *S. viviparus*.
(2) This specimen has been referred by Günther to *S. spinosus*.
(3) The specimens from S. Mexico have been referred by Günther to *S. torquatus*.

Males green or dark olive above, the dorsal scales often black at the sides; head dark olive above, uniform or with pale green spots; a black collar, continuous or broadly interrupted between the shoulders, and extending across the throat. Lower surface of head and body dark blue, uniform or with the breast and the middle line of the belly yellowish white or pale bluish green; the light ventral stripe edged with black. In some of the specimens from Omilteme the throat is bluish white with oblique blue stripes converging backwards. Females olive or olive-brown above, spotted with black, or with more or less regular black wavy cross-bands; black collar ill-defined or reduced to a bar in front of the shoulder, not extending across the throat. Lower parts yellowish white, throat bluish green.

This species is very closely allied to *S. spinosus*, from which it differs in the stronger mucronation and denticulation of the dorsal scales.

The type specimens came from St. Agustin, W. slope of Atitlan, Guatemala, 2000 ft. The specimens which I refer to the same species are from Jalapa, Omilteme, and Amula, South Mexico, Hacienda Rosa de Jericho in Nicaragua, 3250 ft., and Bebedero in Costa Rica.

12. Sceloporus asper, sp. n. (Plate XXXIII.)

Head-shields smooth; frontal transversely divided, the anterior moiety often longitudinally bisected, in contact with the interparietal or narrowly separated from the latter by the frontoparietals; interparietal as long as broad or a little broader than long, much larger than the parietals; a series of four transversely

enlarged supraoculars, bordered inwards by one series of very small scales and separated from the supraciliaries by two series of small scales; two canthal scales; three or four pointed scales, smaller than those in front of them, form a denticulation on the anterior border of the ear.

Dorsal scales much larger than ventrals, as long as broad, strongly keeled and mucronate, scarcely denticulate, the keels converging more or less distinctly towards the median line; 28 to 32 scales between the interparietal shield and the base of the tail; 7 scales, taken in the middle of the back, correspond to the length of the shielded part of the head. Lateral scales keeled, graduating into the dorsals and ventrals, directed obliquely upwards and backwards. Ventral scales small, smooth, bicuspid. 38 to 44 scales round the middle of the body.

The adpressed hind limb reaches the ear; tibia nearly as long as the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth equals the distance between the end of the snout and the collar-fold. 17 to 21 femoral pores on each side.

Caudal scales as large as dorsals, very strongly keeled and mucronate, the keels forming continuous longitudinal ridges. Males with enlarged postanal scales.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. La Cumbre de los Arrastrados. Buller.	85	18	21	18	24	30	7	42	21–19
♀. " " "	85	19	22	18	24	30	7	40	18–19
♀. " " "	70	15	16	14	20	28	7	38	17–17
♀. " " "	72	15	17	14	21	32	7	42	17–17
♀. " " "	69	14	15	14	20	30	7	44	18–18

Males olive or green above, uniform blue-green beneath; no collar, but a rather indistinct blackish blotch in front of the shoulder. Females brown above, with ill-defined darker spots or chevron-shaped cross-bars; whitish beneath, uniform or throat bluish.

Hab. A few specimens, of which the measurements and other particulars are recorded above, were obtained by Dr. A. C. Buller at La Cumbre de los Arrastrados, State of Jalisco, at an altitude of 8500 feet.

13. SCELOPORUS ZOSTEROMUS.

Sceloporus zosteromus, Cope, Proc. Ac. Philad. 1863, p. 105, and Proc. Amer. Philos. Soc. xxii. 1885, p. 395; Bouleng. Cat. Liz. ii. p. 225 (1885); Stejneger, N. Amer. Faun. no. 7, 1893, p. 181, pl. i. fig. 3; Van Denburgh, Proc. Calif. Acad. (2) v. 1895, p. 108.

Sceloporus clarkii zosteromus, Cope, Check-List N. Am. Rept. p. 49 (1875).

Sceloporus rufidorsum, Yarrow, Proc. U.S. Nat. Mus. v. 1882, p. 442.

Head-shields smooth; frontal transversely divided and in contact with the interparietal; latter shield as long as broad or a little broader than long, much larger than the parietals[1]; a series of four or five large, transverse supraoculars, bordered inwards by an incomplete series of scales, the last two or three shields being in contact with the frontoparietals and parietals, and separated from the supraciliaries by one or two series of scales; two canthal scales; three to five long pointed scales on the anterior border of the ear, much larger than those in front of them.

Dorsal scales much larger than ventrals, at least as long as broad, keeled, mucronate, entire or slightly denticulate, forming parallel longitudinal series; 28 to 30 scales between the interparietal shield and the base of the tail; 5 or 6 scales, taken in the middle of the back, correspond to the length of the shielded part of the head. Lateral scales keeled, graduating into the dorsals and ventrals, directed obliquely upwards and backwards. Ventral scales small, smooth, bicuspid. 32–36 scales round the middle of the body.

The adpressed hind limb reaches the ear or a little beyond; tibia longer than the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth equals the distance between the end of the snout and the cervical pit. 17 to 22 femoral pores on each side.

Caudal scales as large as dorsals, strongly mucronate. Males with enlarged postanal scales.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. S. José del Cabo. Eisen ...	83	17	19	21	23	29	6	34	19–17
♂. " " " ...	82	17	19	21	24	28	5½	36	20–20
♀. " " " ...	75	14	15	17	20	29	5	32	18–18
♀. " " " ...	62	13	14	16	20	29	6	32	17–18
♂. Miraflores. Eisen	70	14	15	18	21	28	6	36	18–18

Olive above, with a more or less distinct yellowish or reddish stripe along each side of the back; more or less distinct dark bars may be present across the back. Yellowish white beneath; males with a bluish-black band along each side of the middle line of the belly, and extending on the anterior face of the thigh; a blue-black vertical bar in front of the arm, sometimes connected with the ventral band; posterior part of the throat blue-black. Females uniform yellowish white beneath.

Hab. Lower California and neighbouring islands (Ceros, Santa Margarita, and Magdalena).

[1] Cope says: "Parietal scales wider than the interparietal." This is no doubt a lapsus, as may be seen by comparing Stejneger's figure, drawn from the type specimen.

14. Sceloporus licki.

Sceloporus licki, Van Denburgh, Proc. Cal. Ac. (2) v. 1895, p. 110, pl. x.

Head-shields smooth; frontal transversely divided, in contact with the interparietal; latter as long as broad or a little broader than long, broader than the parietals; a series of four large transverse supraoculars bordered inwards by an incomplete series of scales, the last two supraoculars being in contact with the interparietal and parietal; one or two series of scales between the large supraoculars and the supraciliaries; one or two canthal scales; four or five pointed scales, much longer than broad, form a denticulation on the anterior border of the ear.

Dorsal scales much larger than ventrals, as long as broad, strongly keeled, very strongly mucronate and denticulate, the keels forming parallel longitudinal lines; 32–38 scales between the interparietal shield and the base of the tail; 7–9 (exceptionally 6 or 10) scales correspond to the length of the shielded part of the head. Lateral scales graduating into dorsals and ventrals, strongly keeled, pointing upwards and backwards. Ventral scales small, smooth, bi- or tricuspid. 36–38 scales round the middle of the body.

The adpressed hind limb reaches the ear, or between the ear and the eye; tibia longer than the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth equals the distance between the end of the snout and the collar-fold. 14–16 femoral pores on each side.

Caudal scales as large as dorsals, strongly keeled and mucronate. Males with enlarged postanal scales.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. S. San Lazaro. Eisen & Vaslit...	71	14	16	18	20	35	8	38	15–16
♂. " " ...	69	14	15	16	19	35	7	36	14–14
♂. " " ...	65	13	15	16	19	33	7	36	15–14
♂. Miraflores. Eisen & Vaslit	70	13	15	16	18	36	7	36	14–14

The following description of the colours is taken from fresh specimens by Mr. Van Denburgh:—

"Back and sides olive-brown, many of the scales having central markings of deep blue or green; a narrow line of verdigris-green runs along each side from the eye to the base of the tail; below this, a narrower similarly-coloured line runs from the ear to a point a short distance above and behind the axilla. A patch in front of the shoulder, the central part of the belly, and the anterior and lower surfaces of the thigh black, which colour gradually fades into the cyanine blue of the sides of the belly; throat olive-grey, with greenish-white lines, which converge to a point midway between the neck-patches. Tail brown, suffused with campanula-blue and beryl-green towards its base. One male has a single large blue patch on the throat, through which the ordinarily whitish lines show as lines of paler blue."

Hab. Lower California. Numerous specimens were obtained at San José del Cabo, Miraflores, and in the Sierra San Lazaro and Sierra El Taste.

15. SCELOPORUS FORMOSUS.

Sceloporus formosus, Wiegm. Herp. Mex. p. 50, pl. vii. fig. 2 (1834); Bocourt, Miss. Sc. Mex., Rept. p. 182, pl. xviii. fig. 3 (1874); Bouleng. Cat. Liz. ii. p. 222 (1885).

Tropidolepis formosus, Dum. & Bibr. Erp. Gén. iv. p. 303 (1837).

Sceloporus malachiticus, Cope, Proc. Ac. Philad. 1864, p. 178, and Proc. Amer. Philos. Soc. xxii. 1885, p. 394.

Sceloporus lunæi, Bocourt, l. c. p. 184, pl. viii. bis, fig. 5; Cope, l. c. p. 395; Günth. Biol. C.-Am., Rept. p. 67 (1890).

Sceloporus smaragdinus, Bocourt, l. c. p. 186, pl. xviii. fig. 6 and pl. xix. fig. 1; Günth. l. c. p. 68.

Sceloporus viviparus, Cope, Proc. Amer. Philos. Soc. xxii. 1885, p. 398.

Sceloporus toniocnemis, Cope, l. c. p. 399.

Sceloporus torquatus formosus, Cope, l. c. p. 402.

Sceloporus irazuensis, Günth. l. c. p. 67.

Sceloporus salvini, Günth. l. c. p. 68.

Head-shields smooth; frontal transversely divided, usually in contact with the interparietal; latter as long as broad or a little broader than long, much larger than the parietals, which may be divided; a series of three to five more or less enlarged, transverse supraoculars, bordered inwards by a complete or incomplete series of scales; one, two, or three series of scales between the large supraoculars and the supraciliaries; one or two canthal scales; three or four pointed scales, not or but a little larger than those before them, form a denticulation on the anterior border of the ear.

Dorsal scales much larger than ventrals, as long as broad or a little broader than long, strongly keeled, moderately or shortly mucronate, entire or tri- or quinque-cuspid, the keels forming parallel lines or obliquely converging towards the middle line on the posterior part of the back; 35–45 scales between the interparietal shield and the base of the tail; 8 or 9 scales (exceptionally 10), taken in the middle of the back, correspond to the length of the shielded part of the head. Lateral scales graduating into dorsals and ventrals, strongly keeled, pointing upwards and backwards. Ventral scales small, smooth, bi- or tricuspid. 38–52 scales round the middle of the body.

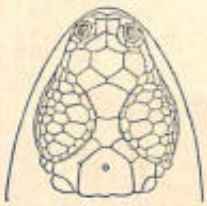
The adpressed hind limb reaches the shoulder, the collar-fold, or the ear; tibia as long as or slightly longer than the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth equals or slightly exceeds the distance between the end of the snout and the collar-fold. 11–16 femoral pores on each side.

Caudal scales as large as or a little larger than dorsals, strongly keeled and mucronate. Males with enlarged postanal scales.

As Bocourt, Cope, and Günther all agree to consider the

number, one or two, of canthal scales as a specific character, I have divided accordingly the specimens in the following table. One, which is here figured, defies the system in being referable to the first category on the right side, to the second on the left.

Fig. 3.



Head of *Sceloporus formosus* from Costa Rica.

I have placed it last in the first division. It will be seen that the character is not constantly correlated with any other, and for that reason I must refuse to attach any special importance to it. Of *S. irazuensis*, Günther says:—"Two canthal scales, but owing to the shortness of the snout the anterior is not always fully developed." I cannot account for such a statement; there is no correlation between the number of canthals and the length of the snout, as may be seen from the specimen figured above, one of the types of *S. irazuensis*. Günther himself does not seem to have had great faith in the value of the character, as he has in several instances associated in the same species individuals with one canthal and others with two, although those exceptions are not alluded to in his descriptions. Curiously, Günther's *S. smaragdinus* is described as with one canthal scale (p. 69), and yet *S. tæniocnemis*, Cope, is referred to it as a synonym in spite of Cope attributing to it two canthals.

A. One canthal shield.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
a. ♂. S. Mexico. Godman (1)	84	16	18	17	?	35	8	40	14–14
b. ♂. Coban, Guatemala. Salvin (2)	74	15	17	15	21	35	8	40	15–15
c. ♂. Dueñas, Guatemala. Salvin (3)	85	18	20	19	23	41	9	50	14–13
d. ♂. " " " ...	85	17	19	18	24	42	9	52	16–15
e. ♂. " " " ...	75	15	17	16	22	44	8	50	16–15
f. ♂. " " " ...	66	14	15	15	20	38	9	48	15–16
g. ♂. " " " ...	66	14	15	15	19	41	10	48	13–14
h. ♀. " " " ...	85	16	18	16	22	40	8	48	16–15
i. ♀. " " " ...	66	13	14	13	18	39	8	48	16–16
k. ♀. " " " ...	64	13	14	14	19	40	9	50	16–16
l. ♂. Ysabal, Guatemala. Salvin (3)...	84	16	17	17	24	40	8	44	15–16
m. ♂. Irazu, Costa Rica (1).....	63	13	15	13	19	34	8	40	14–14
n. ♀. " "	57	13	14	13	17	35	8	38	13–12

(1) Referred by Günther to *S. irazuensis*.
(2) Referred by Günther to *S. lunæi*.
(3) Referred by Günther to *S. smaragdinus*.

B. Two canthal shields.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
o. ♂. Jalapa. Hoege (1)	85	17	19	18	24	38	8	42	12–12
p. ♂. S. Mexico. Godman (1)	97	19	21	20	27	45	9	44	12–11
q. ♂. „ „ (2)	65	14	15	14	18	35	8	42	15–16
r. ♀. „ „ (1)	96	18	20	18	25	45	9	46	14–13
s. ♀. „ „ (1)	89	17	19	17	25	43	8	45	12–13
t. ♂. Guatemala. Salvin (1)	89	18	20	18	25	37	8	44	11–13
u. ♂. „ „ (1)	80	16	18	16	24	37	8	42	13–14
v. ♀. „ „ (1)	76	15	17	15	23	39	8	44	14–16
w. ♂. Irazu, Costa Rica (2)	68	14	16	14	18	33	8	42	16–16
x. ♀. „ „ (2)	68	13	15	14	20	35	8	38	15–13
y. ♀. „ „ (2)	62	13	15	14	19	33	8	40	14–13

(1) Referred by Günther to *S. salvini*.
(2) Referred by Günther to *S. irazuensis*.

Green or olive above, dorsal scales often with a lighter central spot; series of blackish spots sometimes present on the back. Males with a black collar, which may be confined to the throat and sides (specs. *a–n*, *q*, *w–y*), or extend, continuous (specs. *o*, *r*) or interrupted (specs. *p*, *s–v*), across the nape; throat dark blue; breast blue or whitish, sometimes black; belly entirely dark blue or divided by a median yellowish-white, black-edged stripe. Females with a black bar in front of the shoulder, which may extend across the nape but not across the throat; lower parts yellowish white, throat often bluish green.

Hab. Mexico, Guatemala, and Costa Rica. Recorded by Bocourt from Tehuantepec and Colima in Mexico, Solola, Totonicapam, Quezaltenengo, and the Alta Vera Paz in Guatemala.

16. Sceloporus undulatus.

Agama undulata (Bosc), Daudin, Hist. Rept. iii. p. 384 (1802); Harlan, Med. Phys. Res. p. 140 (1835).

Lacerta hyacinthina, Green, Journ. Ac. Philad. i. 1818, p. 349.

Lacerta fasciata, Green, l. c.

Uromastyx undulatus, Merrem, Tent. p. 57 (1820).

Tropidolepis undulatus, Gray, Griff. A. K. ix. Syn. p. 43 (1831); Dum. & Bibr. Erp. Gén. iv. p. 298 (1837); Holbr. N. Am. Herp. ii. p. 73, pl. ix. (1842); Gray, Cat. Liz. p. 208 (1845).

Sceloporus undulatus, Fitzing. Syst. Rept. p. 75 (1843); Girard, U.S. Explor. Exped., Herp. p. 379, pl. xix. figs. 15–21 (1858); Bocourt, Miss. Sc. Mex., Rept. p. 195, pl. xviii. bis, fig. 11 (1874); Cope, Proc. Amer. Philos. Soc. xxii. 1885, p. 395; Bouleng. Cat. Liz. ii. p. 227 (1885); Günth. Biol. C.-Am., Rept. p. 67 (1890); H. Garm. Bull. Illin. Lab. iii. 1892, p. 250; Hay, Batr. Rept. Indiana, p. 132 (1893).

Sceloporus thayerii, Baird & Gir. Proc. Ac. Philad. 1852, p. 127.

Sceloporus occidentalis, Baird & Gir. l. c. p. 175; Girard, l. c. p. 383, pl. xix. figs. 8–14; Stejneger, N. Am. Faun. no. 7, 1893, p. 186.

Sceloporus frontalis, Baird & Gir. l. c.; Gir. l. c. p. 384, pl. xix. figs. 8–14.

Sceloporus longipes, Baird, Proc. Ac. Philad. 1858, p. 254.

Sceloporus biseriatus, Hallow. Rep. U.S. Explor. Surv. R. R. x. pt. iv. p. 6, pl. vi. fig. 2 & pl. viii. (1859); Bocourt, l. c. p. 197, pl. xviii. bis, fig. 10; Cope, Proc. Amer. Philos. Soc. xxii. 1885, p. 395; Stejneger, l. c. p. 184.

Sceloporus smaragdinus (non Bocourt), Cope, in Wheeler's Rep. Explor. W. 100th Mer. v. p. 572, pl. xxiv. fig. 2 (1875).

Sceloporus undulatus, var. *bocourtii*, Bouleng. l. c. p. 229.

Some or all of the head-shields more or less rugose, rarely smooth, the scales between the enlarged supraoculars and the supraciliaries nearly constantly keeled or tuberculate; frontal transversely divided, usually in contact with the interparietal; latter as long as broad, a little longer than broad, or a little broader than long, much larger than the parietals, which may be divided; a series of four or five more or less enlarged, transverse supraoculars, bordered inwards by a complete (rarely incomplete) series of scales and separated from the supraciliaries by one or two series; two canthal scales (rarely one); four or five pointed scales, as large as or larger than those before them, form a denticulation on the anterior border of the ear.

Dorsal scales much larger than ventrals, as long as broad or a little broader than long, strongly keeled, rather strongly mucronate, entire or feebly denticulate, the keels forming parallel lines or obliquely converging towards the middle line on the posterior part of the back; 32–43 scales between the interparietal shield and the base of the tail; 7–9 (exceptionally 10) scales, taken in the middle of the back, correspond to the length of the shielded part of the head. Lateral scales graduating into dorsals and ventrals, keeled, pointing upwards and backwards. Ventral scales small, smooth, bicuspid. 36–48 scales round the middle of the body.

The adpressed hind limb reaches the shoulder, the collar-fold, or the ear; tibia as long as or a little longer than the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth equals or slightly exceeds the distance between the end of the snout and the collar-fold. 13–19 femoral pores on each side.

Caudal scales as large as or a little larger than dorsals, strongly keeled and mucronate. Males with enlarged postanal scales.

The typical form, inhabiting the Eastern and Central United States and the border of the Gulf of Mexico, is grey, brown, or copper-colour above, with a dorso-lateral series of whitish or bluish spots or lateral bands crossed by transverse dark brown or black angular spots, or undulous or zigzag cross-bars, which may extend across the back. In males, the sides of the belly are blue or blue-green, edged with black along a whitish stripe which

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. Raleigh, N. Car. Brimley	65	14	15	14	18	38	9	44	14-15
♂. „ „	61	13	15	14	17	39	9	44	15-14
♂. Bloomington, Ind. Bollman ...	63	13	15	14	18	37	8	44	13-13
♀. „ „ ...	66	13	15	14	18	33	8	42	13-13
♂. Hot Springs, Arkansas. Brimley.	61	13	14	14	18	40	9	46	14-13
♀. „ „ „	55	11	12	12	16	42	9	46	16-14
♂. E. United States. Russell	59	13	14	14	18	37	9	38	14-15
♂. „ Green	70	14	16	15	19	35	7	36	15-15
♀. „ „	60	13	14	14	18	37	8	40	15-15
♂. New Orleans	65	13	14	14	17	32	7	39	14-14
♂. Duval Co., Texas. Taylor	60	13	14	14	17	37	8	40	17-18
♂. „ „	50	11	12	12	15	37	8	40	14-14
♂. „ „	48	10	11	11	14	38	8	42	17-16
♂. „ „	59	12	13	13	16	38	9	40	19-19
♀. „ „	54	11	12	12	15	38	7	40	14-16
♂. Salt Lake City	51	10	11	12	16	40	10	44	14-13
♂. Arizona. Wright	81	15	17	19	23	36	7	44	16-16
♂. „ „	72	15	16	18	22	36	7	40	15-14
♂. „ „	67	14	15	17	21	37	8	44	15-15
♂. „ „	78	15	16	17	22	37	8	44	16-16
♂. Hemet Valley, S. Diego Co., Cal. Gilbert.	73	15	16	18	22	40	8	48	17-16
♀. „ „ „	80	16	17	19	22	37	7½	44	15-16
♀. Tia Juana, S. Diego Co. Eigenmann.	61	13	14	14	19	37	9	44	17-17
♂. Palo Alto, Cal.	58	11	13	14	18	45	9	50	17-18
♂. „ „	53	11	12	12	17	40	9	46	16-15
♂. S. Bernardino, Cal. Forrer.....	72	14	16	17	21	40	8	42	15-15
♂. „ „	70	14	15	17	20	37	8	42	14-15
♂. „ „	53	11	12	12	16	35	8	44	15-15
♂. „ „	65	13	15	16	19	38	8	44	15-13
♂. „ „	61	13	14	15	19	36	8	42	15-17
♂. „ „	59	12	13	13	18	36	8	44	15-15
♂. „ Douglas.....	67	14	15	16	22	36	8	44	17-16
♂. S. Pedro, Cal. Eigenmann	67	14	15	15	18	36	7	40	14-13
♂. „ „	64	13	14	14	19	35	7	40	13-14
♂. „ „	57	12	13	13	16	34	7	38	14-13
♂. Sta. Cruz, Cal. Forrer.....	60	12	14	14	16	37.	8	42	17-17
♂. „ „	60	12	13	13	15	38	8	45	15-16
♂. Camp Taylor, Marin Co., Cal. Eigenmann.	68	14	15	16	19	35	8	44	14-15
♀. „ „ „	66	14	15	14	18	39	9	44	16-16
♂. Camp Taylor. Eigenmann	68	13	14	15	19	39	7	45	15-16
♂. „ „	66	13	14	13	16	38	8	42	14-15
♂. „ „	56	12	13	12	17	36	8	42	14-14
♂. „ „	55	12	13	13	16	40	8	40	15-14
♀. „ „	48	11	12	11	14	40	9	42	15-15
♂. S. Jacinto, Cal.	78	15	16	18	23	39	8	48	14-15
♀. „	63	13	14	15	19	35	7	44	14-14
♂. Los Gatos, Cal. Gilbert	65	13	14	15	19	40	8	46	19-19
♀. „ „	50	11	12	11	15	39	9	47	16-15
♂. Mt. Whitney, Cal. Smiths. In. (1).	83	16	18	19	22	39	7	44	16-17
♂. „ „ (1).	67	14	15	16	19	37	8	44	16-17
♀. Monterey, Cal.	62	13	14	14	16	36	7	44	15-15
♀. California. Smiths. Inst.	64	13	14	14	19	43	9	45	17-16
♂. „ Gruber	63	13	14	15	18	39	8	44	17-16
♀. „ „	54	12	13	13	16	39	9	44	16-16
♂. Brit. Columbia. Lord	67	14	15	16	19	38	8	42	15-17
♂. „ „	66	13	14	15	18	38	8	40	15-14
♂. „ „	65	13	14	15	17	37	8	44	14-14
♂. Yzabal, Guatemala. Salvin	74	15	17	16	20	34	8	40	14-16

(1) These specimens, numbered 8658 and 8659, were sent as *S. thayeri*. They are now referred to *S. occidentalis* by Stejneger.

extends down the middle line of the belly; there is a blue or green spot, often edged or surrounded with black, on each side of the throat, and a black bar in front of the shoulder, sometimes extending across the neck; breast whitish; the two blue spots of the throat sometimes confluent into one. In females, the lower parts are whitish, uniform or with some small brown spots; a pair of blue spots is sometimes present on the throat.

The Western form is often more olive above, sometimes greenish, and the dark dorsal markings are frequently more in the form of large blotches in two or four longitudinal series; a light dorso-lateral stripe is frequently well defined. The blue patches on the sides of the belly are usually as well developed in females and young as in males; the latter, however, not unfrequently differ in having the whole of the lower surfaces not occupied by the blue colour of a uniform black.

Although I am perfectly satisfied that the specimens here enumerated (see p. 505) cannot be divided into several species, yet it would be desirable to attempt some sort of classification into varieties. For such a purpose, however, my material is insufficient, and the desultory and often misleading descriptions of supposed species hitherto published in America are of no service. On examination of a small material one would feel tempted to divide the species into an Eastern (typical) and a Western form (var. *biseriatus*, Hallow., with which, according to Stejneger, my var. *bocourti* is identical), the latter being distinguished by a rather larger size, larger ear-lobules, and the presence of a large patch of blue on the sides of the belly in females and young. But the size of the ear-lobules varies, and some Western specimens have them no larger than in the typical form. I have carefully compared specimens from Monterey, which Stejneger refers to *S. occidentalis*, with others referred by the same authority to *S. biseriatus*, and cannot find any difference by which to separate them.

Hab. This species has a wide range in North America, extending from North Mexico to New Jersey on the east coast and British Columbia on the west. Its range in Mexico cannot at present be traced; but a specimen collected at Yzabal, Guatemala, by Mr. Salvin, certainly belongs to it.

17. SCELOPORUS ELONGATUS.

Sceloporus elongatus, Stejneger, N. Am. Faun. no. 3, 1890, p. 111.

This species appears to be very closely allied to *S. gratiosus*. It is described as follows:—

"Head-shields smooth; occipital [interparietal] comparatively small, but broader than parietals; two or three parietals on each side; two scales on canthus rostralis; supraoculars, one large row and three small subequal ones, two outer and one inner; five free scales in front of ear-opening; dorsal rows nearly parallel; lateral scales but little smaller, in oblique rows; scales on shoulders large,

connecting dorsals with brachials; dorsal scales keeled, pointed, with a well-pronounced notch on each side of the point, 47 to 51 scales between occipital and tail, 9 to 11 in a head length; femoral pores 16 to 18 on each side, not meeting medially; tail about eight times the length of the head; distance between base of fifth toe and extremity of fourth, including claw, less than distance from nostril to arm, and much more than from snout to posterior margin of ear; no colour bands across nape; no longitudinal colour bands; males with dark blue patches on flanks and one on each side of throat; females similarly marked, but colours less vivid and less extended."

Total length 199 millim.; head to occiput 15; snout to vent 75; fore limb 34; hind limb 52.

Hab. Painted Desert, Arizona.

18. SCELOPORUS GRATIOSUS.

Sceloporus gratiosus, Baird & Gir. Proc. Ac. Philad. 1852, p. 69, and in Stansb. Exped. Gr. Salt Lake, p. 346, pl. v. figs. 1–3 (1852); Cope, in Hayden's Rep. U.S. Geol. Surv. Montana, p. 468 (1872), and Proc. Am. Philos. Soc. xxii. 1885, p. 395; Bouleng. Cat. Liz. ii. p. 230 (1885); Günth. Biol. C. Am., Rept. p. 71 (1890); Stejneger, N. Am. Faun. no. 3, 1890, p. 111, and no. 7, 1893, pt. ii. p. 183.

Sceloporus gracilis, Baird & Gir. Proc. Ac. Philad. 1852, p. 175; Girard, U.S. Explor. Exped., Herp. p. 386, pl. xx. figs. 1–9 (1858); Bocourt, Miss. Sc. Mex., Rept. p. 190, pl. xviii. fig. 4 (1874).

Sceloporus jalapæ, Günth. l.c. p. 74.

Sceloporus vandenburgianus, Cope, Amer. Nat. 1896, p. 834.

Head-shields smooth; frontal transversely divided, in contact with the interparietal or separated from it by the frontoparietals; interparietal large, broader than long; parietals small or broken up into scales; four to six transversely enlarged supraoculars, bordered inwards by one series of scales and separated from the supraciliaries by two or three series; four or five slightly enlarged pointed scales form a denticulation on the anterior border of the ear.

Dorsal scales small, a little larger than ventrals, strongly keeled, pointed or slightly mucronate, forming parallel longitudinal lines; 52–56 scales between the interparietal shield and the base of the tail, 11–16 corresponding to the length of the shielded part of the head. Lateral scales a little smaller than dorsals, keeled, directed obliquely upwards and backwards. Ventral scales smooth, more or less distinctly bicuspid. 50–58 scales round the middle of the body.

The adpressed hind limb reaches the ear or between the shoulder and the ear; tibia as long as or slightly longer than the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth equals the distance between the end of the snout and the anterior extremity, or the middle of the collar-fold. Femoral pores 14–18 on each side.

Caudal scales larger than dorsals, keeled. Males with enlarged postanal scales.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. Brit. Columbia. Lord	42	9	10	10	13	55	13	62	16-16
♂. Hemet Valley, S. Diego Co., Cal. Gilbert.	50	12	13	13	17	56	15	59	15–14
♀. " " " ...	55	11	12	12	16	63	16	57	15–15
♀. Puebla, Mexico. Boucard.....	45	9	10	9	11	56	12	58	18–18
♀. " "	44	9	10	9	12	55	13	54	18–18
♂. Jalapa. " Hoege (1)....	47	10	11	10	14	52	12	56	18–17

(1) Type of *S. jalapæ*. The series of femoral pores separated by a single scale on the præanal region, as is likewise the case in one of the two females from Puebla.

Olive above, with two more or less distinct lighter or yellowish stripes along each side, and longitudinal series of transverse blackish spots which may be confluent into stripes. Male with the sides of the belly blue and black-edged, the middle line white and narrow or more or less broad; throat blue, or whitish with a few black spots; front of arm and thigh sometimes black. Female with the lower parts uniform white.

Hab. S. gratiosus has a wide distribution. It is on record from British Columbia, Oregon, California, Nevada, Utah, Arizona, Northern Lower California, Vera Cruz, and Puebla.

19. SCELOPORUS GRAMMICUS.

Sceloporus grammicus, Wiegm. Isis, 1828, p. 370, and Herp. Mex. p. 51 (1834); Bocourt, Miss. Sc. Mex., Rept. p. 192, pl. xviii. bis, fig. 12 (1874); Cope, Proc. Am. Philos. Soc. xxii. 1885, p. 395; Bouleng. Cat. Liz. ii. p. 231 (1885); Günth. Biol. C.-Am., Rept. p. 71 (1890).

Sceloporus pleurostictus, Wiegm. Isis, 1828, p. 370.

Tropidolepis grammicus, Gray, Griff. A.K. ix. Syn. p. 43 (1831); Dum. & Bibr. Erp. Gén. iv. p. 308 (1837).

Sceloporus heterurus, Cope, Proc. Ac. Philad. 1866, p. 322.

Head-shields smooth or slightly rugose; frontal transversely divided, in contact with the interparietal, which is a little broader than long; parietals small, usually one pair on each side; a series of four or five transversely enlarged supraoculars, bordered inwards by one series of scales and separated from the supraciliaries by two or three series; two canthal scales; anterior border of ear feebly denticulated.

Dorsal scales larger than ventrals, strongly keeled, not or but slightly mucronate, forming oblique series; 45–50 scales between the interparietal shield and the base of the tail, 12–15 corresponding to the length of the shielded part of the head. Lateral scales keeled, directed obliquely upwards and backwards, gradually

merging into dorsals and ventrals. Ventral scales smooth, mostly entire. 46–50 scales round the middle of the body.

The adpressed hind limb reaches the ear; tibia as long as the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth slightly exceeds the distance between the end of the snout and the posterior border of the ear. 13–16 femoral pores on each side.

Caudal scales much larger than dorsals, strongly keeled. Males with enlarged postanal scales.

Olive above, with transverse black spots; a narrow black scapular collar, interrupted in the middle. Male with a blue, black-edged patch on each side of the belly.

A small species, the largest specimen on record measuring 66 millim. from snout to vent. I have examined only two half-grown specimens from Guatemala.

Hab. The few specimens known come from Mexico (Oaxaca, Mirador, Tehuantepec) and Guatemala.

20. SCELOPORUS MICROLEPIDOTUS.

Sceloporus grammicus, var. α, Wiegm. Isis, 1828, p. 370.

Sceloporus microlepidotus, Wiegm. Herp. Mex. p. 51 (1834); Bocourt, Miss. Sc. Mex., Rept. p. 194, pl. xviii. bis, fig. 13 (1874); Cope, Proc. Amer. Philos. Soc. xxii. 1885, p. 395; Bouleng. Cat. Liz. ii. p. 232 (1885); Dugès, Naturaleza, (2) i. 1888, p. 112, pl. xi. fig. 5; Günth. Biol. C.-Am., Rept. p. 72 (1890).

Tropidolepis microlepidotus, Dum. & Bibr. Erp. Gén. iv. p. 308 (1837); Gray, Cat. Liz. p. 209 (1845).

Sceloporus dispar, Baird & Gir. Proc. Ac. Philad. 1852, p. 127.

Sceloporus rubriventris, Günth. l. c. pl. xxxii. fig. C.[1]

Head-shields smooth or slightly rugose; frontal transversely divided, in contact with the interparietal or separated from it by a small azygous shield; interparietal as long as broad or a little broader than long; parietals small or broken up into scales; one or two series of transversely enlarged supraoculars, bordered inwards by one series of scales and separated from the supraciliaries by two to four series; two canthal scales; anterior border of ear with a denticulation of slightly enlarged pointed scales.

Dorsal scales not or but slightly larger than ventrals, strongly keeled, not or but slightly mucronate, forming oblique longitudinal series converging towards the median line; 60–83 scales between the interparietal shield and the base of the tail, 12–20 corresponding to the length of the shielded part of the head. Lateral scales keeled, directed upwards and backwards. Ventral scales smooth, entire or bicuspid. 62–78 scales round the middle of the body.

The adpressed hind limb reaches the shoulder or the ear; tibia

[1] Founded partly on the erroneous assumption that both sexes are coloured alike. The two specimens described are females. The number of scales in a series along the middle of the back varies much more than between 62 and 68 in the specimens referred by Günther to *S. microlepidotus*.

nearly as long as the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth exceeds the distance between the end of the snout and the posterior border of the ear. 14–22 femoral pores on each side.

Caudal scales much larger than dorsals, strongly keeled, shortly mucronate. Males with enlarged postanal scales.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. Mexico	67	13	14	14	18	71	16	78	18–18
♂. „	58	11	12	12	16	78	16	70	17–15
♂. „ Sallé	64	12	14	14	17	68	15	62	16–16
♂. „ „	54	11	12	11	15	63	15	62	16–15
♂. Ciudad, Durango. Forrer	57	11	12	12	15	83	16	72	15–15
♂. „ „	55	11	12	11	14	72	16	71	17–17
♂. „ „	51	11	12	12	14	80	18	70	16–15
♂. „ „	51	11	12	12	14	71	16	66	15–15
♂. „ „	49	10	11	11	14	70	16	72	14–14
♂. „ „	49	10	11	11	14	77	17	74	16–16
♂. „ „	50	10	11	10	13	74	16	66	14–15
♀. Ventanas, Durango. Forrer	46	9	10	10	12	67	18	67	15–16
♀. Guanajuato. Dugès	52	11	12	11	14	64	16	65	16–15
♀. „ „	58	11	12	11	14	68	15	68	16–16
♀. Jalapa. Hoege	63	13	14	13	17	82	20	78	17–17
♀. Orizaba	48	11	12	11	15	75	20	70	16–15
♀. „	46	10	11	10	13	72	20	74	17–18
♀. „	59	12	13	12	15	73	18	74	16–16
♀. „	56	11	12	11	15	82	21	72	14–14
♀. Puebla. Boucard	70	13	15	13	17	83	16	72	18–19
♀. „ „	62	12	13	13	15	79	16	72	17–18
♀. „ „	43	10	11	10	13	82	20	73	18–18
♀. City of Mexico. Dugès	66	13	14	14	18	73	16	74	17–18
♀. „ „	65	13	14	14	17	82	20	74	17–18
♀. „ „	62	12	13	12	16	78	17	72	17–16
♀. Omilteme, Guerrero (1). Smith	60	13	14	13	16	60	12	64	15–16
♀. „ „ (1). „	60	12	14	13	16	62	15	62	17–18
♀. Popocatepetl, 9000 ft. Godman	49	11	12	10	14	72	16	62	16–16
♀. „ „ „	43	10	11	9	13	63	18	70	16–15
♀. S. Mexico. Godman	63	13	14	14	17	72	18	72	17–16
♀. „ „	55	11	12	11	14	80	19	66	16–15
♀. „ „	50	10	11	10	14	82	19	68	16–17

(1) Types of *S. rubriventris*.

Brownish, olive, or green above, the sides often marbled with black; dorsal region immaculate, or irregularly spotted with black and whitish, more often with a double series of angularly curved black markings pointing forwards; head frequently with transverse black lines; usually a large black spot in front of the shoulder, sometimes connected with its fellow across the throat. Males with the throat and the sides of the belly blue, broadly edged with black near the narrow whitish median ventral line; front of thighs sometimes black.[1] Females yellowish or greenish below,

[1] Some males, according to Dugès, have the middle of the throat, and the flanks above the blue patches, orange.

sometimes tinged with rusty or orange on the throat and the sides of the belly; throat sometimes marbled with grey.

Hab. This species appears to be distributed over the greater part of Mexico, in the mountains up to 9000 feet.

21. SCELOPORUS HETEROLEPIS.

Sceloporus heterolepis, Bouleng. Proc. Zool. Soc. 1894, p. 731, pl. xlviii. fig. 4.

Head-shields smooth; frontal transversely divided, in contact with the interparietal, or separated from it by a small azygous shield; interparietal as long as broad, or broader than long; parietals small, sometimes indistinct; one or two more or less irregular series of transversely enlarged supraoculars, the series surrounded by smaller scales; two canthal scales; anterior border of ear with a denticulation formed by three or four pointed scales. Dorsal scales very unequal in size, irregular, some nearly smooth, others strongly keeled; a pair of vertebral and a dorso-lateral series of large strongly-keeled scales form sorts of crests along the body; 45–75 scales along the median line between the interparietal shield and the base of the tail, 10–13 corresponding to the length of the shielded part of the head. Lateral scales imbricate, small, directed obliquely upwards and backwards. Ventral scales small, smooth, mostly bicuspid. 56–68 scales round the middle of the body.

The hind limb reaches the shoulder or the ear; tibia as long as the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth exceeds the distance between the end of the snout and the posterior border of the ear. 14 to 19 femoral pores on each side.

Caudal scales as large as largest dorsals, strongly keeled, spinose. Males with enlarged postanal scales.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. La Cumbre de los Arrastrados. Buller.	64	13	14	13	17	75	13	62	17–17
♂. " " " ...	61	13	14	13	17	58	12	60	16–16
♂. " " " ...	61	13	14	13	16	73	13	58	14–14
♂. " " " ...	58	13	14	13	17	51	11	62	17–17
♂. " " " ...	58	12	13	13	17	59	13	56	16–15
♂. " " " ...	56	12	13	12	16	62	12	62	18–17
♂. " " " ...	59	12	13	12	15	59	12	58	17–19
♂. " " " ...	58	12	13	12	15	56	11	58	18–16
♂. " " " ...	58	12	13	12	15	65	11	60	16–16
♂. " " " ...	49	11	12	10	14	53	10	58	15–17
♂. " " " ...	49	11	12	11	15	59	10	62	17–16
♂. Real Alto. Buller	51	11	12	11	15	61	12	66	15–17
♂. Sierra de Bolaños. Buller	59	13	14	13	17	45	10	68	17–16

Coloration very much as in *S. microlepidotus*. Greyish or pale brown above, with indistinct darker and lighter blotches and symmetrical blackish markings in the form of transverse or angular

lines, the first of which crosses the frontal and supraocular regions. Male with a black bar (sometimes interrupted) across the throat, and with a large pale blue blotch on each side of the belly, broadly edged with blackish blue on the median ventral line.

Hab. The specimens were collected at various localities in the State of Jalisco, at altitudes varying between 7800 and 8500 feet.

22. SCELOPORUS PYRRHOCEPHALUS.

Sceloporus pyrrhocephalus[1], Cope, Proc. Ac. Philad. 1864, p. 177, and Proc. Am. Philos. Soc. xxii. 1885, p. 394; Bouleng. Cat. Liz. ii. p. 235 (1885); Günth. Biol. C.-Am., Rept. p. 70 (1890).

Head-shields smooth; frontal transversely divided, in contact with the interparietal, which is a little broader than long; parietals small, one pair on each side; one or two canthal scales; five large transverse supraoculars, bordered inwards by one series of scales, and separated from the supraciliaries by another; five scales, not larger than those before them, form a denticulation on the anterior border of the ear.

Dorsal scales much larger than ventrals, strongly keeled, mucronate and more or less distinctly denticulate, forming oblique series converging towards the median line; 40–43 scales between the interparietal shield and the base of the tail; 8 scales, taken in the middle of the back, correspond to the length of the head. Ventral scales small, smooth, bicuspid. 46–50 scales round the middle of the body.

The adpressed hind limb reaches the shoulder or the ear; tibia as long as the distance between the end of the snout and the ear; the distance between the base of the fifth toe and the extremity of the fourth exceeds the distance between the end of the snout and the posterior border of the ear. 12–15 femoral pores on each side.

Tail distinctly compressed. Caudal scales as large as dorsals, strongly keeled and mucronate. Males without enlarged postanal scales.

The two specimens in the British Museum show the following measurements and numbers of scales:—

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. Colima. Lloyd	72	15	16	16	18	43	8	50	12–12
♂. „ „	66	13	14	15	19	40	8	46	14–15

Bronze-coloured above, reddish towards the sides; a broad, black, light-edged stripe along each side; a black vertical bar in front of the shoulder; head reddish brown; lips with dark vertical bars; an elongate black spot with yellow centre (pineal eye) in the middle of the interparietal shield; throat with oblique bluish bands, converging posteriorly; breast and middle of belly yellowish;

[1] Originally misspelt "*pyrocephalus*."

sides of belly pale blue, with seven to nine blackish-blue cross-bars. The coloration of the female is still unknown.

Hab. This well-marked species is only known from one locality: Colima, in Western Mexico.

23. SCELOPORUS CHRYSOSTICTUS.

Sceloporus chrysostictus, Cope, Proc. Ac. Philad. 1866, p. 125, and Proc. Am. Philos. Soc. xxii. 1885, p. 394; Bouleng. Cat. Liz. ii. p. 235 (1885); Günth. Biol. C.-Am., Rept. p. 70 (1890).

Head-shields keeled or striated; frontal transversely divided, the anterior portion usually longitudinally bisected; a pair of interparietals between the frontal and the interparietal; latter broader than long; parietals very small, one or two on each side; a series of four or five large transverse supraoculars, bordered inwards by a complete or incomplete series of very small scales, and separated from the supraciliaries by one or two series of scales; two canthal scales, rarely one; anterior border of ear feebly denticulated.

Dorsal scales much larger than ventrals, strongly keeled, simply pointed, forming slightly oblique longitudinal lines; 40–45 scales between the interparietal shield and the base of the tail, 8–10 corresponding to the length of the shielded part of the head. Lateral scales smaller than, but graduating into, the dorsals, keeled and directed obliquely upwards and backwards. Ventral scales small, smooth, entire. 36–40 scales round the middle of the body.

The adpressed hind limb reaches the anterior border of the orbit or the nostril; tibia longer than the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth equals the distance between the arm and the nostril or the tip of the snout. 13–16 femoral pores on each side.

Caudal scales as large as dorsals, keeled, pointed. Males with enlarged postanal scales.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. Yucatan	63	13	14	16	21	41	9	36	15–14
♂. „	52	11	12	13	20	44	10	38	15–16
♀♀. „	55	11	12	14	20	43	10	40	15–15
♀. „	50	11	11	14	19	43	9	38	14–?

Brownish or olive above, strongly metallic; a golden dorso-lateral band; a blackish spot at axilla; hinder side of thighs with a transverse and several vertical blackish bars. Lower surfaces yellowish white, throat sometimes brownish. Male without distinctive ventral markings.

Hab. S. chrysostictus is recorded by Cope from Yucatan and Guatemala.

24. SCELOPORUS ÆNEUS.

Sceloporus æneus, Wiegm. Isis, 1828, p. 370, and Herp. Mex. p. 52 (1834); Bocourt, Miss. Sc. Mex., Rept. p. 205, pl. xviii. bis, fig. 4 (1874); Cope, Proc. Am. Philos. Soc. xxii. 1885, p. 394; Bouleng. Cat. Liz. ii. p. 233 (1885); Günth. Biol. C.-Am., Rept. p. 74 (1890).

Tropidolepis æneus, Gray, Griff. A. K. ix. Syn. p. 44 (1831); Dum. & Bibr. Erp. Gén. iv. p. 309 (1837).

Head-shields keeled or striated; frontal transversely divided, in contact with the interparietal, or separated from it by a small azygous shield; parietals very small, or broken up into scales; a more or less regular series of feebly enlarged transverse supraoculars, bordered inwards by one series of scales, and separated from the supraciliaries by two or three series; one or two canthal scales; anterior border of ear very slightly denticulated.

Dorsal scales larger than ventrals, strongly keeled, sharply pointed or tricuspid, forming parallel longitudinal lines; 39–44 scales between the interparietal shield and the base of the tail, 6–10 corresponding to the length of the shielded part of the head. Lateral scales as large as or little smaller than dorsals, more or less distinctly keeled, forming straight or very slightly oblique longitudinal series. Ventral scales smooth, mostly bicuspid. 36–48 scales round the middle of the body.

The adpressed hind limb reaches hardly the axilla or the shoulder; tibia shorter than the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth equals the distance between the end of the snout and the anterior or the posterior border of the ear. 14–19 femoral pores on each side, meeting or narrowly separated on the præanal region.

Caudal scales as large as or a little larger than dorsals, strongly keeled, sharply pointed. Males with enlarged postanal scales.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. Puebla. Boucard	60	12	13	11	13	41	8	40	17–17
♂. „ „	50	11	12	9	13	40	9	40	19–19
♂. „ „	56	10	11	9	12	40	6	40	17–18
♂. „ „	54	10	11	9	13	42	8	48	16–16
♂. Orizaba	53	11	12	9	12	42	8	42	15–15
♂. Jalisco, N. of R. de Santiago. Smith	46	10	11	9	12	44	10	42	18–16
♀. „ „ „	47	10	11	9	12	39	8	36	18–17
♂. La Cumbre de los Arrastrados, Jalisco. Buller	49	10	11	9	13	41	9	42	16–15
♀. „ „ „	43	9	10	8	11	41	8	44	14–14
♀. H. Sta. Gertrudis, Jalisco. Buller	50	10	11	9	12	40	8	40	15–15
♀. Mexico, Boucard	49	10	10	9	11	40	8	44	17–16
♀. „ „	47	9	10	8	10	41	8	42	15–15

Olive, bronzy brown, or reddish brown above, uniform, or with

light streaks and symmetrical dark markings, exactly as in *S. scalaris*. Lower parts, in the male, much spotted with black in addition to the blue ventral patches, the throat and belly sometimes nearly entirely blackish blue.

Hab. Mexico. Recorded from the States of Vera Cruz, Puebla, and Jalisco.

25. SCELOPORUS SCALARIS.

Sceloporus scalaris, Wiegm. Isis, 1828, p. 370, and Herp. Mex. p. 50, pl. viii. fig. 2 (1834); Bocourt, Miss. Sc. Mex., Rept. p. 202, pl. xviii. bis, fig. 9 (1874); Cope, Proc. Am. Philos. Soc. xxii. 1885, p. 394; Boulenger, Cat. Liz. ii. p. 234 (1885); Dugès, Naturaleza, (2) i. 1887, p. 111; Günth. Biol. C.-Am., Rept. p. 73 (1890).

Tropidolepis scalaris, Gray, Griff. A. K. ix. Syn. p. 44 (1831), and Zool. Beechey's Voy. p. 95, pl. xxx. fig. 3 (1839); Dum. & Bibr. Erp. Gén. iv. p. 310 (1837); Gray, Cat. Liz. p. 210 (1845).

Head-shields keeled or striated; frontal transversely divided, in contact with the interparietal, which is as long as broad or longer than broad; parietals very small, or broken up into scales; a more or less regular series of feebly enlarged transverse supraoculars, bordered inwards by one series of scales and separated from the supraciliaries by two or three series; two canthal scales; anterior border of ear very slightly denticulated.

Dorsal scales larger than ventrals, strongly keeled, sharply pointed, forming parallel longitudinal lines; 33–48 scales between the interparietal shield and the base of the tail, 6–10 corresponding to the length of the shielded part of the head. Lateral scales nearly as large as dorsals, more or less distinctly keeled, forming straight or very slightly oblique longitudinal series. Ventral scales smooth, mostly bicuspid. 34–46 scales round the middle of the body.

The adpressed hind limb reaches the axilla, the shoulder, or between the shoulder and the ear; tibia as long as or slightly longer than the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth equals the distance between the end of the snout and the ear or the collar-fold. 13–20 femoral pores on each side, meeting or narrowly separated on the præanal region.

Caudal scales as large as or larger than dorsals, strongly keeled. Males with enlarged postanal scales.

Yellowish brown, reddish, or olive above, with four regular series of large crescentic brown spots, the series separated by more or less well-defined light longitudinal lines or stripes; head with symmetrical dark brown markings; a black or deep blue spot, often with a light blue centre, in front of the arm. Male yellowish white beneath, the throat spotted with blackish or with oblique blackish lines converging posteriorly; an elongate deep blue patch on each side of the belly. Female uniform yellowish

		1.	2.	3.	4.	5.	6.	7.	8.	9.
♀.	Jalisco, N. of R. de Santiago. Smith	57	11	12	11	14	37	7	36	16-16
♂.	" " "	54	11	12	11	13	38	7	35	15-15
♂.	" " "	52	11	12	11	15	36	7	38	17-16
♂.	" " "	51	11	12	11	13	38	8	40	14-13
♂.	" " "	50	10	11	10	13	33	6	34	15-15
♂.	" " "	50	10	11	10	13	34	6	36	14-15
♂.	" " "	49	10	11	10	12	36	6	38	15-15
♂.	" " "	48	10	11	10	12	34	7	37	17-17
♀.	Zacatecas. Buller	58	11	12	11	14	40	7	37	14-13
♂.	" "	50	10	11	10	13	38	7	38	13-15
♀.	Guanajuato. Dugès	64	12	13	12	15	45	7	42	15-15
♀.	Atlixco. Boucard	64	12	13	12	15	48	8	42	17-16
♂.	" "	63	12	13	12	16	43	8	40	17-17
♀.	Hac. del Bobo, S. Mexico. Hoege	45	10	11	10	12	45	9	40	17-17
♀.	S. Mexico. Godman	69	13	15	14	15	44	10	39	17-16
♂.	" "	67	13	14	14	17	41	9	42	18-18
♂.	" "	55	10	11	11	14	45	9	44	17-17
♂.	" "	59	11	12	12	13	45	9	44	19-18
♂.	" "	47	9	10	9	12	44	10	42	17-17
♀.	Mexico. Boucard	62	13	15	13	17	43	9	42	17-17
♂.	" "	61	12	14	12	16	43	9	42	18-17
♂.	" "	64	12	14	13	17	43	9	42	19-20
♂.	" "	63	13	14	13	16	41	8	40	16-17
♂.	" "	61	12	14	13	17	44	9	43	19-18
♂.	" "	60	12	14	12	16	43	9	42	16-17

white beneath, uniform or with oblique blackish lines on the throat.

Hab. This species, which may have to be united with the preceding, inhabits the greater part of Mexico; it is said to penetrate northwards a little way into South-western Texas and Arizona, although the determination of the specimens on which the statement is made requires revision, for some of them at least prove, according to Stejneger, to belong to *S. variabilis*.

26. Sceloporus variabilis.

Sceloporus variabilis, Wiegm. Herp. Mex. p. 51 (1834); Bocourt, Miss. Sc. Mex., Rept. p. 200, pl. xviii. bis, fig. 1, & pl. xix. fig. 2 (1874); Cope, Proc. Am. Philos. Soc. xxii. 1885, p. 394; Bouleng. Cat. Liz. ii. p. 236 (1885); Günth. Biol. C.-Am., Rept. p. 75 (1890); Stejneger, Proc. U.S. Nat. Mus. xiv. 1891, p. 485.

Tropidolepis variabilis, Dum. & Bibr. Erp. Gén. iv. p. 308 (1837); Gray, Cat. Liz. p. 209 (1845).

Sceloporus marmoratus, Hallow. Proc. Ac. Philad. 1852, p. 178, and in Sitgreave's Exped. Zuni & Color. R. p. 110, pl. ii. (1853).

Sceloporus delicatissimus, Hallow. ll. cc. pp. 178, 109, pl. i.

Lysoptychus lateralis, Cope, Proc. U.S. Nat. Mus. xi. 1888, p. 397, pl. xxxvi. fig. 1.

Head-shields keeled or striated, rarely nearly smooth; frontal transversely dilated, sometimes also longitudinally, separated from

the interparietal by a pair of frontoparietals; interparietal usually broader than long; parietals small, often broken up into scales: a series of four to six large transverse supraoculars, bordered inwards by a complete or incomplete series of scales, and separated from the supraciliaries by one, two, or three series; two canthal scales; a feeble denticulation on the anterior border of the ear. A more or less distinct transverse gular fold often present[1]; lateral cervical fold forming a deep pouch.

Dorsal scales strongly keeled, pointed or shortly mucronate, not or but very feebly denticulated, forming 12 to 18 straight or slightly oblique longitudinal series; 46–65 scales between the

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. Duval Co., Texas. Taylor	49	11	11	11	16	65	15	68	10–11
♂. " " "	49	11	11	11	16	64	15	64	12–11
♂. " " "	48	11	12	12	14	60	16	65	14–14
♂. Coahuila. Taylor	42	10	10	10	14	58	16	68	15–15
♀. Huamelula. Boucard	60	13	14	14	19	63	17	76	13–14
♀. " "	47	11	11	11	16	64	17	78	14–15
♂. Jalisco, N. of R. de Santiago. Smith	72	14	15	16	20	55	12	62	12–11
♀. " " "	67	14	15	16	20	56	11	68	14–14
♀. " " "	57	12	13	13	17	53	12	68	13–12
♀. " " "	54	11	12	12	16	53	11	64	11–12
♀. " " "	46	10	11	12	15	52	11	62	14–14
♂. Tampico. Richardson	75	15	17	17	21	50	11	60	12–13
♂. " "	70	14	16	17	22	56	12	66	13–14
♂. " "	70	14	16	17	23	47	10	60	13–15
♂. " "	70	15	16	17	22	53	12	60	15–15
♂. " "	68	14	16	17	22	50	12	58	14–13
♂. " "	57	12	13	14	20	49	12	58	11–12
♂. " "	62	13	14	15	18	53	12	60	11–13
♂. " "	58	13	14	14	18	53	11	58	12–12
♂. " "	56	12	13	14	18	52	11	58	14–14
♂. " "	56	12	13	14	19	52	12	60	13–14
♀. " "	56	12	13	14	19	46	11	56	13–12
♀. " "	53	11	12	12	18	51	12	56	11–13
♂. Orizaba. Godman.....	58	13	14	14	18	53	17	74	13–14
♂. " "	57	12	13	13	17	51	12	68	13–13
♂. Jalapa	70	14	16	16	21	55	12	68	14–15
♂. " Godman	55	12	13	13	18	63	14	66	12–14
♂. Huatuzco. "	67	14	16	16	20	59	13	66	13–13
♂. Atoyac, Guerrero. Smith.....	66	14	16	16	20	52	12	68	13–12
♂. " "	64	14	15	15	19	53	13	70	16–15
♂. " "	63	13	14	14	19	51	12	60	13–11
♂. " "	62	13	14	14	19	55	12	64	14–14
♂. " "	58	12	14	14	19	60	13	64	13–12
♂. " "	57	12	13	14	18	55	13	58	11–11
♂. " "	54	12	13	13	16	57	12	66	13–13
♂. " "	54	12	13	13	16	50	11	58	12–13
♀. " "	52	11	12	12	14	48	11	58	12–12
♂. Hac. del Bobo, S. Mexico. Hoege	50	11	12	12	18	56	13	64	13–14
♀. S. Geronimo, Guatemala. Salvin	54	12	13	12	16	52	12	62	12–11

[1] The genus *Lysoptychus* was established by Cope on account of "a loose fold across the throat formed by the conjunction of the pre-humeral folds."

interparietal shield and the base of the tail, 10–17 corresponding to the length of the shielded part of the head. Lateral scales much smaller, abruptly differentiated from dorsals, keeled, imbricate, directed obliquely upwards and backwards. Ventral scales as large as laterals or a little larger, smooth, mostly bicuspid. 56–78 scales round the middle of the body.

The adpressed hind limb reaches the ear or the eye; tibia as long as or a little longer than the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth equals the distance between the arm and the nostril or a little less. 10–16 femoral pores on each side.

Caudal scales as large as or a little larger than dorsals, strongly keeled, shortly mucronate. Males with enlarged postanal scales.

Olive, brownish, or golden above, sides darker; a more or less distinct yellowish dorso-lateral band; a series of transverse blackish bars or spots along each side of the back; a blackish spot, light-edged in front, above axilla. Lower parts yellowish or dirty white in the female. Male with a large pink or pale blue blotch on each side of the belly, edged internally with dark blue and often very narrowly separated on the median line; throat and breast sometimes dark grey.

Hab. The greater part of Mexico and Guatemala, extending northwards into Southern Texas.

27. Sceloporus cupreus.

Sceloporus cupreus, Bocourt, Miss. Sc. Mex., Rept. p. 210, pl. xviii. bis, fig. 2 (1874).

Sceloporus teapensis, Günth. Biol. C.-Am., Rept. p. 75 (1890).

Head-shields keeled or striated; frontal transversely divided, sometimes longitudinally bisected, separated from the interparietal by a pair of frontoparietals; interparietal broader than long; parietals small or broken up into scales; a series of four or five large transverse supraoculars, bordered inwards by a complete or incomplete series of small scales and separated from the supraciliaries by one or two series; two canthal scales; anterior border of ear very feebly denticulated.

Ten or eleven longitudinal series of large, strongly keeled, shortly mucronate dorsal scales, forming straight or slightly oblique longitudinal series; 39–43 scales between the interparietal shield and the base of the tail, 8 or 9 corresponding to the length of the shielded part of the head. Lateral scales much smaller, keeled, directed upwards and backwards, abruptly differentiated from the dorsals. Ventral scales small, smooth, mostly bicuspid. 40–46 scales round the middle of the body.

The adpressed hind limb reaches the ear or the eye; tibia as long as the distance between the end of the snout and the ear; the distance between the base of the fifth toe and the extremity of the fourth equals the distance between the end of the snout and the anterior extremity or the middle of the collar-fold. 9–14 femoral pores on each side.

Caudal scales as large as or a little larger than dorsals, strongly keeled, shortly mucronate. Males with enlarged postanal scales.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. Sarabia, Oaxaca. Buller	65	14	15	15	20	39	9	46	14–13
♀. ,, ,, ...	56	12	13	13	16	43	9	42	14–13
♀. S. Domingo de Guzman, Oaxaca. Buller	58	13	14	14	17	40	9	42	11–12
♂. Teapa, Tabasco. Smith (1).....	74	15	17	17	20	40	9	40	9–11
♂. ,, ,, ...	66	14	16	16	20	39	9	46	10–10
♀. ,, ,, ...	61	13	14	15	20	39	9	44	12–13
♀. ,, ,, ...	62	13	14	15	19	40	8	42	10–11
♀. ,, ,, ...	61	13	14	14	18	40	9	44	10–11
♀. ,, ,, ...	57	12	13	13	18	42	9	46	13–12

(1) Types of *S. teapensis*.

This table shows such approximation to *S. variabilis* in the number of scales as to render it probable that a larger series would completely bridge over the gap now believed to exist between the two species, in which case they would have to be united.

Coloration exactly as in *S. variabilis*, the ground-colour of the upper parts varying from pale golden to dark bronzy olive, with more or less distinct lighter lateral bands; a black spot with an oblique white streak above the shoulder.

Hab. This species, which has been erroneously referred to the synonymy of *S. chrysostictus* by Cope, is only known from the States of Oaxaca, whence the type specimens were obtained[1], and Tabasco.

28. SCELOPORUS SINIFERUS.

Sceloporus siniferus, Cope, Proc. Am. Philos. Soc. xi. 1869, p. 157; Bocourt, Journ. de Zool. v. 1876, p. 342; Cope, Proc. Am. Philos. Soc. xxii. 1885, p. 394; Bouleng. Cat. Liz. ii. p. 237 (1885); Günth. Biol. C.-Am., Rept. p. 76 (1890).

Sceloporus humeralis, Bocourt, Miss. Sc. Mex., Rept. p. 206, pl. xviii. bis, fig. 3 (1874).

Head-shields keeled or striated, rarely nearly smooth; frontal transversely divided, the anterior or both the anterior and posterior portions longitudinally bisected, separated from the interparietal by a pair of frontoparietals; interparietal broader than long, usually followed by a band-like shield; parietals small or broken up into scales; four or five large transverse supraoculars, bordered inwards by a complete or incomplete series of scales and separated

[1] The agreement between our female specimens from Oaxaca and the type female, which was likewise obtained together with *S. siniferus*, is so close that I cannot entertain the least doubt as to the correctness of my identification. But it must be mentioned that Bocourt describes the male as without sexual markings, whilst our specimens have the belly coloured as in *S. variabilis*. I have, however, examined a male of the latter species (from H. del Bobo) in which the ventral markings are very indistinct.

from the supraciliaries by one or two series; two canthal scales; three or four obtusely pointed scales form a feeble denticulation on the anterior border of the ear. Lateral cervical fold forming a deep pouch.

Dorsal scales very strongly keeled, pointed or shortly mucronate, forming 8 to 10 straight or slightly oblique longitudinal series; 34–44 scales between the interparietal shield and the base of the tail, 6–9 corresponding to the length of the shielded part of the head. Lateral scales much smaller, abruptly differentiated from dorsals, keeled, imbricate, directed obliquely upwards and backwards. Ventral scales as large as laterals or a little larger, smooth, entire. 36–44 scales round the middle of the body.

The adpressed hind limb reaches the ear, the eye, or the nostril; tibia a little longer than the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth equals the distance between the nostril and the arm, or a little less. 3–8 femoral pores on each side.

Caudal scales as large as dorsals, strongly keeled, shortly mucronate. No enlarged postanal scales.

	1.	2.	3.	4.	5.	6.	7.	8.	9.
♂. Acapulco, Guerrero. Godman...	52	12	13	15	21	32	7	34	8–7
♂. Omilteme, „ „ ...	52	11	12	14	19	33	6	40	7–7
♂. Oaxaca. Sallé	53	12	13	13	18	36	8	36	4–6
♂. „ „	52	12	13	13	17	36	7	40	5–4
♂. S. Domingo de Guzman, Oaxaca. Buller	55	13	14	14	19	34	7	36	4–5
♀. „ „ „	53	13	14	14	20	35	8	42	5–5
♀. „ „ „	51	12	13	13	17	37	8	40	6–5
♀. Tehuantepec City. Buller	53	12	13	14	19	40	9	44	5–5
♀. „ „	51	11	12	12	16	35	8	38	5–5
♀. „ „	44	10	11	11	16	37	9	44	4–6
♀. „ „	41	10	10	10	14	35	8	42	5–5
♀. Tehuantepec	53	12	13	13	18	33	8	40	5–5

Olive-brown above, with coppery gloss; sides darker, sometimes blackish; a yellowish dorso-lateral streak frequently separates the dorsal from the lateral surfaces; a series of oblique blackish cross-lines along each side of the back. Lower surfaces uniform yellowish in both sexes, or finely speckled with blackish in the males.

Hab. Isthmus of Tehuantepec.

29. SCELOPORUS FULVUS.

Sceloporus fulvus, Bocourt, Miss. Sc. Mex., Rept. p. 214, pl. xviii. bis, fig. 8 (1874); Bouleng. Cat. Liz. ii. p. 238 (1885).

Head-shields feebly keeled or striated, sometimes nearly smooth; frontal divided into four small shields separated from the interparietal by a pair of frontoparietals; interparietal as long as broad; parietals small, two on each side; a series of four or five large transverse supraoculars, bordered inwards by one series of small scales and separated from the supraciliaries by one or two series;

a single canthal scale; anterior border of ear very slightly denticulated. Lateral cervical fold forming a deep pouch.

Dorsal scales much larger than ventrals, strongly keeled, sharply pointed, forming eight or nine parallel longitudinal series; 30–33 scales between the interparietal shield and the base of the tail, 7 or 8 corresponding to the length of the shielded part of the head. Lateral scales smaller, slightly larger than ventrals, keeled, obliquely directed upwards and backwards, sharply differentiated from the dorsals. Ventral scales obtusely keeled, pointed, entire. 38–40 scales round the middle of the body.

The adpressed hind limb reaches the eye; tibia longer than the shielded part of the head; the distance between the base of the fifth toe and the extremity of the fourth equals the distance between the end of the snout and the cervical pouch. 3–5 femoral pores on each side.

Caudal scales nearly as large as dorsals, strongly keeled. No enlarged postanal scales.

Fulvous above, sides dark brown; a yellow dorso-lateral band separating the dorsal from the lateral surfaces; a more or less distinct series of oblique dark-brown spots along each side of the back. Lower parts uniform yellowish in both sexes.

Hab. Salvador, Nicaragua.

The two specimens examined by me form part of M. Lataste's collection.

30. SCELOPORUS SQUAMOSUS.

Sceloporus squamosus, Bocourt, Miss. Sc. Mex., Rept. p. 212, pl. xviii. bis, fig. 7, and xix. fig. 3 (1874); Cope, Proc. Am. Philos. Soc. xxii. 1885, p. 394; Bouleng. Cat. Liz. ii. p. 238 (1885).

Differs from *S. siniferus* and *fulvus* by the presence, in the male, of enlarged postanal scales: from the former, by the presence of a single canthal scale; from the latter by the absence of keels on the ventral scales. Lower surfaces, in both sexes, yellowish, dotted all over with grey.

Hab. Guatemala to Costa Rica.

This species is a desideratum in the British Museum.

31. SCELOPORUS UTIFORMIS.

Sceloporus utiformis, Cope, Proc. Ac. Philad. 1864, p. 177; Bocourt, Miss. Sc. Mex., Rept. p. 208, pl. xviii. bis, fig. 6 (1874); Cope, Proc. Am. Philos. Soc. xxii. 1885, p. 394; Bouleng. Cat. Liz. ii. p. 238 (1885).

Head-shields keeled or striated; frontal transversely divided; interparietal as long as broad; parietals very small; a series of five or six large transverse supraoculars, bordered inwards by a series of small scales, and separated from the supraciliaries by two or three series; two canthal scales; anterior border of ear very slightly denticulated. Sides of neck strongly plicate, minutely granular.

Ten longitudinal rows of large, highly keeled, shortly mucronate dorsal scales, separated by many lateral series of minute flat scales

from the smaller entire-edged ventrals; 40 scales between the interparietal shield and the base of the tail; 10 dorsal scales correspond to the length of the head.

Tibia longer than the shielded part of the head. 13 or 14 femoral pores on each side.

General colour blackish above, with numerous indistinct lighter cross-bars; or light brown with a double longitudinal series of transverse black spots and a yellow dorso-lateral band; yellowish or greenish inferiorly.

From snout to vent 68 millim.

Hab. Colima, Mexico.

I have not seen examples of this species.

32. SCELOPORUS COUCHII.

Sceloporus couchii, Baird, Proc. Ac. Philad. 1858, p. 254; Bouleng. Cat. Liz. ii. p. 231 (1885).

Head-shields smooth; frontal transversely divided; interparietal large, as long as broad, separated from the frontal by a pair of small shields; parietals small, two on each side; two canthal scales; five transversely enlarged supraoculars, bordered inwards by one series of scales and separated from the supraciliaries by two or three series; four slightly enlarged, pointed scales form a denticulation on the anterior border of the ear.

Dorsal scales small, not larger than ventrals, keeled, truncate or rounded behind, forming parallel longitudinal lines; 82 scales between the interparietal shield and the base of the tail; 20 scales, taken in the middle of the back, correspond to the length of the shielded part of the head; lateral scales minute, granular, much smaller than dorsals and ventrals. Ventral scales smooth, entire. 108 scales round the middle of the body.

The adpressed hind limb reaches the posterior border of the orbit; tibia as long as the distance between the end of the snout and the ear; the distance between the base of the fifth toe and the extremity of the fourth equals the distance between the end of the snout and the middle of the collar-fold. Femoral pores 17–18 (25 in the type).

Caudal scales much larger than dorsals, strongly keeled and shortly mucronate. Males with enlarged postanal scales.

Dark olive above, with an interrupted bluish-white lateral stripe; sides spotted with bluish white; a black white-edged ocellus with blue centre in front of the shoulder; lips white with black vertical bars. Throat white with dark blue oblique streaks converging posteriorly; breast and middle of belly white; sides of belly blue, with blackish inner edge.

Hab. The type is from Santa Catharina, Nuevo Leon. The single specimen I have examined, a male measuring 57 millim. from snout to vent, was obtained in Duval Co., Texas, by Mr. W. Taylor.

EXPLANATION OF PLATE XXXIII.

Sceloporus asper, male, upper and under views.

2. Contributions to our Knowledge of the Plankton of the Faeroe Channel.—No. II. By G. Herbert Fowler, B.A., Ph.D., Assistant Professor of Zoology, University College, London.

[Received March 29, 1897.]

The following notes form a continuation of the previous paper on this subject (see P. Z. S. 1896, p. 991):—

Conchœcia maxima (Brady & Norman).

Twenty-five specimens, apparently referable to this Ostracod, were obtained in deep-water hauls. It occurred in three hauls at depths between 480 and 220 fathoms, and in three hauls which began at depths greater than 300 fathoms and were finished at the surface; it did not occur in a single one of the twenty-two surface hauls (100 fathoms or less, to the surface).

The only other occurrences of this species are recorded by Brady and Norman[1] as "off Greenland in lat. 74° 49′ N., long. 11° 30′ W., in a depth of 350 fathoms, and by H.M.S. 'Triton' in 1882, lat. 60° 20′ N., long. 7° 23′ W., in 200 fathoms, cold area, Faroe Channel." Mr. John Murray, who supplied these specimens to Mr. Brady and Canon Norman, has kindly informed me that the Greenland specimens "were brought home by Mr. Gray in a Peterhead whaler a few years ago."

So far as the three records go, there can be little doubt that in *Conchœcia maxima* we have a true member of the cold Mesoplanktonic fauna. The lowest depth and temperatures at which it was captured on the 'Research' were[2]:—

Sta. 13*g*.—465 to 335 fathoms; temp. 31° to 33° Fahr.
Sta. 19*a*.—480 to 350 fathoms; temp. 46° to 47° Fahr.

Tomopteris onisciformis, Eschscholtz.

Vejdovský[3] recognizes three European species of *Tomopteris*:—*onisciformis* (Eschscholtz[4]), *vitrina* (Vejdovský[3]), and *scolopendra* (Keferstein[5]). His diagnostic characters, however, seem quite inadequate for sharp distinction, and fall in all probability within the limits of individual variation, excepting in the case of the "Flossenaugen," the remarkable structures which have been variously interpreted as eyes or as phosphorescent organs.

According to Vejdovský these are arranged as follows:—

Vitrina, Vej.—One on the notopodium, one on the neuropodium; pigment yellow; one lens.

[1] Sci. Trans. Roy. Dublin Society, (ii.) v. 687, pl. lxi. figs. 1–8.
[2] *Cf.* Proc. Zool. Soc. 1896, p. 993 note.
[3] Zeitschrift wiss. Zoologie, xxxi. p. 81.
[4] Isis, 1825, p. 735.
[5] Arch. Anat. Physiol., 1861, p. 360.

Scolopendra, Kef.—One on the neuropodium only; pigment dark red; two lenses.

Onisciformis, Esch.—Two on the notopodium, two on the neuropodium; pigment yellow; five lenses.

These seem good diagnostic characters, but are unfortunately not entirely justified.

Taking first the number and position of these organs, and accepting Vejdovský's and Keferstein's account of *vitrina* and *scolopendra* respectively, the alleged presence of two "Flossenaugen" on each half of the parapodium in *onisciformis* is stated by Vejdovský to have been observed by Carpenter and Claparède [1], and by Leuckart and Pagenstecher [2]. A reference to the original memoirs shows, however, that the first-named authors describe and figure one only on the notopodium, one on the neuropodium; and that the German authors, describing a 2 mm. *onisciformis* under the name of *quadricornis*, describe and figure one only on the basal part of each parapodium. Busch [3] also, in describing young specimens, agrees with Leuckart and Pagenstecher. *Tomopteris onisciformis*, therefore, like *T. vitrina*, has apparently one "Flossenauge" on the notopodium, one on the neuropodium, or two on each parapodium; it has probably only one in young stages, and this only on certain parapodia.

Taking next the question of the pigment, its colour, yellow, dark red, or brown, can hardly be reckoned diagnostic. Lastly, with regard to the question of the lenses—these appear, according to Greef [4], who worked on fresh material at the Canary Islands, to be artificial products of the preservation fluids. Almost certainly, judged by a comparison of the figures, the five lenses attributed by Vejdovský to Leuckart and Pagenstecher's *onisciformis* are the same things as his "Augen-drüse" cells, which appear to surround the pigment-cells in a surface view.

There seems, therefore, to be no real specific distinction between Vejdovský's *vitrina* and *onisciformis* (auctt.). In my specimens of *onisciformis* the basal joint of the second cirrhi (Borstencirrhen) was sometimes longer, sometimes shorter than the first parapodium, and the eye-lenses were single—thus breaking down two more of his diagnostic criteria.

It is possible, as Vejdovský suggests, that *T. scolopendra* (Kef.) may be separate from *T. onisciformis* (?=*Briarœa scolopendra*, Quoy and Gaimard [5]); but it is always difficult, often impossible, to make certain of the "Flossenaugen" in preserved material, and conceivably *scolopendra* may prove a Mediterranean variety of *onisciformis*.

The largest 'Research' specimen measured 45·5 mm. in length;

[1] Trans. Linnean Soc., xxiii. p. 59.
[2] Arch. Anat. Physiol., 1858, p. 588.
[3] Arch. Anat. Physiol., 1847, p. 180.
[4] Zeitschrift wiss. Zoologie, xxxii. p. 237.
[5] Ann. Sciences naturelles, x. p. 235.

the second cirrhi (Borstencirrhen) were only 33 mm. long in this specimen, but in smaller ones were often longer than the body. The fully developed parapodia were 20 in number; the undeveloped posterior part of the body carried eight rudimentary parapodia, and measured 9 mm. In the youngest specimens the parapodia were proportionately fewer than in the medium-sized specimens, and are again less crowded in the largest. Points like these, taken with the specific uncertainty already discussed, show how necessary is a renewed study of the genus on *living* material.

I have not found any record of a larger specimen than this, but my friend Mr. E. T. Browne informs me that he has taken a specimen about 55 mm. in length off Valentia.

As regards the horizontal distribution of the species, it is common in northern seas, but not apparently further north than the Faeroe Channel. Here it was captured by both the 'Knight Errant' and the 'Triton,' and Prof. M'Intosh [1] points out that it appears to have been procured from very varying depths; this agrees with my experience on the 'Research'; it was taken at [2] Sta. 13*g*—465 to 335 fathoms, temp. 31° to 33° Fahr., and was also taken at the surface at a temperature of 54° F.

TRACHELOTEUTHIS RIISEI (Steenstrup).

I have found some difficulty in the determination of this species, owing probably to the fact that Steenstrup's original description [3] was of the briefest.

A specimen obtained in the Faeroe Channel during the cruise of H.M.S. 'Knight Errant' in 1880 was fully described by Hoyle among the 'Challenger' Cephalopoda [4], but he expressed himself as uncertain of his determination.

The deciding characteristics of the only two species [5] known appear to be the following according to Carus [6] (founded on Hoyle and Weiss) and Steenstrup:—

	riisei.	*behnii.*	'Research' spec.
Fins	Rhomboid. C., S.	Rounded behind. C. Heart-shaped. S.	Rounded behind. Heart-shaped.
	$=\frac{1}{3}$ body length. C.	$>\frac{1}{3}$ body length. C.[7] $=\frac{1}{3}$ body length. S.	$=\frac{1}{3}$ body length.
Tentacles	=body length. C.	$=\frac{2}{3}$ body length. C.	=body length.
Arm 4 ...	$=\frac{2}{3}$ length of arms 2, 3. S.	$=\frac{1}{2}$ length of arms 2, 3. S.	$=\frac{2}{3}$ length of 2, 3.

While, then, the general dimensions of my specimen agree with

[1] 'Challenger' Rep. Zool., Annelida Polychæta, xii. p. 532.
[2] *Cf.* Proc. Zool. Soc. 1896, p. 993 note.
[3] Vidensk. Medd. Nat. Foren. Kjöbenhavn, (4) iii. p. 293.
[4] Chall. Rep. Zool. xvi. Cephalopoda, pp. 163–166, pl. xxviii. figs. 6–12.
[5] Since the above was in type, I find that a third species, *T. guernei*, has been described by Joubin ('Campagnes Scientifiques par S. A. le Prince de Monaco,' fasc. ix.), but it is not likely to be confounded with either of the other two.
[6] Prodrom. Faunæ Mediterr. ii. pp. 447, 448.
[7] "Plus quam $\frac{1}{3}$ pallii æquantes." Surely a mistake!

those of *T. riisei*, the shape of the fin is markedly that of *T. behnii*; this is well brought out by Hoyle's figure, which shows a distinctly rhomboid fin.

A specimen of *T. behnii* was described by Weiss [1], which agrees almost exactly with the diagnostic characters given above for that species.

The following table exhibits the dimensions of my specimens, the 'Knight Errant' specimen described by Hoyle, and the Messina specimen described by Weiss, expressed in percentages of mantle length:—

	'Research.'	'Knight Errant.'	Messina.
Length of mantle in mm.	23	32	21
Breadth of mantle	·38	·25	—
Length of fin	·34	·40	·28
Breadth of fins	·56	·59	·38
Length of arm 1	·21	·24	·14
„ 2	·56	·56	·33
„ 3	·47	·46	·28
„ 4	·34	·40	·19
Length of tentacle....	·91	1·00	·61

So far as this goes it is fairly obvious that the 'Knight Errant' and 'Research' species are the same, and different from the Messina species; the dimensions further point to an accurate determination by Hoyle and Weiss of their respective species.

I have therefore assigned my specimen to *T. riisei*, although the shape of the tail-fin is distinctly that of the other species.

Dimensions in millimetres:—end of body to margin of mantle, 23; breadth of body, 9; length of fin, 8; breadth of conjoint fins, 13; arm i, 5; arm ii, 13; arm iii, 11; arm iv, 8; tentacle, 21.

The animal was of an absolutely glass-like transparence, except for the two staring black eyes and a black mass posteriorly (? ink-sac). When it had been killed, scattered chromatophores became more obvious, notably four, symmetrically placed on the dorsal surface of the head, and a line of smaller ones along the median dorsal line of the mantle; they were of a deep claret-colour.

As Hoyle [2] pointed out, and was corroborated by Jatta [3], *Tracheloteuthis* is a member of the subfamily *Ommastrephini*; the latter author refuses, however, to accept the suggested identification of *Tracheloteuthis* with *Verrilliola*=*Entomopsis*, as the four species described under these two genera are members of the *Taonoteuthi*.

Distribution:—

(1) Faeroe Channel—60° 29′ N., 8° 19′ W., surface ('Knight Errant').

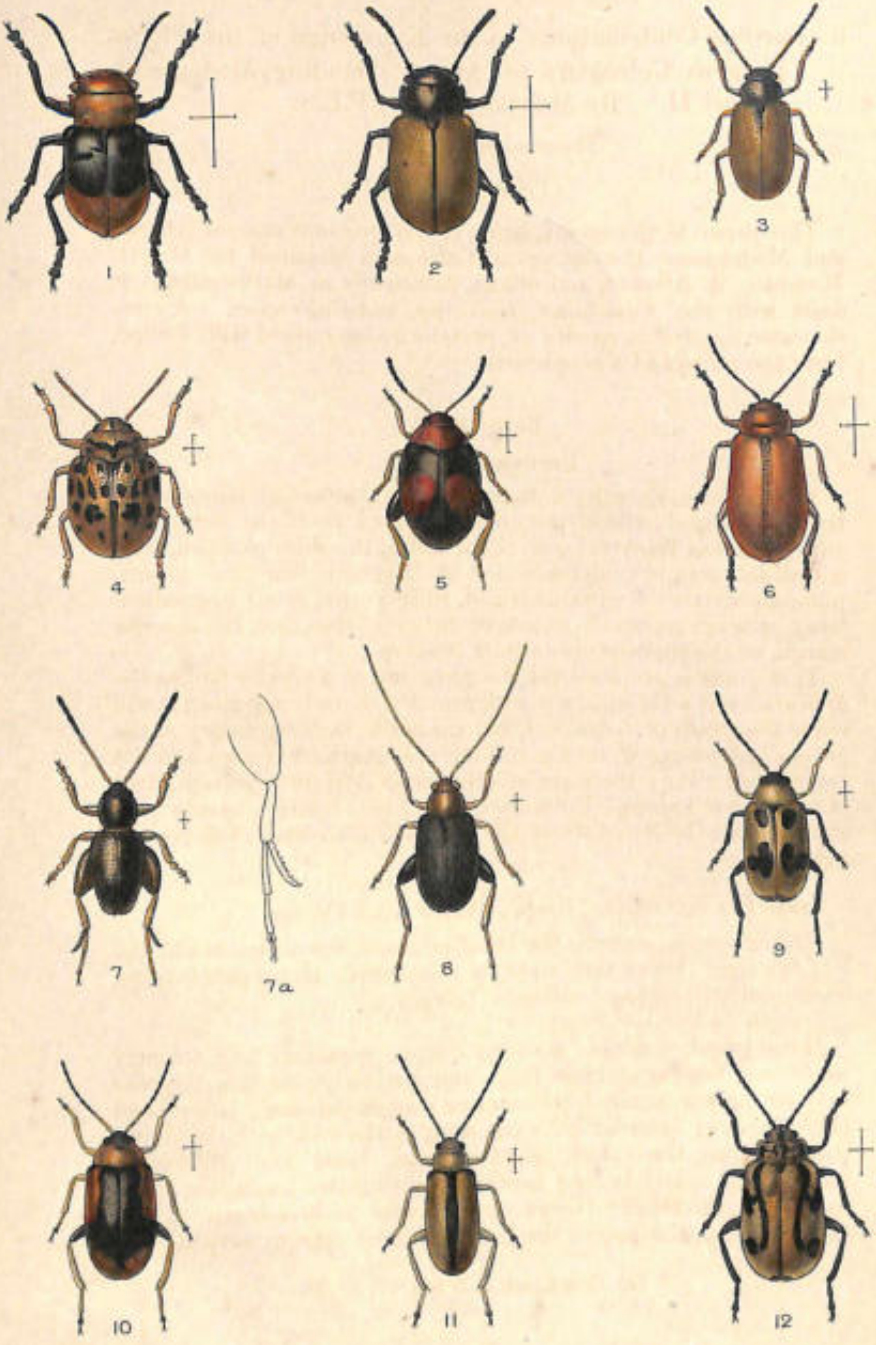
(2) Faeroe Channel—60° 2′ N., 5° 49′ W., 100 to 0 fathoms ('Research').

(3) Atlantic, Mediterranean (*Steenstrup*).

[1] Quart. Journ. Micr. Sci. xxix. pp. 75–96, pls. viii.–x.

[2] *Loc. cit.*

[3] Fauna e Flora Golf. Neapel.—I Cefalopodi (Sistematica), p. 112.



W.Purkiss del. et lith.

West, Newman imp.

Phytophagous Coleoptera from Africa and Madagascar

3. Further Contributions to the Knowledge of the Phytophagous Coleoptera of Africa, including Madagascar. —Part II.[1] By Martin Jacoby, F.E.S.

[Received May 14, 1897.]

(Plate XXXIV.)

This paper is the continuation of my previous one on African and Madagascar Phytophagous Coleoptera obtained by Mr. G. Marshall, M. Alluaud, and others, principally in Mashonaland; it deals with the *Eumolpinæ*, *Halticinæ*, and *Galerucinæ*. A considerable number of species at present undetermined will, I hope, form the subject of a supplement.

Eumolpinæ.

Lefevrea, n. gen.

Body oblong, smooth; antennæ filiform, the apical joints sometimes thickened; the clypeus not separated from the face; eyes entire; thorax transverse, of equal width, the sides rounded, with a distinct margin; elytra wider at the base than the thorax, punctate-striate; femora unarmed, tibiæ entire, claws appendiculate; prosternum much narrowed between the coxæ, the anterior margin of the thoracic episternum concave.

This genus is proposed for the reception of a species having the appearance of a *Colaspis*, but with rounded thoracic margins; it will enter the group of *Iphimeinæ*, but cannot be included in any of the genera composing it, on account of the unarmed femora and not emarginate tibiæ: there are at present no African representatives of that group known. From *Iphimoides*, Jac., the very narrow prosternum and the structure of the face will distinguish the present genus.

Lefevrea æneicolle, n. sp. (Plate XXXIV. fig. 3.)

Dark greenish æneous, the basal joints of the antennæ and the legs fulvous; thorax very strongly punctured; elytra pale fulvous, finely punctate-striate; abdomen fulvous.

Length 1½ line.

Head broad, greenish æneous, shining, remotely and strongly punctured, the vertex more finely and distinctly punctate; clypeus very strongly punctured, its anterior margin concave; labrum and palpi fulvous; antennæ not extending to the middle of the elytra, pale fulvous, the apical joints fuscous, basal joint thickened, second joint nearly as long as the following two joints, the apical five joints thickened; thorax nearly twice as broad as long, the sides rounded, the angles distinct, the basal margin very slightly

[1] For Part I., see P. Z. S. 1897, p. 238.

rounded, the surface impressed with deep, round punctures, remotely placed, rather larger at the sides than at the disc, metallic greenish æneous; scutellum of the same colour, its apex rounded; elytra subcylindrical, not depressed below the base, pale fulvous, with closely approached rows of fine punctures, which are nearly indistinct at the apex; underside nearly glabrous, greenish æneous; the flanks of the thorax deeply punctured, the rest nearly impunctate; abdomen and legs fulvous; the anterior margin of the thoracic episternum concave, furnished with a distinct fringe of hairs.

Hab. Mashonaland, Salisbury (*G. Marshall*).

LEFEVREA PUNCTICOLLIS, n. sp.

Below bluish-black, above metallic dark green, the basal joints of the antennæ and the anterior tibiæ fulvous; thorax very closely and finely punctured; elytra very closely punctate-striate, the interstices sparingly punctured.

Length 1½ line.

Head broad, closely punctured, especially so at the lower portion; the clypeus not separated from the face, its anterior margin nearly straight; antennæ filiform, black, the lower four joints fulvous, all the joints, with the exception of the basal two, slender and of nearly equal length; thorax nearly twice as broad as long, of equal width, the sides very strongly rounded and widened at the middle, the disc very closely, evenly, and finely punctured; scutellum with the apex rather rounded, with a few punctures; elytra parallel, dark green, not very shining, more strongly punctured than the thorax (at the base), the punctures arranged in closely approached rows, which are, however, less well-defined at the base than posteriorly, where they are more separated and finer, the interstices likewise very minutely and sparingly punctate; legs piceous, the anterior tibiæ fulvous, all the tibiæ armed with a small spine, claws appendiculate; prosternum narrow and elongate; the anterior margin of the thoracic episternum concave, furnished with a fringe of hairs.

Hab. Mashonaland (*G. Marshall*). British Museum and my collection.

The thorax in this species is more than usually widened at the sides, and the punctuation is extremely close and fine; the antennæ have more elongate terminal joints than in *L. æneicolle*.

LEFEVREA FULVIPES, n. sp.

Dark greenish, the basal five joints of the antennæ and the legs fulvous; thorax strongly and closely punctured; elytra finely punctate-striate; underside blackish.

Length 1¼ line.

Head rather closely and distinctly punctured, greenish, the labrum fulvous; clypeus not separated from the face; antennæ extending to the middle of the elytra, the lower five joints fulvous,

the others black, distinctly thickened; thorax scarcely twice as broad as long, the sides rounded, scarcely narrowed anteriorly, the angles distinct, the surface convex, strongly and closely punctured, dark greenish, not very shining; elytra parallel, subcylindrical, finely punctate-striate in closely approached rows; the interstices minutely punctate; legs entirely fulvous, rather robust.

Hab. Mashonaland (*G. Marshall*). British Mus. coll. and my own.

Whether this species is the male of the preceding one I am unable to say. I have not enough specimens for examination, as only two were obtained, and those are glued to cards; but the dilated anterior tarsi are no doubt peculiar to the male sex, as in most Eumolpidæ. Since, however, the antennæ differ in colour and structure, and the thorax entirely in shape and punctuation, as well as the legs in colour, I cannot look upon the present insect as identical; but the elytra show scarcely any difference in regard to the punctuation.

LEFEVREA ABDOMINALIS, n. sp.

Metallic greenish or bluish, the antennæ (the apical joints excepted), the legs, and the abdomen fulvous; thorax very strongly and remotely punctured; elytra bluish, finely punctate-striate.

Length 1½ line (3 millim.).

Head strongly but not closely punctured, greenish æneous; labrum fulvous; antennæ not extending to the middle of the elytra, robust, fulvous, the three or four apical joints fuscous, the third and fourth joints equal, slightly longer than the second one, the fifth slightly longer, the following three joints slightly dilated (♂), the apical ones thinner again, the last more elongate; thorax about one-half broader than long, the sides moderately rounded, the surface greenish, impressed with deep and round punctures not closely placed; elytra subcylindrical, bluish, finely punctate-striate, the punctures slightly larger at the base, the interstices smooth and impunctate; breast dark and æneous; abdomen and legs fulvous, the anterior tarsi rather short and robust.

Hab. Mashonaland (*G. Marshall*). Coll. Brit. Mus. and my own.

The two specimens before me are evidently males, and differ in every respect from the preceding species in regard to details, but not generically. The structure of the antennæ and the colour of the abdomen and legs will separate the species at once.

LEFEVREA INTERMEDIA, n. sp.

Dark greenish or bluish, the basal joints of the antennæ and the anterior legs fulvous; thorax strongly and subremotely punctured; elytra closely punctate-striate, the interstices distinctly punctured, partly costate at the sides.

Length 1½ line.

Head finely and remotely punctured, with a short longitudinal central groove; clypeus sparingly punctured, not separated from the face, its anterior margin nearly straight; labrum piceous; antennæ slender, extending to about the middle of the elytra, black, the lower four joints and the base of the fifth fulvous, third joint slightly shorter than the fourth and fifth, which are equal; thorax one-half broader than long, the sides evenly rounded, not narrowed in front, the surface strongly and not very closely punctured, with a narrow smooth central space somewhat obsolete, posterior angles indistinct, the disc with a very obsolete depression at each side near the base; elytra very slightly widened towards the middle, strongly and closely punctured in rows, the interstices also finely but distinctly punctate, especially so near the base, those at the sides raised into two or three narrow costæ; legs piceous, the extreme base of the femora and the anterior legs more or less fulvous.

Hab. Mashonaland (*G. Marshall*).

This insect agrees very nearly with *L. puncticollis* in regard to the punctuation of the elytra; but the shape of the thorax and its sculpture are so different, that I cannot look upon it as identical, although it may represent the female sex of that species.

In *L. puncticollis* the sides of the thorax are very strongly rounded and widened, and the disc is very closely and finely punctured: the opposite in regard to both these details is the case in the present species, examples of which are contained in the British Museum collection and in my own.

LEFEVREA MINUTA, n. sp.

Below black, above dark green, basal joints of the antennæ fulvous; thorax extremely closely punctured; elytra closely punctate-striate, the interstices minutely punctate.

Length $\frac{3}{4}$–1 line.

In shape resembling a small species of *Colaspis*; the head distinctly and closely punctured, the vertex more distantly so; sides of the clypeus thickened, the latter not separated from the face; antennæ not extending to the middle of the elytra, black, the lower four joints fulvous, third and fourth joints equal, second slightly shorter, terminal joints gradually thickened; thorax twice as broad as long, the sides very strongly rounded and widened at the middle, the surface extremely closely and rather strongly punctured; scutellum broader than long, with a few punctures; elytra parallel, not wider than the thorax, closely punctate-striate, each puncture provided with an extremely short hair, the interstices also closely punctured, those near the lateral margin slightly longitudinally costate: underside and legs blackish, nearly impubescent; prosternum strongly narrowed between the coxæ.

Hab. Niger-Benué Exped. (*Staudinger*).

The smallest species of those here described; the sides of the thorax very strongly rounded. I received several specimens from Dr. Staudinger.

TAPHIUS, n. gen.

Body elongate and parallel, smooth; antennæ filiform; head broad, eyes entire, clypeus not separated from the face; thorax transverse, the sides straight, not widened, distinctly marginate, the angles acute; scutellum small; elytra wider at the base than the thorax, punctate-striate; femora unarmed; tibiæ simple, not emarginate at the apex, all furnished with a small spine, the first joint of the posterior tarsi as long as the following two joints together, claws appendiculate; prosternum narrowly elongate, the anterior margin of the thoracic episternum concave.

I am obliged to establish this genus for the reception of a species allied to the genus *Lefevrea*, of the same shape and general structure, but differing in the entirely filiform antennæ, the different shape of head, and in the straight sides of the thorax.

TAPHIUS FLAVUS, n. sp.

Below piceous, above pale flavous; antennæ long and slender, the apical joints fuscous; thorax strongly and subremotely punctured; elytra depressed along the suture, strongly punctate-striate laterally, more finely so near the suture; legs flavous.

Length 1½ line.

Head broad, flavous, strongly but remotely punctured, the clypeus not separated from the face, distinctly depressed, its sides raised into an acute ridge, its anterior edge moderately concave; antennæ extending beyond the middle of the elytra, flavous, the terminal four joints black, basal joint short and thick, second one-half shorter, the third twice as long as the second joint and nearly as long as the following joints; thorax one-half broader than long, somewhat cylindrical and of equal width, the sides nearly straight, the angles in shape of a small tooth, the disc strongly but not closely punctured, flavous, anterior and posterior margins straight; scutellum triangular; elytra slightly wider at the base than the thorax, parallel, longitudinally depressed along the suture, with nine or ten regular rows of punctures, which are deeper and larger at the sides than near the suture, they are distinct to the base and apex: underside piceous, very sparingly pubescent and nearly impunctate; legs flavous.

Hab. Mashonaland (*G. Marshall*).

The head in this species is peculiarly broad and the antennæ are widely separated; the lower portion of the face is broadly but shallowly concave; the shape of the thorax resembles somewhat that of the genus *Aulexis*, but the sides are without teeth. In the British Museum collection and my own.

PSEUDOCOLASPIS APICICORNIS, n. sp.

Æneous, strongly pubescent; antennæ and legs fulvous, the penultimate three joints of the former fuscous; thorax strongly

and closely punctured and pubescent; elytra similarly punctured, with short white pubescence arranged in rows; femora dentate.

Length 1¼ line.

Head closely punctured and clothed with whitish pubescence, æneous or cupreous; labrum fulvous as well as the palpi; antennæ fulvous, the eighth, ninth, and tenth joints fuscous or black, the seventh joint triangularly widened, the following three transverse, the apical joint pointed; thorax subcylindrical, widened at the middle, the disc with a well-marked transverse depression anteriorly, the punctures closely placed and strongly marked, the interstices clothed with long whitish pubescence; scutellum pointed at the apex, densely pubescent; elytra wider at the base than the thorax, narrowed posteriorly, the shoulders prominent, the punctuation similar to that of the thorax and interrupted by rows of short whitish hairs through the entire length of the elytra: underside densely pubescent; legs fulvous, all the femora with a distinct tooth.

Hab. Mashonaland (*G. Marshall*). Collection Brit. Mus. and my own.

This is one of the small species which may be known by the colour of the antennæ in connection with the strong and close punctuation of the upper surface and the regularly arranged pubescence of the elytra. All the specimens before me agree in the above particulars, but in one the thorax is of a reddish cupreous colour.

PSEUDOCOLASPIS FEMORATA, Baly.

Subquadrate-ovate, bright green, blue, or nearly black; thorax closely rugose-punctate, strongly convex and narrowed in front; elytra subquadrate, with basal depression, very closely punctured and finely rugose, with single rows of very short, white hairs; all the femora with a long and acute spine.

Var. *a*. Above metallic green or blue; legs cupreous, apex of tibiæ fulvous.

Var. *b*. Obscure dark cupreous, scutellum aureous.

Var. *c*. Nearly black, opaque as well as the legs.

Length 1½–2 lines.

Head finely granulate and closely punctured, bright green as well as the labrum, the lower portion less closely punctate; antennæ extending to the base of the thorax, the lower six joints fulvous, the basal one stained with metallic green above, the terminal five joints black, forming a club, each joint transversely thickened; thorax subglobose, very convex, distinctly narrowed anteriorly, broader than long, very distinctly and closely punctured, the punctures slightly elongate and evenly distributed over the entire surface; scutellum broad, the apex pointed at the middle, the surface strongly punctured; elytra much broader at the base than the thorax, pointed at the apex, the shoulders produced into an acute ridge, the space below the base with a distinct depression, the surface more strongly punctured than the thorax, the

punctures partly confluent, the interstices more or less transversely wrinkled, the posterior portion furnished with single rows of very short whitish stiff hairs, the suture towards the apex longitudinally depressed: the underside brighter metallic green, the sides of the breast clothed with long whitish pubescence, the other parts strongly punctured as well as the femora, the latter with a long and acute spine; the tibiæ fulvous at their lower portion; tarsi piceous, the first joint more or less fulvous.

Hab. Mashonaland (*G. Marshall*). Collection Brit. Mus. and my own.

SCELODONTA VICINA, Har.

Cupreous, finely pubescent above; thorax transversely strigose, with two purplish bands; elytra deeply foveolate-punctate and transversely reticulate, each with five irregularly shaped obscure purplish markings.

Length 1½ line.

Head strongly and closely punctured, each puncture furnished with a whitish short seta, the middle of the front with a narrow longitudinal groove; clypeus punctured like the head; antennæ metallic bluish black, the lower three or four joints cupreous; thorax subcylindrical, one-half broader than long, the sides strongly rounded and widened at the middle, if viewed from above, the surface strongly transversely strigose, the interstices deeply punctured, cupreous, the sides more or less distinctly marked with dark purplish in shape of an indistinct band; scutellum strongly punctured, the apex pointed at the middle; elytra much wider at the base than the thorax, deeply foveolate-punctate throughout, the interstices transversely wrinkled, furnished with single white hairs, here and there arranged in rows, the apex with three short costæ, one near the suture, one obliquely placed at the middle, and the third near the lateral margin, the bright cupreous colour of the disc interrupted by dark purplish markings, of which one is placed at the middle of the base, two nearly connected spots below the shoulders, a longitudinal narrow oblique band near the suture at the middle, and the other marks on the two lateral costæ near the apex, all these markings are not well-defined but distinct; legs cupreous, tarsi black, femora with a small tooth; the sides of the breast densely covered with light pubescence.

Hab. Mashonaland (*G. Marshall*): collection British Museum. S. Africa (*Holub*): collect. Jacoby.

The species most nearly allied to the present one seems to be *S. maculosa*, Lefèv., from the Zambesi; but the author describes the elytra as having but three fusco-æneous spots and says nothing of their shape, nor does he mention the purplish bands of the thorax; in other respects the two species seem nearly to agree. One specimen was sent home by Mr. Marshall; the other is contained in my collection and was obtained by the African traveller Herr Holub. Both specimens agree in every particular.

RHYPARIDA MADAGASCARIENSIS, n. sp.

Entirely fulvous, head finely and remotely punctured; thorax transverse, closely punctured at the sides, the centre impunctate; elytra strongly punctate-striate, the interstices minutely punctured.

Length 1½ line.

Of oblong shape, the head finely granulate and not closely but distinctly punctured; the epistome separated from the face by an obsolete transverse groove, rather more strongly punctured than the head, its anterior margin concave at the middle; palpi slender; eyes surrounded by a very narrow groove; antennæ extending rather beyond the middle of the elytra, fulvous, the second joint slightly shorter than the third, the fourth rather longer than the fifth joint, the following ones elongate and rather stout; thorax twice as broad as long, the sides rounded, the anterior angles produced into a short tooth, the surface rather closely punctured at the sides, the punctures somewhat elongate, the middle of the disc, in shape of a narrow space, nearly impunctate, opaque; scutellum not longer than broad; elytra not wider at the base than the thorax, with a very shallow depression below the base, strongly punctate-striate, the interstices finely and sparingly punctured; the four posterior tibiæ deeply emarginate at the apex, claws bifid; anterior margin of the thoracic episternum concave; prosternum narrow, longer than broad.

This is the second species of the genus described by me from Madagascar; it agrees in everything with its many other Eastern congeners in regard to structural details and resembles many of the species in general shape and coloration. The present insect is easily distinguished from the other Madagascar species by the colour and sculpture of the thorax. Since the anterior margin of the thoracic episternum is not in the least convex but concave, the species cannot find its place amongst the *Typophorinæ*.

LINISCUS MASHONANUS, n. sp.

Metallic dark green, below and the femora nearly black, basal joints of the antennæ and the tibiæ more or less fulvous; thorax nearly impunctate; elytra very strongly punctate-striate; femora with a minute tooth.

Length 1½–2 lines.

Of elongate and parallel shape; the head with a few fine punctures at the vertex; the clypeus not separated from the face, sparingly punctured; eyes large, slightly notched; antennæ scarcely extending to the middle of the elytra, black, the lower two or three joints fulvous; the basal joint thickened, the second one-half shorter than this and the third joint, the following four joints slender and equal, the terminal ones distinctly thickened; thorax about one-half broader than long, broader in the female, the sides rounded and narrowed anteriorly, the angles dentiform,

with the usual seta, the disc rather deflexed anteriorly, very sparingly and finely punctured, but variable in that respect, sometimes with a small round fovea at each side; elytra wider at the base than the thorax, impressed with ten rows of very deep, large and round punctures, the interstices smooth and impunctate; the underside and the femora nearly black; tibiæ and tarsi more or less fulvous, the four posterior ones emarginate at the apex; the claws bifid; the femora with a very small tooth; prosternum broad, rugosely punctured.

Hab. Mashonaland (*G. Marshall*).

In this species the thorax is of slightly different shape from the typical form, having the anterior portion rather more deflexed, which gives the thorax a somewhat different appearance; the femora also have a minute tooth. But although Lefèvre has described the type as having unarmed femora, his *L. strigaticeps*, of which I possess a specimen named by the author, has likewise a small tooth on all the femora; altogether the presence or absence of this tooth cannot be considered of sufficient generic value, since nearly every species varies frequently in this respect, even if undoubtedly belonging to the same genus of Eulmopidæ. The present species may be known by the nearly impunctate thorax.

EURYDEMUS ÆNEUS, n. sp.

Below and the legs more or less piceous, above greenish æneous, the antennæ, tibiæ, and tarsi dark fulvous; thorax sparingly punctured: elytra depressed below the base, strongly punctate-striate anteriorly, finely so posteriorly.

Length 2 lines.

Head with a few punctures at the vertex; the eyes large, surrounded by a narrow, shallow sulcus, the intermediate space narrower than their diameter; clypeus separated by shallow oblique grooves from the face, sparingly but distinctly punctured, labrum fulvous; antennæ extending to about the middle of the elytra, fulvous, the basal joint thickened, the second shorter, but as long as the third joint, following joints more elongate, the terminal ones slightly thickened; thorax nearly twice as broad as long, the sides straight at the base, slightly rounded in front, anterior and posterior angles distinct, surface irregularly and remotely punctured, the punctures larger at the sides than at the middle, the base with a narrow margin; scutellum oblong; elytra much broader at the base than the thorax, the shoulders prominent, the basal portion rather deeply transversely depressed, the surface rather deeply punctate-striate at the sides and within the depression, the other punctures much smaller and nearly indistinct near the apex: underside and legs piceous, stained with dark fulvous; the femora more æneous, the posterior ones with a very small tooth; prosternum broad, strongly punctured round the margins; claws bifid, the inner divisions very small.

Hab. Madagascar, Diego-Suarez (*Ch. Alluaud*). Collection M. Alluaud and my own.

I would have referred the present species to *E. madagassus*, Har., had not the anterior femora been described in the diagnosis by the author as strongly dentate, of which no sign is to be detected in the two specimens before me; the elytra are also said to be deeply punctate-striate, while here they are very finely so from the middle downwards. *E. metallicus*, Jac., is of more narrow, parallel shape, the antennæ are much longer, the thorax is much less transversely shaped, and the elytra are deeply punctate-striate throughout.

EURYDEMUS HOLUBI, n. sp.

Dark brown; thorax extremely finely and sparingly punctured; elytra strongly punctate-striate, the interstices strongly longitudinally costate; femora with a distinct tooth.

Length 2 lines.

Head distinctly but not closely punctured, with a slight central ridge; the clypeus distinctly separated from the face, more strongly punctured; eyes large, the intervening space narrower than their diameter; the antennæ extending to the middle of the elytra, fulvous, the second joint but little shorter than the third, the following joints slender and elongate; thorax one-half broader than long, narrowed in front, the sides rounded, the posterior angles thickened, with a single seta, the surface with some very fine punctures at the middle, the sides nearly impunctate; elytra much broader than the thorax, feebly transversely depressed below the base, with deeply and closely punctured striæ; the interstices strongly raised, forming highly raised costæ near the apex and at the sides: underside and legs coloured as above; the femora with a strong tooth.

South Africa (*Holub*).

Of this distinct species, principally distinguished by the costate elytra, three specimens are contained in my collection without particular locality, having been obtained by Herr Holub, the African traveller.

IVONGIUS MINUTUS, n. sp.

Testaceous, the seventh and the apical two joints black; thorax transverse, sparingly punctured; elytra strongly punctate-striate; femora unarmed.

Length $\frac{3}{4}$–1 line.

Head extremely finely punctured, rather convex, the eyes surrounded by a narrow sulcus; clypeus separated from the face by a distinct transverse groove, nearly impunctate; palpi and antennæ flavous, the latter extending beyond the middle of the elytra, the basal and the second joint thickened, the latter as long as the third joint, the seventh and the terminal two joints black,

gradually thickened; thorax twice as broad as long, scarcely narrowed in front, the lateral margins strongly rounded, the base very narrowly marginate, the surface remotely, irregularly, and finely punctured on the disc, the sides nearly impunctate, the anterior margin with an indication of a short transverse groove at the sides; elytra slightly wider at the base than the thorax, without basal depression, the shoulders rather prominent, the punctures round and deep, more widely separated at the sides than near the suture, and nearly disappearing at the apex, the lateral margin impressed with a row of deep punctures: underside darker, impunctate; the prosternum broad, widened at the base; femora unarmed; claws bifid.

Hab. Madagascar, Diego-Suarez (*Ch. Alluaud*).

A very small species, allied to *I. antennarius*, Har., but the antennæ with different black-coloured joints and the thorax punctured, not smooth; the general size smaller.

IVONGIUS LEFEVREI, n. sp.

Testaceous; head distinctly punctured; thorax transverse, closely punctured at the sides; elytra strongly and closely punctate-striate; femora unarmed.

Length $\frac{3}{4}$ line.

Head rather closely and distinctly punctured, the eyes surrounded by a narrow oblique sulcus; the clypeus separated from the face by a deep groove, transversely subquadrate, finely punctured; antennæ extending to the middle of the elytra, the terminal joints thickened, stained with fuscous, the second one as long as the third joint; thorax nearly twice as broad as long, the sides deflexed, the lateral margin strongly rounded, the surface finely and closely punctured, the punctures partly confluent at the sides, the middle more sparingly punctured; elytra scarcely wider at the base than the thorax, rather elongate, impressed with round, deep, and closely placed punctures, which become finer towards the apex, the interstices flat, except the outer one near the lateral margin, which is slightly raised: underside impunctate, slightly darker than the upper surface; the femora unarmed.

Hab. Madagascar.

Rather smaller than *I. minutus* and differing in the finely and closely punctured sides of the thorax, the strongly punctured elytra, and other details.

I have received several specimens from M. Donkier of Paris.

RHEMBASTUS CYLINDRIFORMIS, n. sp.

Subcylindrical, black, above metallic æneous or bluish, the basal joints of the antennæ and the tibiæ fulvous; thorax closely punctured; elytra strongly punctate-striate.

Length 1 line.

Head finely but not closely punctured; the clypeus scarcely

separated from the face, rather more strongly punctate, its anterior margin but slightly concave; labrum fulvous; eyes distinctly notched, surrounded by a very narrow sulcus; antennæ extending to about the middle of the elytra, slender, the lower five joints flavous, the rest black, second joint thickened, scarcely shorter than the third, the following three joints elongate, terminal joints slightly widened; thorax subcylindrical, transverse, of equal width, the sides straight, the angles distinct, the surface convex, dark greenish, rather strongly and closely punctured, posterior margin broadly rounded at the middle; scutellum impunctate; elytra slightly wider at the base than the thorax, the shoulders prominent, the disc cylindrical, moderately strongly punctate-striate, the punctures much finer at the apex, the interstices flat and impunctate, lateral margin perpendicularly deflexed, the colour dark greenish or bluish, metallic: underside blackish; femora unarmed, dark greenish, their extreme base and apex below fulvous; tibiæ fulvous or flavous as well as the tarsi; prosternum broad, subquadrately transverse, its surface uneven, depressed posteriorly; the anterior margin of the thoracic episternum strongly convex.

Hab. Mashonaland (*G. Marshall*). Collection British Mus. and my own.

This little species might possibly equally well be placed in *Ivongius* on account of the unarmed femora, but the scarcely or not separated clypeus and other particulars seem better suited to the present genus; anyhow the species may be known by the fulvous apex of the femora and the similarly coloured tibiæ and tarsi in connection with the dark greenish colour above.

RHEMBASTUS MACULICOLLIS, n. sp. (Plate XXXIV. fig. 4.)

Pale fulvous; thorax strongly punctured, with a transverse V-shaped greenish band and two spots; elytra strongly punctate-striate, with nine or ten greenish spots, partly placed in transverse rows.

Length 1½–2 lines.

Of subquadrate-ovate shape; the head strongly punctured, flavous, with a narrow piceous central stripe (sometimes absent); clypeus separated from the face by a transverse shallow groove, rather closely punctured; labrum fulvous; mandibles black; antennæ flavous, not extending to the middle of the elytra, the second joint nearly as long as the third and thickened, terminal joints rather robust and strongly dilated; thorax transverse, the sides rounded in front, but scarcely narrowed, with a narrow margin, posterior margin broadly produced at the middle, the surface very deeply but rather remotely punctured, the punctures much finer near the anterior margin, the disc with a narrow greenish transverse band, which at the middle assumes the shape of a V, the point of which extends nearly to the base, at each side there is also a more or less distinct greenish spot placed below the

band; scutellum rounded at the sides, more or less piceous or greenish; elytra very strongly punctured in rather irregular rows, closely placed, which are here and there nearly confluent below the shoulders, the ground-colour flavous with the following dark greenish spots—an elongate spot on the shoulders, a small one near the scutellum, four elongate spots placed transversely before the middle, two others rather larger immediately below the latter, and two smaller spots near the apex (one near the margin, the other near the suture), posterior portion of the suture likewise narrowly greenish or brownish; elytral epipleuræ with a short row of punctures at the base: underside and legs flavous, impunctate, all the femora armed with a distinct tooth; prosternum broad, the sides thickened, the disc finely punctured.

Hab. Niger-Benué Expedition (*Staudinger*). My collection.

A well-marked and distinct species, of which I have received three specimens from Dr. Staudinger. The markings of the thorax and the spots of the elytra differ in the specimens in size and partly in shape, and it is quite possible that they may occasionally form longitudinal bands. Like the other species of the genus, the eyes are surrounded by a narrow sulcus.

RHEMBASTUS IMITANS, n. sp.

Pale fulvous or testaceous, the apical joints of the antennæ and the knees piceous; thorax sparingly punctured; elytra distinctly punctate-striate, the sutural and lateral margins, a round spot at the base, and an elongate one at the middle of each elytron greenish æneous.

Length 1 line.

Head impunctate, the vertex often dark æneous, lower portion of the face with a few minute punctures, the clypeus not separated from the face; eyes surrounded by a very narrow sulcus; antennæ extending to the middle of the elytra, fulvous, the terminal five joints nearly black, slender and elongate; thorax transversely convex, twice as broad as long, the lateral margins very slightly rounded, the disc with some remotely placed punctures, which do not extend to the base or the sides, the anterior margin sometimes æneous at the middle; scutellum ovate, greenish æneous; elytra with a rather feeble depression below the base, distinctly punctate-striate anteriorly, the punctures much finer towards the apex, the lateral margin accompanied by a row of deep punctures, narrowly greenish æneous as well as the suture, a round spot at the base and a short stripe at the middle of the disc greenish æneous: underside and legs pale fulvous, the knees darker; femora armed with a tooth; prosternum impunctate.

Hab. Madagascar, Diego-Suarez (*Alluaud*).

In coloration this species almost resembles *R. variabilis*, Har. (=4-*notata*, Lefèv.), but is less than half the size and has the elytral punctuation much finer; the antennæ also differ in

colour, and the general shape of the insect is more elongate and cylindrical.

RHEMBASTUS GERSTAEKERI, n. sp.

Bluish black, the basal joints of the antennæ and the legs fulvous, above metallic dark blue; thorax closely and finely punctured; elytra strongly punctate-striate, the interstices slightly convex.

Length 1½ line.

Head with a very few fine punctures at the vertex and a central longitudinal ridge; eyes with a narrow sulcus near the inner margin; the clypeus separated from the face by a semicircular groove, with a few punctures, its anterior margin fulvous; palpi slender, fulvous; antennæ rather long, extending below the middle of the elytra, the six or seven lower joints fulvous, the others fuscous, basal joint short and thick, the second scarcely one-half shorter than the third, the following joints more elongate; thorax nearly twice as broad as long, the sides straight and obliquely narrowed in front, the surface impressed with distinct round punctures, not very closely and irregularly placed, the sides nearly smooth; elytra strongly punctate-striate, the punctures closely placed, the interstices slightly convex, broad, impunctate, the shoulders prominent: underside blackish, the breast with a bluish gloss; legs reddish fulvous, the femora with a minute tooth, tarsi obscure piceous.

Hab. Ashanti.

Larger than *R. pusillus*, Har., the thorax much more strongly punctured, and the punctuation of the elytra distinct to the apex. *R. punctato-sulcatus*, Fairm., is larger still (5 millim.), the underside is described as rufous, and the elytral punctuation obsolete posteriorly.

RHEMBASTUS APICICORNIS, n. sp.

Oblong-ovate; below black, antennæ (the last joint excepted) and the legs fulvous; above metallic dark green or æneous; thorax closely and distinctly punctured; elytra strongly punctate-striate, the interstices convex at the sides.

Fem. Elytra with an acutely raised sharp costa from the shoulder to the apex.

Length ¾ line.

Head remotely but distinctly punctured, the sides forming a ridge or narrow groove at the inner margin of the eyes, clypeus not separated from the face; antennæ two-thirds the length of the body, fulvous, the last joint black, the second joint thickened like the first and but little shorter, third and fourth joints slender, equal, terminal joints slightly thickened, the last ovately widened; thorax one-half broader than long, subcylindrical, the sides straight, gradually narrowed in front, the basal margin broadly rounded and produced at the middle, the surface closely and rather strongly punctured, the punctures crowded at the sides; scutellum not

broader than long; elytra ovate, convex, strongly punctate-striate, the punctures closely placed, distinct to the apex, the interstices at the latter place and at the sides convex, in the female with an acutely raised costa from the shoulder to the apex; legs fulvous: underside black, very finely punctured; prosternum longer than broad, slightly narrowed at the middle, finely punctured; claws bifid.

Hab. Madagascar, Diego-Suarez. Coll. Alluaud and my own.

This small species might perhaps equally well be placed in *Ivongius*, which genus scarcely differs from *Rhembastus*, but may be known by the colour of the antennæ in both sexes and by the acute lateral costa of the elytra in the female.

MENIUS MADAGASCARIENSIS, n. sp.

Fulvous, the sixth and seventh joints of the antennæ black; thorax strongly but subremotely punctured; elytra deeply punctate-striate, the base, suture, and a semicircular band below the middle obscure æneous; femora unarmed.

Var. Elytra without darker markings.

Length 1 line.

Head with a few minute punctures, fulvous with a very slight metallic gloss, the eyes surrounded by a deep sulcus; antennæ extending to the middle of the elytra, fulvous, the sixth and seventh joints black, the basal joint very short and thick, the second scarcely shorter or thinner, as long as the third one, the others gradually thickened; thorax about one-half broader than long, narrowed in front, the sides straight, the surface strongly but not closely punctured; elytra wider at the base than the thorax, deeply punctate-striate, rather elongate, subcylindrical, the interstices also sparingly punctured, the punctured striæ distinct to the apex, the basal portion, the suture, and a curved band below the middle of each elytron obscure brownish æneous: underside and legs fulvous; femora unarmed, claws bifid.

This is another of the few species of the genus in which the femora are unarmed; the sulcus surrounding the eyes reveals, however, the proper place of the insect to be in *Menius*. The markings of the elytra are very obscure and in the varieties entirely obliterated: only in one specimen amongst the four contained in my collection are they at all distinct; the band at the base joins the sutural one, and the posterior mark is likewise connected with the lateral margin. The specimens were sent to me by Mr. Sikora.

MENIUS FULVICORNIS, n. sp.

Ovately rounded, convex; blackish below, above dark metallic green or blue; the antennæ, palpi, the apex of the tibiæ, and the tarsi flavous or fulvous; thorax remotely punctured; elytra deeply striate-punctate, the interstices at the sides very strongly costate; femora with a tooth.

Length 1¼ line.

Head strongly but not closely punctured, the clypeus separated from the face by a shallow transverse groove, palpi flavous, the eyes surrounded by a narrow sulcus; antennæ fulvous, the second joint as long as the third, terminal joints gradually thickened, rather elongate; thorax twice as broad as long, the lateral margins nearly straight, slightly narrowed towards the apex, posterior margin broadly rounded at the middle, moderately produced, the surface nearly punctured like the head, the punctures rather deeper near the base than anteriorly, not closely placed and somewhat irregularly distributed; elytra with very deep rows of closely placed punctures, the interstices rather convex, the lateral five ones at the middle very strongly costate, humeral callus very prominent: underside nearly black, the breast and the legs with a more or less distinct metallic gloss, the apex of the tibiæ and the tarsi fulvous, anterior femora with a minute, posterior ones with a strong tooth; prosternum broad, slightly rugose.

Hab. Ashantee. My collection.

Smaller than *M. flavitarsus*, Jac., and *M. tarsalis*, Lefèv., the legs differently coloured, the head more strongly punctured, and the elytra in the male with very strongly raised lateral costæ. There is a single female specimen from the same locality before me, which has the terminal joints of the antennæ darker as well as the tarsi, and the elytral costæ much less strongly raised; but whether this is the female of the present species or of another I am unable to say.

MENIUS UNICOLOR, n. sp.

Dark fulvous or obscure piceous; head finely, thorax very strongly punctured; elytra deeply punctate-striate, the interstices sparingly punctate, strongly convex at the sides; femora dentate.

Length 2 lines.

Of entirely dark fulvous colour, subquadrate ovate, the head sparingly and rather finely punctured at the vertex, the eyes surrounded by a sulcus; the clypeus not separated from the face, much more strongly punctured, its anterior edge slightly concave; labrum paler fulvous, its anterior margin strongly emarginate, apex of mandibles black; antennæ slender, fulvous, the second joint less than half the length of the third joint, the latter rather longer than the fourth; thorax scarcely twice as broad as long in the male, broader in the female; the sides nearly straight, narrowed towards the apex, the angles acute, somewhat thickened, the disc rather strongly and closely punctured; elytra wider at the base than the thorax, without basal depression, the surface deeply punctate-striate, the punctures closely placed, the interstices strongly costate at the sides, either with or without some minute punctures, all the femora dentate; prosternum broad, subquadrate, rugosely punctured; the anterior margin of the thoracic episternum strongly convex.

Hab. Madagascar.

The three specimens contained in my collection differ slightly in the amount of the interstitial punctures of the elytra and in the more or less transverse shape of the thorax. The species is rather differently coloured than most of its allies but seems closely allied to *M. chalceatus*, Lefèv.; but in that species the joints of the antennæ differ in their respective length, the clypeus is distinctly separated from the face and nearly smooth, and the whole upper surface is tinged with a gloss of æneous colour.

SYAGRUS NIGROSTRIATUS, n. sp.

Below piceous, above flavous, the apical joints of the antennæ and the knees black; thorax closely and strongly punctured, black at the disc; elytra strongly punctate-striate, flavous, alternately marked with black stripes, interrupted posteriorly.

Length 1¼ line.

Head strongly punctured, flavous, the middle portion more or less black; clypeus fulvous or flavous, very strongly punctured, separated from the face by a distinct transverse groove; antennæ long and slender, black, the lower five joints flavous, the second joint thickened, curved, as long as the third, the following two joints slightly longer, terminal joints elongate, widened at the apex; thorax one-half broader than long, the sides strongly widened, forming a slight angle below the middle, the entire surface covered with large, round punctures, closely placed, blackish, the anterior margin and the base more or less fulvous; scutellum longer than broad, smooth; elytra wider at the base than the thorax, slightly depressed below the base, very strongly punctate-striate, the punctures gradually diminishing in size posteriorly, those at the anterior portion closely placed and somewhat transverse in shape, the interstices more or less convex at the sides, the ground-colour flavous, the interspaces alternately marked with black stripes of various length, all abbreviated at some distance before the apex, and sometimes reduced to short elongate spots, their number varying greatly: underside piceous, shining; legs flavous, the apex of the femora and the base of the tibiæ more or less blackish, femora with a very small tooth.

Hab. Mashonaland (*G. Marshall*).

S. striatipennis, Lefèv., seems to be a closely allied species in regard to coloration, but is described with a smooth head and thorax; in the present insect both parts are very strongly punctured. Many species described by Lefèvre, or rather diagnosed, have afterwards been placed by this author in *Rhembastus*; but even now many species described as *Syagrus*, and the present insect is one of them, do not resemble in the shape of the thorax the typical species *S. calcaratus*, Fab., in which this part is subcylindrical; in many others the thorax resembles more the shape of a *Colaspis*, but on that difference alone it would not be wise to establish another genus, although a revision of the genus will sooner or later be necessary.

SYAGRUS MASHONANUS, n. sp.

Black or fulvous, the apical joints of the antennæ and the knees black; thorax impunctate, elytra strongly punctate-striate, femora dentate.

Mas (?). Thorax fulvous; elytra flavous; legs flavous, with or without dark knees.

Fem. (?). Thorax black; elytra flavous, the sutural and lateral margins and a round spot before the middle greenish black.

Length 2 lines.

Head finely punctured at the vertex, the clypeus more strongly and closely punctured, scarcely separated from the face; antennæ long and slender, fulvous, the apical joints more or less fuscous or black, the second joint but slightly longer than the third, this and the following joints elongate and slender; thorax subcylindrical, about one-half broader than long, the anterior portion rather strongly deflexed at the sides, the latter moderately rounded, the surface impunctate, fulvous in the male, black in the female; elytra subcylindrical, strongly punctate-striate, the punctures finer towards the apex, entirely flavous, or each elytron with a round or elongate black spot before the middle, the sutural and lateral margins likewise black in the female: underside black; legs fulvous, the femora with a distinct tooth, the knees and the first two joints of the tarsi more or less black; claws bifid; prosternum broad, coarsely punctured; the anterior margin of the thoracic episternum slightly convex.

Hab. Mashonaland (*G. Marshall*).

The different coloration in the sexes of this species is rather peculiar and constant in the six specimens before me; the sexes have been pointed out by Mr. Marshall, who has probably taken them *in copulâ*. The male is of nearly entirely fulvous coloration above, although in one specimen the suture is obscurely marked with a fuscous band, but the elytral spots are absent; the legs are likewise either entirely fulvous or have the knees darker, but this is never so pronounced as in the female; in the latter the thorax is black and shining and the head is sometimes likewise marked with black on the vertex.

SYAGRUS RUGICOLLIS, n. sp.

Below piceous, the basal joints of the antennæ and the legs fulvous; thorax greenish æneous, rugosely punctate; elytra obscure fulvous with metallic gloss, the sutural and lateral margins narrowly blackish, surface strongly punctate-striate; posterior femora with a minute tooth.

Length 1¼ line.

Head flat, strigosely punctured on the vertex, the rest of the surface remotely and finely punctate, eyes widely separated, surrounded by a narrow sulcus; clypeus not separated from the face, more strongly punctured; antennæ extending to the middle of the elytra, the lower seven joints fulvous, the others fuscous, third and fourth joints slender, equal, the basal and the second joint

thickened, of nearly equal length, terminal joints scarcely thickened, elongate; thorax one-half broader than long, the sides perfectly straight, gradually narrowed in front, the angles acute, the posterior ones with a long hair, the surface almost subcylindrical, closely and strongly rugose-punctate, the interstices confluent, the punctures round and deep, of greenish æneous colour; scutellum subquadrate, æneous; elytra broader at the base than the thorax, obscure fulvous, with a slight metallic lustre, very feebly depressed below the base, the margins narrowly blackish green, the surface deeply and regularly punctate-striate, the striæ rather closely placed, the interstices flat, with a few minute punctures here and there, shoulders prominent, smooth, the sides of the elytra strongly deflexed: underside dark fulvous or piceous, impunctate; prosternum narrowed between the coxæ, smooth; legs flavous, unarmed, posterior femora with an extremely small tooth; claws bifid; anterior margin of the thoracic episternum strongly rounded.

Hab. Madagascar, Diego-Suarez. Coll. M. Alluaud and my own.

IVONGIUS ABBREVIATUS, n. sp.

Pale testaceous, antennæ with the intermediate and the apical joints black; thorax fusco-æneous, finely punctate; elytra punctured below the base only, the sutural and lateral margins and a short stripe at the middle greenish-æneous.

Length 1¼ line.

Var. Thorax and underside pale fulvous, elytral stripe absent.

Head with a few fine punctures, the clypeus not separated from the face; eyes oblong, widely separated, narrowly notched; antennæ extending to the middle of the elytra, rather slender, testaceous, the sixth and seventh and the apical three joints black, second joint as long as the third but much thicker, terminal joints slightly thickened; thorax nearly twice as broad as long at the base, narrowed in front, the sides nearly straight, the anterior angles slightly produced, posterior margin broadly rounded at the middle, the surface very finely and sparingly punctured, dark fulvous or fuscous with a metallic æneous lustre; scutellum transverse, æneous; elytra subcylindrical, with a shallow depression below base, nearly impunctate, except below the basal portion, where some short rows of deep punctures are placed, the one within the shoulder extending to the base, the others all abbreviated, traces of rows of very fine punctures are also seen under a strong lens at the posterior portion, the suture and lateral margins narrowly greenish æneous, a similar coloured short longitudinal stripe is also placed at the middle of each elytron, the rest of the surface is pale testaceous as well as the underside and legs; femora unarmed, tibiæ emarginate, claws bifid.

Hab. Madagascar.

In the variety the elytral spot is absent, the thorax as well as the underside is of a darker colour than the rest of the body and without metallic gloss. I received three specimens from M. Donkier of Paris.

PSEUDIVONGIUS, n. gen.

Body ovate, non-pubescent; antennæ filiform, the apical joints thickened; eyes notched; epistome not separated from the face; thorax transversely subcylindrical; elytra punctate-striate; femora fusiform, unarmed, the posterior four tibiæ emarginate at the apex, non-sulcate; claws bifid, the inner division very short; prosternum broad, one-half longer than broad; the anterior margin of the thoracic episternum strongly convex.

I am obliged to separate this genus from all others belonging to the group of *Typophorinæ* on account of the want of an ocular sulcus, the non-separation of the clypeus from the face, and the unarmed femora; the shape of the thorax agrees partly with *Syagrus*, but there is no trace of any tooth at the femora; in the general ovate and posteriorly pointed shape the species differs also from most of its African congeners of this group.

PSEUDIVONGIUS NATALENSIS, n. sp.

Oblong-ovate, dark æneous, the basal joints of the antennæ and the tarsi and tibiæ fulvous; thorax finely and closely punctured, elytra strongly punctate-striate, the shoulders with two short oblique costæ.

Length ¾–1 line.

Head finely and somewhat rugosely punctured, the clypeus not separated from the face, its anterior margin concave, eyes distinctly notched, labrum piceous; antennæ filiform, the apical five joints thickened, black, the lower four joints fulvous; thorax transverse, subcylindrical, the sides strongly deflexed, the lateral margin nearly straight, the surface finely and rather closely punctured, the space near the lateral margins nearly impunctate; scutellum triangular, impunctate; elytra widened at the middle, pointed posteriorly, dark æneous, strongly punctate-striate, the interstices slightly convex and impunctate, those at the shoulders forming two short oblique, more or less distinct costæ, the punctures at the same place abbreviated or joined at the ends; the suture in the female deeply depressed at the posterior portion, forming a longitudinal sulcation; underside nearly black, with greenish gloss at the breast; legs fulvous, the femora metallic greenish at the middle portion; prosternum strongly rugose.

Hab. Natal, Estcourt (*G. Marshall*).

This small species will not be difficult to recognize on account of the ovate shape, the short elytral humeral costæ, and the peculiar sutural depression in the female, of which I know no similar instance amongst the numerous other African genera of Eumolpidæ.

PSEUDOMALEGIA, n. gen.

Body oblong, pubescent above and below; eyes entire; antennæ filiform, the last five joints thickened; thorax subcylindrical, rather flattened, without distinct lateral margin; femora unarmed: tibiæ not emarginate at apex; claws bifid; prosternum

strongly narrowed between the coxæ; the anterior margin of the thoracic episternum concave.

The small insect for which this genus is proposed agrees entirely in shape, pubescence, and colour with the species described by Lefèvre under the generic name of *Malegia*: it is, however, not possible to leave the present species in that genus on account of the non-emarginate tibiæ. Lefèvre, in his diagnosis of genera of Eumolpidæ, places *Malegia* in the group *Leprotinæ*, which he describes as having sometimes emarginate, sometimes simple tibiæ; this arrangement seems to me, however, unsatisfactory, since the structure of the tibiæ is a very important character amongst the Eumolpidæ. Whether all the species described by Lefèvre have the tibiæ emarginate or not, it is impossible to say without seeing the types, since the author does not mention the state of the tibiæ in his descriptions. In *M. letourneuxi*, Lefèv., of which I possess a specimen, the tibiæ are emarginate; in *M. turkestanica*, Reitter, of which a typical specimen is before me, the tibiæ are simple, and the species will have to be placed in *Pseudomalegia*. Whether the Natal species is really distinct from one or other of Lefèvre's species is somewhat doubtful, as his descriptions of four or five lines do not allow me to be certain in that respect, but as not even the generic characters agree, I must consider my species to be distinct.

PSEUDOMALEGIA LEFEVREI, n. sp.

Below nearly black, above æneous; four lower joints of the antennæ, the base of the femora, and the tibiæ entirely fulvous; thorax minutely punctured; elytra distinctly punctured in rows, clothed with whitish pubescence.

Length $\frac{3}{4}$–1 line.

Head minutely rugose and pubescent, the epistome not separated from the face; antennæ not extending to the middle of the elytra, black, the lower four joints fulvous, the terminal five joints thickened, the third and following joints nearly equal; thorax scarcely broader than long, the sides rounded at the middle, without distinct lateral margins, the surface very finely rugose, clothed with whitish pubescence; scutellum very small; elytra much wider at the base than the thorax, much more strongly punctured than the latter, the punctation arranged in very closely approached rows, the interstices between the punctures not wider than the latter themselves and clothed with rather long whitish pubescence; legs fulvous, the extreme apex of the femora and the tarsi black, the first joint of the latter as long as the two following joints together; claws bifid.

Hab. Natal, Estcourt (*G. Marshall*).

COLASPOSOMA KRAATZI, n. sp.

Æneous, cupreous, blue or metallic green; the antennæ nearly black; thorax strongly and subremotely punctured; elytra more finely punctate, the punctures arranged in semi-regular rows, the interstices slightly wrinkled; anterior femora subdentate.

Length $3\frac{1}{2}$–4 lines.

♂. Head remotely and strongly punctured; the clypeus separated from the face by a strongly rugose groove, its surface more finely punctured; labrum, mandibles, and palpi black; antennæ extending beyond the middle of the elytra, robust, black, the basal joint more or less metallic, terminal joints strongly widened; thorax more than twice as broad as long, the sides but slightly rounded, narrowly margined, the surface subremotely impressed with large round punctures, which are much more separated near the base, the interstices smooth; scutellum with a few fine punctures; elytra without basal depression, the shoulders rather prominent, the punctures finer than those of the thorax and arranged in somewhat irregular, not very closely approached rows, they get still finer towards the apex, the interstices slightly wrinkled here and there below the shoulders; underside scarcely pubescent or punctured, coloured like the upper surface as well as the legs; the anterior femora with a more or less distinct tooth at the middle.

Hab. West Africa, Cameroons.

This *Colasposoma* is one of those in which the thorax is strongly and not closely punctured, the opposite being the case in many of the African representatives of this genus; the colour is very variable, as is so often the case in these insects, but the black antennæ, labrum, and palpi seem constant; there seems scarcely any difference in regard to the elytral punctuation of the two sexes. *C. abdominale*, Baly, is a closely allied species, but differs principally in the colour of the abdomen. I have received most the specimens before me from Dr. Kraatz, who informs me that they were obtained by Herr Conradt.

COLASPOSOMA FOVEATUM, n. sp.

Dark greenish-æneous, pubescent above, the labrum and the antennæ fulvous; thorax strongly and subremotely punctured; elytra with deep transverse sub-basal depression, finely punctured, the sides transversely rugose.

Length 3 lines.

Head finely longitudinally strigose at the sides of the vertex, sparingly pubescent; the clypeus not distinctly separated from the face; labrum fulvous; antennæ slender, filiform, entirely fulvous; thorax nearly three times broader than long, the sides rounded, the disc subremotely and strongly punctured, the punctures round, the interstices clothed with whitish pubescence, the middle with a narrow, smooth space; scutellum broader than long; elytra with a deep transverse fovea below the shoulders, very finely punctured in irregular rows, clothed with rather long silvery pubescence, the interstices at the sides transversely rugose; underside and legs æneous with a slight purplish gloss, finely pubescent.

Hab. Delagoa Bay.

There are three specimens of this species (probably all females) in my collection; they are closely allied to *C. pubescens*, Lefèv.,

C. melancholicum, Jac., and several others all having the upper surface pubescent, but the present species differs from all in the strong and rather remote punctuation of the thorax and the deep lateral elytral depression.

COLASPOSOMA TRANSVALENSE, n. sp.

Metallic green, antennæ (the basal three joints excepted) bluish black; thorax very finely and closely punctured; elytra more strongly and very closely punctate, the interstices finely transversely wrinkled; legs dark fulvous; tarsi piceous.

Length 2–2½ lines.

Of the same general colour and shape as *C. senegalense*, Cast., of which it may possibly be a local aberration; the head minutely granulate, closely and finely punctured; the clypeus not separated from the face; labrum metallic green; basal joints of palpi fulvous, the apical one black; antennæ extending beyond the middle of the elytra, the lower three joints fulvous, the others bluish black, metallic, all the terminal joints long and slender; thorax more than twice as broad as long, the sides strongly rounded, the surface minutely granulate, very closely and finely punctured with some still finer punctation intermixed, the centre of the disc with a narrow smooth space near the base; scutellum broader than long, with some punctures; elytra very closely and rather more strongly punctured than the thorax, the interstices minutely granulate, punctured and transversely wrinkled at the sides, the base not depressed and the shoulders scarcely prominent; breast metallic green; abdomen dark obscure cupreous; legs dark fulvous; tarsi nearly black.

Hab. Transvaal.

Although, as remarked, this species almost entirely resembles *C. senegalense*, which is frequent in collections and with which it is probably often confounded, the differences are to be found in the metallic green, not fulvous labrum, the dark blue antennæ, and the entirely fulvous legs; the punctuation of the thorax is also still closer and finer. I possess three specimens, apparently all males, which agree entirely in these details.

EURYOPE BIPARTITA, n. sp. (Plate XXXIV. fig. 1.)

Black; head and thorax fulvous, minutely punctured; elytra with basal depression, finely punctured, black, the posterior third portion fulvous.

Length 4½ lines.

Broad and robust; the head deeply depressed in front of the clypeus, the latter narrowly edged with black; mandibles strongly punctured, fulvous, the apex black; antennæ extending beyond the base of the thorax, black, the lower two joints fulvous, terminal joints widened; thorax more than three times as broad as long, the sides widened towards the apex, narrowly margined, the anterior angles strongly produced outwards, the surface minutely and closely punctured, with a round fovea at each side, fulvous;

Length 3½–4 lines.

♂. Head remotely and strongly punctured; the clypeus separated from the face by a strongly rugose groove, its surface more finely punctured; labrum, mandibles, and palpi black; antennæ extending beyond the middle of the elytra, robust, black, the basal joint more or less metallic, terminal joints strongly widened; thorax more than twice as broad as long, the sides but slightly rounded, narrowly margined, the surface subremotely impressed with large round punctures, which are much more separated near the base, the interstices smooth; scutellum with a few fine punctures; elytra without basal depression, the shoulders rather prominent, the punctures finer than those of the thorax and arranged in somewhat irregular, not very closely approached rows, they get still finer towards the apex, the interstices slightly wrinkled here and there below the shoulders; underside scarcely pubescent or punctured, coloured like the upper surface as well as the legs; the anterior femora with a more or less distinct tooth at the middle.

Hab. West Africa, Cameroons.

This *Colasposoma* is one of those in which the thorax is strongly and not closely punctured, the opposite being the case in many of the African representatives of this genus; the colour is very variable, as is so often the case in these insects, but the black antennæ, labrum, and palpi seem constant; there seems scarcely any difference in regard to the elytral punctuation of the two sexes. *C. abdominale*, Baly, is a closely allied species, but differs principally in the colour of the abdomen. I have received most the specimens before me from Dr. Kraatz, who informs me that they were obtained by Herr Conradt.

COLASPOSOMA FOVEATUM, n. sp.

Dark greenish-æneous, pubescent above, the labrum and the antennæ fulvous; thorax strongly and subremotely punctured; elytra with deep transverse sub-basal depression, finely punctured, the sides transversely rugose.

Length 3 lines.

Head finely longitudinally strigose at the sides of the vertex, sparingly pubescent; the clypeus not distinctly separated from the face; labrum fulvous; antennæ slender, filiform, entirely fulvous; thorax nearly three times broader than long, the sides rounded, the disc subremotely and strongly punctured, the punctures round, the interstices clothed with whitish pubescence, the middle with a narrow, smooth space; scutellum broader than long; elytra with a deep transverse fovea below the shoulders, very finely punctured in irregular rows, clothed with rather long silvery pubescence, the interstices at the sides transversely rugose; underside and legs æneous with a slight purplish gloss, finely pubescent.

Hab. Delagoa Bay.

There are three specimens of this species (probably all females) in my collection; they are closely allied to *C. pubescens*, Lefèv.,

C. melancholicum, Jac., and several others all having the upper surface pubescent, but the present species differs from all in the strong and rather remote punctuation of the thorax and the deep lateral elytral depression.

COLASPOSOMA TRANSVALENSE, n. sp.

Metallic green, antennæ (the basal three joints excepted) bluish black; thorax very finely and closely punctured; elytra more strongly and very closely punctate, the interstices finely transversely wrinkled; legs dark fulvous; tarsi piceous.

Length 2–2½ lines.

Of the same general colour and shape as *C. senegalense*, Cast., of which it may possibly be a local aberration; the head minutely granulate, closely and finely punctured; the clypeus not separated from the face; labrum metallic green; basal joints of palpi fulvous, the apical one black; antennæ extending beyond the middle of the elytra, the lower three joints fulvous, the others bluish black, metallic, all the terminal joints long and slender; thorax more than twice as broad as long, the sides strongly rounded, the surface minutely granulate, very closely and finely punctured with some still finer punctation intermixed, the centre of the disc with a narrow smooth space near the base; scutellum broader than long, with some punctures; elytra very closely and rather more strongly punctured than the thorax, the interstices minutely granulate, punctured and transversely wrinkled at the sides, the base not depressed and the shoulders scarcely prominent; breast metallic green; abdomen dark obscure cupreous; legs dark fulvous; tarsi nearly black.

Hab. Transvaal.

Although, as remarked, this species almost entirely resembles *C. senegalense*, which is frequent in collections and with which it is probably often confounded, the differences are to be found in the metallic green, not fulvous labrum, the dark blue antennæ, and the entirely fulvous legs; the punctuation of the thorax is also still closer and finer. I possess three specimens, apparently all males, which agree entirely in these details.

EURYOPE BIPARTITA, n. sp. (Plate XXXIV. fig. 1.)

Black; head and thorax fulvous, minutely punctured; elytra with basal depression, finely punctured, black, the posterior third portion fulvous.

Length 4½ lines.

Broad and robust; the head deeply depressed in front of the clypeus, the latter narrowly edged with black; mandibles strongly punctured, fulvous, the apex black; antennæ extending beyond the base of the thorax, black, the lower two joints fulvous, terminal joints widened; thorax more than three times as broad as long, the sides widened towards the apex, narrowly margined, the anterior angles strongly produced outwards, the surface minutely and closely punctured, with a round fovea at each side, fulvous;

scutellum black; elytra with a deep transverse depression below the base, punctured like the thorax, the two anterior thirds black, the posterior one fulvous, the edge of division of the black portion deeply concave at the sides, convex near the suture; underside and legs black; the last abdominal segment fulvous.

Hab. Africa.

The single specimen in my collection was formerly in that of Major V. Quedenfeldt and has no particular locality indicated; the species differs from all its allies in the coloration.

EURYOPE NIGRICOLLIS, n. sp. (Plate XXXIV. fig. 2.)

Black, head and thorax very finely punctured; elytra testaceous, finely punctured, the margins very narrowly black.

Length 4 lines.

Head entirely black, very finely and not closely punctured, with an obsolete fovea at the middle of the vertex and another at the base of the antennæ; palpi and antennæ black, the latter extending to the base of the elytra; the second and third joints of the antennæ equal, the others gradually widened and robust; thorax of usual shape, the sides straight and obliquely widened towards the apex, all the angles acute, the surface with a transverse depression near the base, very finely punctured, black, shining; scutellum black, its apex broadly rounded; elytra testaceous, scarcely more strongly punctured than the thorax, the margins extremely narrowly black, their epipleuræ of the same colour as well as the underside and legs.

Hab. East Africa. In my collection

Distinguished from all its congeners by the black head and thorax and the pale coloured elytra; two specimens are before me.

NOTE.

Nerissidius, Weise.—A Eumolpid genus described by Weise in the Deutsche entom. Zeitsch. 1895, and allied to *Nerissus*, is compared with this genus by the author, but the latter has evidently overlooked Baly's genus *Cheiridea* (Journ. Linn. Soc. 1877), which has the sides of the thorax likewise serrate, and with which Weise's genus may be identical; but no mention is made in regard to the shape of the thoracic margin of the episternum, which at present forms the chief character of distinction in the two principal groups of *Eumolpinæ*.

HALTICINÆ.

NISOTRA INCISICOLLIS, n. sp.

Oblong-ovate, fulvous; thorax finely and closely punctured, with deep anterior and posterior grooves; elytra metallic green, irregularly and closely impressed with small and still smaller punctures.

Length 1½ line.

Head very finely and sparingly punctured; the clypeus more strongly so, separated at the sides by narrow oblique grooves,

placed above the base of the antennæ; the latter not extending to the middle of the elytra, entirely fulvous, the third and fourth joints equal, longer than the second, terminal joints gradually thickened; thorax twice as broad as long, the sides feebly rounded, the anterior angles not produced, posterior ones acute, the surface closely and finely punctured at the sides, more sparingly so at the disc, the anterior margin with a deep longitudinal groove at each side extending to about one-third the length of the thorax, the base with a much shorter groove at each side; scutellum fulvous; elytra with closely approached rows of larger punctures, the interstices everywhere closely and finely punctured, slightly wrinkled here and there; the space in front of the lateral margins slightly thickened and accompanied by some deeper punctures; elytral epipleuræ very broad, concave and nearly smooth; underside and legs entirely fulvous, impunctate; prosternum narrowly elongate; the first joint of the tarsi in the male strongly widened.

Hab. Madagascar, Diego-Suarez (*C. Alluaud*).

This is quite a distinct species from *N. delecta*, Dalm., on account of the deeper and longer anterior thoracic grooves, and the very close punctuation, of the elytra, amongst which the larger punctures are but obsoletely arranged in rows.

NISOTRA CHAPUISI, n. sp.

Oblong, testaceous, terminal joints of the antennæ fuscous; thorax closely and finely punctured, with obscure basal grooves; elytra very closely and semi-regularly punctured; abdomen and femora more or less piceous.

Length 1–1¼ line.

Head microscopically punctured at the vertex; the clypeus with a few deeper punctures and a fovea at the base; antennæ not extending to the middle of the elytra; the lower six joints testaceous, the rest black, third and fourth joints equal, terminal joints thickened, pubescent, the last more elongate; thorax at least twice as broad as long, the sides very strongly rounded at the middle, all the angles acute but not produced; the disc convex, very closely and rather finely punctured; the anterior and posterior margins with a very small indentation at each side, only visible under a strong lens; elytra oblong, scarcely widened, pointed at the apex, very closely punctured in irregular rows, the punctures rather larger than those of the thorax and evenly distributed, without arrangement in pairs; underside and the posterior femora more or less black.

Hab. Madagascar, Diego-Suarez (*C. Alluaud*).

A species of rather elongate shape and closely allied to *N. testacea*, Chap., from Abyssinia, but smaller, the lower six, not four, joints of the antennæ testaceous, the thorax with scarcely perceptible grooves, and the elytral punctation irregular, not geminate.

EPITRIX WEISEI, n. sp.

Black, pubescent; antennæ, tibiæ, and tarsi flavous; thorax

scutellum black; elytra with a deep transverse depression below the base, punctured like the thorax, the two anterior thirds black, the posterior one fulvous, the edge of division of the black portion deeply concave at the sides, convex near the suture; underside and legs black; the last abdominal segment fulvous.

Hab. Africa.

The single specimen in my collection was formerly in that of Major V. Quedenfeldt and has no particular locality indicated; the species differs from all its allies in the coloration.

EURYOPE NIGRICOLLIS, n. sp. (Plate XXXIV. fig. 2.)

Black, head and thorax very finely punctured; elytra testaceous, finely punctured, the margins very narrowly black.

Length 4 lines.

Head entirely black, very finely and not closely punctured, with an obsolete fovea at the middle of the vertex and another at the base of the antennæ; palpi and antennæ black, the latter extending to the base of the elytra; the second and third joints of the antennæ equal, the others gradually widened and robust; thorax of usual shape, the sides straight and obliquely widened towards the apex, all the angles acute, the surface with a transverse depression near the base, very finely punctured, black, shining; scutellum black, its apex broadly rounded; elytra testaceous, scarcely more strongly punctured than the thorax, the margins extremely narrowly black, their epipleuræ of the same colour as well as the underside and legs.

Hab. East Africa. In my collection

Distinguished from all its congeners by the black head and thorax and the pale coloured elytra; two specimens are before me.

NOTE.

Nerissidius, Weise.—A Eumolpid genus described by Weise in the Deutsche entom. Zeitsch. 1895, and allied to *Nerissus*, is compared with this genus by the author, but the latter has evidently overlooked Baly's genus *Cheiridea* (Journ. Linn. Soc. 1877), which has the sides of the thorax likewise serrate, and with which Weise's genus may be identical; but no mention is made in regard to the shape of the thoracic margin of the episternum, which at present forms the chief character of distinction in the two principal groups of *Eumolpinæ*.

HALTICINÆ.

NISOTRA INCISICOLLIS, n. sp.

Oblong-ovate, fulvous; thorax finely and closely punctured, with deep anterior and posterior grooves; elytra metallic green, irregularly and closely impressed with small and still smaller punctures.

Length 1½ line.

Head very finely and sparingly punctured; the clypeus more strongly so, separated at the sides by narrow oblique grooves,

placed above the base of the antennæ; the latter not extending to the middle of the elytra, entirely fulvous, the third and fourth joints equal, longer than the second, terminal joints gradually thickened; thorax twice as broad as long, the sides feebly rounded, the anterior angles not produced, posterior ones acute, the surface closely and finely punctured at the sides, more sparingly so at the disc, the anterior margin with a deep longitudinal groove at each side extending to about one-third the length of the thorax, the base with a much shorter groove at each side; scutellum fulvous; elytra with closely approached rows of larger punctures, the interstices everywhere closely and finely punctured, slightly wrinkled here and there; the space in front of the lateral margins slightly thickened and accompanied by some deeper punctures; elytral epipleuræ very broad, concave and nearly smooth; underside and legs entirely fulvous, impunctate; prosternum narrowly elongate; the first joint of the tarsi in the male strongly widened.

Hab. Madagascar, Diego-Suarez (*C. Alluaud*).

This is quite a distinct species from *N. delecta*, Dalm., on account of the deeper and longer anterior thoracic grooves, and the very close punctuation, of the elytra, amongst which the larger punctures are but obsoletely arranged in rows.

NISOTRA CHAPUISI, n. sp.

Oblong, testaceous, terminal joints of the antennæ fuscous; thorax closely and finely punctured, with obscure basal grooves; elytra very closely and semi-regularly punctured; abdomen and femora more or less piceous.

Length 1–1¼ line.

Head microscopically punctured at the vertex; the clypeus with a few deeper punctures and a fovea at the base; antennæ not extending to the middle of the elytra; the lower six joints testaceous, the rest black, third and fourth joints equal, terminal joints thickened, pubescent, the last more elongate; thorax at least twice as broad as long, the sides very strongly rounded at the middle, all the angles acute but not produced; the disc convex, very closely and rather finely punctured; the anterior and posterior margins with a very small indentation at each side, only visible under a strong lens; elytra oblong, scarcely widened, pointed at the apex, very closely punctured in irregular rows, the punctures rather larger than those of the thorax and evenly distributed, without arrangement in pairs; underside and the posterior femora more or less black.

Hab. Madagascar, Diego-Suarez (*C. Alluaud*).

A species of rather elongate shape and closely allied to *N. testacea*, Chap., from Abyssinia, but smaller, the lower six, not four, joints of the antennæ testaceous, the thorax with scarcely perceptible grooves, and the elytral punctation irregular, not geminate.

EPITRIX WEISEI, n. sp.

Black, pubescent; antennæ, tibiæ, and tarsi flavous; thorax

strongly and closely punctured; the sulcus deep; elytra strongly punctate-striate, the interstices convex and clothed with yellowish pubescence.

Length ¾ line.

Head smooth and impunctate, black, shining, with the usual oblique narrow grooves; antennæ extending slightly beyond the middle of the elytra, flavous, the terminal joints slightly thickened, the third and fourth joints equal; thorax with the sides straight, slightly narrowed anteriorly, the anterior angles oblique, the basal margin produced in front of the scutellum; the basal sulcus straight and deep, the disc closely and strongly punctured, the base behind the sulcus rather more strongly so; elytral punctures strong and closely placed, the interstices costate and pubescent; underside and posterior femora black, the other legs and the posterior tibiæ and tarsi fulvous.

Hab. Madagascar, Diego-Suarez (*Ch. Alluaud*).

This is the first species of *Epitrix* known from Madagascar, and the second African one: it is closely allied to most of its European congeners and to *E. lævifrons*, Weise, from Ashantee; it differs from the last in the black, not dark rufous head, and in the convex elytral interstices, as well as in the rather long yellowish pubescence of the latter. Weise mentions no pubescence in his species.

EPITRIX INTEGRICOLLIS, n. sp.

Black; the antennæ, tibiæ, and tarsi flavous; thorax closely and strongly punctured, the base with a perpendicular groove; elytra finely punctate-striate, the interstices longitudinally pubescent.

Length ½ line.

Head impunctate, with the exception of a few punctures near the eyes, the oblique grooves distinct; carina rather broad; antennæ extending to the middle of the elytra, flavous, the extreme apex of the last joint piceous, third and fourth joints very small, smaller than the second, terminal joints thickened; thorax transverse, the sides slightly rounded, forming an oblique angle near the apex, with the setiferous pore below the angle; the surface closely and finely punctured, without transverse sulcus, but with a short and rather obsolete perpendicular groove at each side of the basal margin, the latter but slightly produced and rounded in front of the scutellum; elytra with closely approached rows of moderately strong punctures, the interstices scarcely raised and impunctate, with rows of short, white pubescence; below black, sparingly pubescent and punctured; femora more or less stained with black, the posterior ones entirely of that colour; tibiæ and tarsi flavous.

Hab. Mashonaland (*G. Marshall*). British Museum Collection and my own.

From most or all species of the genus the present one is distinguished by the want of a thoracic transverse sulcation, only

a short and obsolete perpendicular groove indicating the commencement of the sulcus found in the other members of the genus.

DIBOLOIDES, n. gen.

Oblong-ovate, very convex; antennæ short, the terminal joints thickened; thorax strongly transverse, without depressions; elytra not wider at the base than the thorax, punctate-striate; posterior femora strongly incrassate, their tibiæ greatly widened towards the apex, deeply longitudinally sulcate, with a strong spur at the apex, placed at the middle, the metatarsus of the posterior legs nearly as long as the following joints together; anterior tibiæ unarmed; claws appendiculate; the first abdominal segment double the length of the following ones; prosternum narrowed between the coxæ; mesosternum small, widened posteriorly; the anterior coxal cavities closed.

Amongst the genera with closed coxal cavities, the present one approaches most nearly in shape the Australian genus *Arsipoda*, from which it differs in the want of any thoracic grooves, in the much shorter antennæ, and the narrower and not raised prosternum. The insect also resembles *Dibolia*, but in that genus the cavities are open.

DIBOLOIDES BICOLOR, n. sp. (Pl. XXXIV. fig. 5.)

Reddish fulvous, the apical joints of the antennæ and the posterior femora black; thorax finely granulate-punctate; elytra finely punctate-striate, black, with two round fulvous spots at the middle.

Var. *a*. Elytra fulvous, with a transverse black band at the base and a sutural spot near the apex.

Var. *b*. Elytra entirely fulvous.

Length $1\frac{1}{2}$–$1\frac{3}{4}$ line.

Head with a few very fine punctures, reddish fulvous, frontal elevations and carina absent; epistome separated from the face by a shallow transverse groove, the anterior portion rather deflexed, paler; palpi filiform, flavous; eyes large, ovate; antennæ only extending to the base of the thorax, flavous, the terminal three or four joints black, transverse, basal joint long and slender, lightly curved, second joint short and thickened, third more slender and one-half longer, the intermediate joints slightly triangularly widened, terminal ones narrower and shorter again; thorax nearly three times broader than long, the sides nearly straight and narrowed in front, the angles not produced, but distinct, the surface extremely closely and finely punctured, reddish fulvous; scutellum small, triangular; elytra strongly convex, ovate, widened towards the middle; finely punctate-striate, each elytron with ten rows of punctures, the subsutural row very short, the lateral two rows rather larger and more closely approached, the interstices everywhere very finely and closely punctured; elytral epipleuræ very broad, concave; underside and

legs fulvous; the posterior femora black, prosternum finely punctured.

Hab. Mashonaland (*G. Marshall*).

I have taken rather arbitrarily the form with black elytra and two fulvous spots for the type, but the species seems subject to great variation in regard to colour. In the typical form each elytron has a subtransverse large red spot placed in the middle; in the variety *a* the red colour is so increased as to reduce the black portion to a transverse narrow band at the base and a small sutural spot at the apex, until in the variety *b* this also disappears and the elytra are entirely reddish fulvous; the posterior femora remain, however, constantly black.

PHYLLOTRETA MASHONANA, n. sp.

Elongate, black, shining, the basal joints of the antennæ and the base and apex of the tibiæ fulvous; thorax finely, elytra very closely and more strongly punctured.

Mas. The fourth and fifth joints of the antennæ dilated.

Length 1 line.

Head finely rugose-punctate, with a short central groove between the antennæ, the carina, and the clypeus in shape of acute ridges; labrum black; antennæ scarcely extending to the middle of the elytra, black, the lower three joints fulvous, the basal joint black above, second and third joints short, equal, fourth thickened, moniliform, fifth similarly thickened but twice as long as broad, subquadrate, the rest subequal, rather short; thorax one-half broader than long, the sides rounded, the anterior angles slightly oblique and thickened, the surface closely and finely punctured; elytra subdepressed, rather more strongly punctured than the thorax, the punctures extremely closely and irregularly placed, the interstices here and there slightly wrinkled; underside and legs black, the base and the apex of the tibiæ, as well as the tarsi, fulvous; prosternum narrowly elongate; mesosternum twice as long as broad.

Hab. Mashonaland (*G. Marshall*). British Museum and my collection.

PHYLLOTRETA OPACA, n. sp.

Black, opaque, the basal joints of the antennæ and the tibiæ and tarsi flavous; thorax finely, elytra more strongly and closely punctured.

Length $\frac{1}{2}$–$\frac{3}{4}$ line.

Much smaller than *P. mashonana* and opaque, not shining, the head extremely finely and rather sparingly punctured, without any frontal tubercles; antennæ scarcely extending to the middle of the elytra, black, the lower three or four joints flavous, the basal joint elongate, not thickened, the second one slightly longer than the third (♂ ?), equal in the female, terminal joint not thickened or slightly so, elongate; thorax about one-half broader than long, the sides straight, the anterior angles oblique, the disc rather deflexed,

very finely and closely punctured, the interstices somewhat uneven or wrinkled, opaque; scutellum broad, triangular; elytra slightly narrowed below the middle, more strongly punctured than the thorax, the punctures placed in very closely approached, semi-regular rows, the apex of each elytron subtruncate; legs flavous, the posterior femora black, the metatarsus of the hind legs as long as the following joints together.

Hab. Mashonaland (*G. Marshall*). British Mus. coll. and my own.

Of only half the size of the preceding species, with entirely flavous tibiæ and tarsi and more opaque upper surface; there are three specimens before me, of which one is apparently immature, as it is of a brownish colour and with entirely flavous antennæ. The specimens being glued to cards, I am unable to say anything about the underside or the sexes, but they will be easily distinguished from the preceding insect.

LONGITARSUS WOLLASTONI, n. sp.

Apterous; obscure piceous below, above testaceous; antennæ longer than the body; thorax subquadrate, impunctate; elytra very convex, widened at the middle, nearly impunctate, the disc with an obscure fuscous spot.

Length $\frac{1}{9}$ line.

Head impunctate, the frontal tubercles small, but strongly raised; clypeus rather broad, impunctate; antennæ rather longer than the entire body in the male, slightly shorter in the other sex, pale flavous, the second joint nearly as long as the third, the following more elongate; thorax about one-half broader than long, the sides quite straight, converging outwards or widened towards the apex, the anterior angles oblique, forming a tooth before the middle; posterior angles likewise oblique, but to a smaller extent, the surface impunctate; scutellum broader than long; elytra narrowed at the base and at the apex, very convex, not perceptibly punctured; the middle of the disc with a darker but very obscure round patch, gradually shading into the ground-colour; below nearly black, legs pale testaceous, the first joint of the posterior tarsi as long as the following three joints together.

Hab. Madagascar, Diego-Suarez (*Ch. Alluaud*).

LONGITARSUS AFRICANUS, n. sp.

Apterous; flavous, the apex of the posterior femora black; labrum piceous; head impunctate; thorax finely punctured and minutely granulate; elytra nearly similarly sculptured.

Length 1–$1\frac{1}{4}$ line.

Head entirely impunctate, without frontal tubercles, the carina rather broad; clypeus slightly thickened, its anterior edge straight, the labrum nearly black; antennæ nearly as long as the body, flavous, the third joint one-third longer than the second and one-third shorter than the fourth joint, the fifth and the terminal joints very elongate; thorax one-half broader than long, more

transverse in the female, the sides very slightly rounded at the middle, the anterior angles oblique, forming a tooth at some distance from the middle, the surface finely granulate and closely and finely punctured; elytra widened towards the middle, each apex rounded, the surface slightly more strongly punctured than the thorax, the punctures closely arranged in irregular rows; posterior tibiæ distinctly toothed at their upper margins, their metatarsus shorter than half the length of the tibiæ, posterior portion of the hind femora black.

Hab. Mashonaland (*G. Marshall*). British Museum and my collection.

This *Longitarsus* does not differ in any striking way from many of its European congeners in general appearance and sculpture; the absence of wings, the uniformly coloured antennæ, and the partly black posterior femora will, however, help in its recognition. The posterior tibiæ have a distinct and rather robust spine.

LONGITARSUS BIANGULATUS, n. sp.

Winged, piceous below, above obscure fulvous, antennæ and legs flavous; sides of thorax biangulate, surface closely punctured; elytra closely, distinctly, and semiregularly punctured.

Length $\frac{3}{4}$–1 line.

Head obscure piceous or fulvous, impunctate, opaque, frontal tubercles absent, carina acute and sharply defined, forming a sharp ridge at the middle; antennæ two-thirds the length of the body, flavous, the first joint long and slender, the second scarcely shorter than the third joint, the following more elongate; thorax one-half broader than long, the anterior angles strongly oblique, forming a thickened angle near the middle, and followed by a semidistinct tooth below the latter, the surface finely and closely impressed with somewhat elongate punctures, the interstices minutely granulate, obscure fulvous, opaque; elytra more strongly punctured than the thorax, the punctures arranged in closely approached rather regular rows: the underside and the posterior femora more or less piceous; rest of the legs flavous, the metatarsus of the posterior legs half the length of the tibiæ.

Hab. Mashonaland (*G. Marshall*). British Museum and my collection.

A species of more dusky fulvous colour, which may be known by the acutely raised carina of the head and the obsolete second angle at the sides of the thorax, more distinct in some specimens than in others.

SERRAPHULA, n. gen.

Body ovate, apterous; antennæ filiform, frontal elevations strongly raised; thorax subquadrate, without depressions; elytra punctate-striate; legs robust, the posterior femora very strongly dilated, their tibiæ widened at the apex, the latter mucronate and furnished with a long serrate prolongation scarcely shorter than the tibia itself; tarsi inserted above the apex of the tibiæ; the

metatarsus of the posterior legs very elongate, the second joint but little shorter, third joint very small, claws appendiculate; the prosternum narrowly elongate, the anterior cavities open; the first abdominal segment very long.

The genus here proposed is one of the most remarkable amongst the whole tribe of *Halticinæ*, no similar structural peculiarity in regard to the tibiæ having ever come under my observation: this consists of an elongate appendage at the end of the tibiæ of almost the length of the tibiæ themselves, and furnished along the lower margin with a row of teeth; whether this extra joint is movable or not I am not able to say, but it evidently assists the insect, which seems possessed of great saltatorial power, to judge by the enormously developed posterior femora, in getting a firm hold on the plants which it may frequent. The general appearance of this small species is not unlike that of a *Longitarsus*; punctate-striate elytra and the tibial process will, however, at once separate the genus.

The long serrate process at the apex of the posterior tibiæ is, like the rest of the legs, of fulvous colour, and the teeth at its lower edge are strongly marked and regularly placed.

SERRAPHULA ÆNEA, n. sp. (Plate XXXIV. fig. 7.)

Below black, above dark æneous; antennæ and legs partly fulvous; thorax closely and finely punctured and minutely granulate; elytra finely punctate-striate.

Length 1 line.

Head finely granulate, with a few punctures at the vertex, the frontal elevations strongly raised, trigonate, obscure fulvous; clypeus triangularly swollen; palpi pointed; antennæ extending beyond the middle of the elytra, fulvous, the terminal three or four joints fuscous, basal joint long and slender, second and third short, equal, the following joints slightly longer and gradually thickened, apical joint more elongate; thorax subquadrate, slightly broader than long, not narrowed in front or at the base, the sides very little rounded at the middle, anterior angles obsolete, posterior ones distinct, the surface very finely, rather closely punctured and minutely granulate, greenish or brownish æneous; scutellum triangular, rather broad; elytra ovate, gradually widened towards the middle, finely punctate-striate, the interstices smooth and flat: underside black; legs robust, fulvous.

Hab. Mashonaland (*G. Marshall*). British Museum Coll. and my own.

SPHÆRODERMA FEMORATUM, n. sp.

Metallic dark blue, the head, basal joints of the antennæ, the thorax, and the anterior four legs fulvous; elytra semi-geminate, punctate-striate.

Length 1 line.

Head impunctate, fulvous, frontal tubercles small, carina distinct, rather broad; antennæ extending beyond the base of the thorax,

fulvous, the last five joints black, strongly thickened; thorax more than twice as broad as long, the sides slightly rounded, the anterior angles oblique, the posterior margin obliquely shaped at the sides, but scarcely sinuate, the surface finely and moderately closely punctured, the punctures slightly elongate in shape, especially so at the sides; scutellum small, black; elytra longer than broad, metallic blue, rather more strongly punctured than the thorax, the punctures arranged in double rows near the suture, more irregularly at the sides, the interstice impunctate: underside and the posterior femora dark blue, the other legs and the tibiæ fulvous; prosternum longer than broad.

Hab. Mozambique, Rikatia (*Junod*).

Of this small species, principally distinguished by the system of coloration, a single specimen is contained in my collection.

SPHÆRODERMA HOVÆ, n. sp.

Black, the antennæ and the legs fulvous; thorax very finely punctured; elytra more strongly, but not closely punctate-striate, the striæ here and there in pairs; posterior femora black.

Length 1¼ line.

Head impunctate, the frontal tubercles very narrow and oblique; carina very short; the clypeus, labrum, and palpi fulvous; antennæ nearly extending to the middle of the elytra, fulvous, the second joint scarcely shorter than the third, the fourth and following joints gradually but rather strongly widened; thorax twice as broad as long, the sides nearly straight, obliquely narrowed towards the apex, the basal margin sinuate at the sides, broadly produced at the middle, the surface rather closely and very finely, but not evenly, punctured; scutellum smooth; elytra with rows of stronger punctures not very regularly placed, the rows themselves rather widely separated, those at the sides arranged partly in pairs, the extreme apex of each elytron obliquely shaped, their epipleuræ deeply concave, impunctate; legs fulvous, the posterior femora black; prosternum subquadrate, narrowed at the middle, with a few punctures; metasternum deeply punctured; abdomen sparingly pubescent, distinctly punctured, the last segment of the male with a longitudinal central groove.

Hab. Madagascar, Diego-Suarez (*Ch. Alluaud*).

Differing from most of its allies in the black colour and the fulvous antennæ and legs.

EUGONOTES, n. gen.

Narrowly parallel, pubescent; head rather deeply inserted, eyes comparatively large, frontal tubercles absent; clypeus broad, not separated from the face; palpi but little thickened; antennæ closely approached, slender, longer than the body in the male, the second and third joints nearly equal, the others very elongate; thorax subquadrate, without depressions; elytra punctate-striate and pubescent; posterior femora strongly incrassate, their tibiæ widened at the apex, not sulcate, with

distinct spine; metatarsus of the posterior legs much longer than the following three joints together; claws appendiculate; prosternum subquadrate; mesosternum broader; the anterior coxal cavities closed.

I suggest this genus for a small species of a Halticide, having the appearance and general characters of most of the smaller species belonging to the group *Monoplatinæ*, or bladder-clawed Halticidæ, but differing in the simple not inflated claw-joint. The insect seems nearly allied to my genus *Allomorpha*, but may be at once known by the punctate-striate elytra. The genus would perhaps best be placed near *Febra*, Clark.

Eugonotes longicornis, n. sp. (Plate XXXIV. fig. 8.)

Black, antennæ and legs flavous; head and thorax pale fulvous, extremely finely punctured; elytra black, finely pubescent, closely and strongly punctate-striate, the interstices slightly convex; posterior femora black.

Length 1 line.

Head impunctate, pale fulvous; eyes very large, frontal tubercles absent; clypeus broad, raised into a short ridge between the antennæ, impunctate; antennæ extending to the apex of the elytra, flavous, the first joint long and slender, the second thickened, a little shorter than the third joint, the fourth one-half longer than the third joint, the others very elongate; thorax about one-half broader than long, the sides nearly straight, the anterior angles oblique, forming another angle before the middle, the surface rather convex, extremely finely punctured and granulate; scutellum transverse, black; elytra opaque, black, clothed with short whitish pubescence, regularly and strongly punctate-striate, the subsutural row abbreviated before the middle, the punctures very closely placed, the interstices longitudinally costate: underside and posterior femora black, the other legs flavous; posterior tibiæ not sulcate, with a distinct spine, their metatarsus as long as half their length; prosternum nearly subquadrate; the anterior coxal cavities closed.

Hab. Madagascar, Diego-Suarez (*Ch. Alluaud*).

Dibolosoma, n. gen.

Body ovate; eyes large, rather closely approached, the intermediate space with deep oblique grooves; frontal tubercles absent; clypeus broad; antennæ rather short, the apical joints distinctly thickened; thorax transverse, without any grooves or sulci; elytral punctuation semi-regular, punctate-striate at the sides; anterior tibiæ unarmed; posterior femora strongly incrassate, their tibiæ widened at the apex, the latter sulcate to a short extent, with a distinct spine, the metatarsus as long as the following three joints together; claws appendiculate; prosternum distinct; the anterior coxal cavities closed.

In shape the insect for which this genus is proposed resembles

a species of *Dibolia*. Amongst the genera with closed coxal cavities, *Dibolosoma* may be known by the short and robust antennæ, the want of frontal tubercles, the supra-orbital grooves, punctate-striate elytra, and other particulars.

Platycepha, Baly, from Australia, seems closely allied, but has all the tibiæ mucronate, still shorter antennæ, and a tooth at the posterior tibiæ.

DIBOLOSOMA QUADRIPUSTULATUM, n. sp.

Piceous; antennæ flavous, the eighth and ninth joints black; thorax finely and closely punctured, opaque; elytra as closely punctured, the sides with deep rows of punctures, the disc with two fulvous spots, one before, the other below the middle; legs fulvous.

Length 1 line.

Head finely granulate, greenish piceous, with lateral deep oblique grooves, separating the clypeus; the latter broad, with a few fine punctures; palpi slender, flavous; antennæ extending nearly to the middle of the elytra, flavous, the eighth and ninth joints black, the first and second joints thickened, the third and fourth equal, the following joints gradually but rather strongly thickened; thorax twice as broad as long, the sides rounded and rather strongly narrowed towards the apex; posterior margin sinuate at the sides, rounded and slightly produced at the middle, the sides with a narrow reflexed margin; the surface everywhere finely and closely punctured, the punctures at the sides slightly larger, the interstices very finely granulate; elytra very nearly similarly sculptured, opaque, the punctures slightly arranged in rows, those at the sides forming three or four regular rows of deeper punctures; a rather broad space in front of the lateral margin impunctate; a round large spot before the middle and a similar one near the apex, fulvous.

Hab. Madagascar, Diego-Suarez (*Ch. Alluaud*).

CHÆTOCNEMA GAHANI, n. sp.

Elongate, dark æneous; antennæ as long as the body, fulvous, stained with fuscous; thorax finely and closely punctured and granulate; elytra moderately strongly punctate-striate, the interstices flat, finely granulate; tibiæ and tarsi fulvous.

Length 1½ line.

Head finely and remotely punctured, minutely granulate, without frontal elevations or carina, the sides with a distinct oblique groove, the space in front of the eyes distinctly punctured; antennæ extending to the apex of the elytra, fulvous, the upper joints stained with fuscous at the apex, basal joint thickened, second joint shorter than the third, this shorter than the fourth joint, the other joints slender and elongate; thorax more than twice as broad as long, the sides nearly straight, scarcely narrowed anteriorly, the angles acute, the surface finely and closely punctured and minutely granulate; the extreme basal margin with

a narrow impressed line but without punctures; scutellum twice as broad as long; elytra as broad as the thorax at the base, elongate and pointed posteriorly, regularly impressed with round but not deep punctures, the interstices finely granulate and flat; posterior femora extremely strongly incrassate, æneous; tibiæ and tarsi dark fulvous, the four posterior tibiæ with a strong tooth.

Hab. Mashonaland (*G. Marshall*). A single specimen in the Museum collection.

This is another species of elongate posteriorly-pointed shape, distinguished by the long antennæ and their colour, and by the finely granulate and punctured thorax and similarly sculptured elytra. *C. longicornis*, Jac., from Natal has the antennæ still much longer and of different colour and the elytral interstices costate at the sides.

CHÆTOCNEMA ANTENNATA, n. sp.

Oblong, dark æneous, lower joints of the antennæ fulvous; thorax finely punctured, not granulate; elytra closely punctate-striate, the interstices longitudinally convex; tibiæ and tarsi obscure dark fulvous.

Length $\frac{3}{4}$ line.

Head broad, extremely finely but evenly and remotely punctured, with a fine oblique groove at each side, frontal elevations absent; antennæ not extending to the middle of the elytra, black, the lower four joints fulvous, the basal joint black above, the second also stained with black, scarcely shorter than the third and fourth joints, terminal joints slightly thickened, the last one more elongate; thorax more than twice as broad as long, the sides nearly straight, not narrowed towards the apex, the surface closely and finely punctured, the punctures of equal size, the interstices shining, the basal margin accompanied by a row of slightly larger punctures but without impressed line; scutellum broader than long; elytra with regular rows of deep and closely-placed punctures, those near the suture more confused; the interstices smooth and impunctate, longitudinally costate at the side: underside and the femora obscure æneous; breast and abdomen finely punctured; prosternum longitudinally sulcate.

Hab. Mashonaland (*G. Marshall*). British Museum collection and my own.

A small species with comparatively short antennæ and non-granulate upper surface. The antennæ in some specimens are nearly entirely black, but generally the third and following two joints are fulvous.

CHÆTOCNEMA SUBQUADRATA, n. sp.

Ovately subquadrate, black; head impunctate; thorax extremely finely and obsoletely punctured; elytra strongly punctate-striate, with smooth and shining interstices; legs nearly black.

Length $\frac{1}{2}$ line.

Head entirely impunctate, with a small depression above each

eye, followed by the usual oblique groove, the latter rather deep; clypeus impunctate, deflexed; antennæ extending to about the middle of the elytra, black, the lower four joints fulvous below, terminal joints not thickened, rather elongate; thorax transverse, rather convex, the sides slightly rounded, the surface very obsoletely and finely punctured, the punctures of somewhat elongate shape but irregularly distributed, of a somewhat wrinkled appearance (in some specimens almost obsolete), the base with a row of more distinct punctures at the sides; elytra of subquadrate shape, black, shining like the rest of the upper parts, the punctures round and regular, the interstices impunctate, slightly costate at the sides; underside and legs nearly black; the metasternum smooth; the abdomen distinctly punctured; the extreme base of the tibiæ and the tarsi more or less fulvous.

Hab. Mashonaland (*G. Marshall*). Collection British Museum and my own.

Of still smaller size than *C. gahani* and of subquadrate shape and nearly entirely black colour; the punctuation of the thorax is very variable, assuming in some specimens, probably of female sex, a longitudinally strigose appearance, while in others there are but few punctures visible. The species will, however, not be difficult to distinguish on account of its colour and that of the antennæ and legs.

CHÆTOCNEMA SEMIREGULATA, n. sp.

Oblong, dark greenish æneous, the lower joints of the antennæ (the basal joint excepted) and the tarsi flavous; head and thorax very closely and rather finely punctured; elytra more strongly punctate-striate, the subsutural rows irregularly so.

Length 1 line.

Head very broad, without frontal elevations, the upper portion very finely and closely punctured and extremely minutely granulate, the lateral grooves very obsolete, the clypeus separated from the face by a transverse groove, more remotely and strongly punctured, the space in front of the eyes also rather strongly and very closely punctate; antennæ comparatively short, black, the second and the following two joints flavous, the terminal five joints thickened, slightly longer than broad; thorax strongly transverse, of equal width, the sides rather rounded, the surface rather convex, very closely and finely punctured, especially so at the sides, the interstices extremely finely granulate when seen under a strong lens, the basal margin not accompanied by an impressed line but by a row of stronger punctures; a narrow nearly smooth space is visible in front of the scutellum, the latter very small, transverse; elytra subcylindrical, pointed posteriorly, with rows of rather strong punctures, not always regularly placed, those near the suture forming two very closely approached irregular rows, the interstices impunctate and shining, slightly costate at the sides and apex; femora and tibiæ more or less dark æneous, the latter more or less obscure fulvous; tarsi robust, flavous.

Hab. Mashonaland (*G. Marshall*). British Museum and my collection.

Of more subcylindrical and pointed shape than *C. antennata*, the antennæ and legs of different colour, the terminal joints of the former more strongly thickened, the head and thorax still more closely punctured, and the elytral punctuation less regular.

CHÆTOCNEMA MASHONANA, n. sp.

Dark æneous, the basal four joints of the antennæ and the tibiæ and tarsi fulvous; head sparingly punctured; thorax finely and closely punctate; elytra strongly punctate-striate, the interstices longitudinally convex, minutely granulate.

Length 1–1¼ line.

Head broad, with a few distinct punctures near the eyes at the vertex, the sides with a deep oblique groove; frontal elevations absent; clypeus ending in a broad point between the antennæ, with a few coarse punctures at each side, the sides below the eyes also strongly punctured and pubescent; antennæ extending beyond the middle of the elytra, shorter in the female, slender, the lower four joints fulvous, the rest dark, the base of each joint pale, basal joint long and slender, second also proportionately long, slightly shorter than the third joint, the following joints nearly equal; thorax rather more than twice as broad as long, the sides straight and slightly narrowed in front, the anterior angles thickened, the basal margin accompanied by an impressed line and with a very obsolete, little, oblique groove at each side, often scarcely visible, the surface minutely granulate, finely and closely punctured, with a row of stronger punctures accompanying the basal margin; scutellum broader than long; elytra rather elongate, pointed posteriorly, strongly and regularly punctate-striate, the subsutural row likewise regular, the interstices convex throughout and minutely granulate: underside piceous or nearly black; posterior femora very strongly incrassate, æneous; tibiæ robust, fulvous, the posterior four with a distinct tooth.

Hab. Mashonaland (*G. Marshall*). Collection British Museum and my own.

Much smaller than *C. natalensis*, Baly, and without frontal tubercles or carina; the clypeus also smooth except at the sides, the thorax with finely granulate interstices, not smooth and shining as in that species, and the elytra with convex interspaces. *C. wollastoni*, Baly, has a strongly-punctured head and rounded sides of the thorax, besides differing in other details.

NEODERA FULVA, n. sp.

Fulvous, the apical four joints of the antennæ black; thorax impunctate, with deep basal sulcus; elytra with the basal portion raised, entirely impunctate.

Length 2–2½ lines.

Of elongate parallel shape, the head impunctate, frontal tubercles and carina small and thick; antennæ extending nearly

to the middle of the elytra, fulvous, the terminal four joints black, the basal joint short and thick, the third and fourth equal, the fifth longer, the terminal joints slightly thickened, pubescent; thorax scarcely one-half broader than long in the male, more transverse in the female, the sides rounded at the middle, obliquely narrowed towards the apex, the anterior angles slightly thickened, the disc entirely impunctate, the basal sulcus deep, slightly sinuate, and limited at the sides by a perpendicular groove, another more obsolete transverse depression is seen in certain lights anteriorly; elytra with the basal portion slightly raised, entirely impunctate like the thorax: underside sometimes of a more flavous colour; the apex of the tibiæ and the tarsi more or less black; posterior femora moderately thickened; anterior coxal cavities closed.

Hab. Madagascar, Diego-Suarez (*Ch. Alluaud*).

Neodera was founded by Duvivier on some nearly similarly coloured species of Halticidæ, agreeing in the main points with *Pseudodera* and *Crepidodera*, but differing in the total absence of any punctuation, the shape of the thorax and its sulcus, which resembles somewhat that of *Phygasia*. I am unable to discover any spines on the anterior tibiæ, and those at the posterior ones are very small; the tibiæ are not channelled. The present insect differs from its allies and those described by v. Harold as *Crepidodera* (*picticornis*, *varicornis*, and *madagassa*) by the colour of the antennæ, which is the same in three specimens before me.

NEODERA TRANSVERSICOLLIS, n. sp. (Plate XXXIV. fig. 6.)

Fulvous, the last seven joints of the antennæ black; thorax transverse, impunctate; elytra with some punctures near the suture only.

Length 3 lines.

It will only be necessary to point out the differences between this species and the preceding, which it otherwise resembles. It is a much larger insect; the antennæ have only the four lower joints fulvous, the others are black and rather short; the thorax is nearly twice as broad as long, the anterior angles are produced obliquely outwards, and the basal sulcus is very deep and broad; the elytra show a row of punctures close to the suture as far as the middle; the tarsi are obscure piceous.

Hab. Madagascar. A single female specimen (*coll. Jacoby*).

GALERUCINÆ.

LUPERUS GIGANTEUS, n. sp.

Metallic blue; thorax transverse, nearly impunctate; elytra very finely and closely punctured.

Length $3\frac{1}{2}$–4 lines.

Head with a few extremely fine punctures near the eyes, the latter very large, frontal elevations transverse; clypeus distinctly swollen; labrum black, its anterior edge flavous; antennæ extending beyond the middle of the elytra, black, the lower three

joints metallic blue, the rest pubescent, the third joint one-half longer than the second, half the length of the fourth joint; thorax strongly transverse, much widened at the middle, the sides slightly rounded as well as the anterior angles, the latter thickened, with the setiferous pore placed below the angle, posterior margin rounded and produced at the middle, the surface with some extremely minute punctures, only visible under a strong lens; scutellum broad, impunctate; elytra very elongate, parallel, finely but distinctly and very closely punctured: underside less metallic, clothed with greyish pubescence; legs slender; all the tibiæ mucronate; the first joint of the posterior tarsi much longer than the following joints together; claws appendiculate; anterior coxal cavities open.

Hab. Cameroons.

I have received two specimens of this large-sized species from Dr. Kraatz of Berlin.

LUPERUS WEISEI, n. sp.

Piceous, above testaceous; thorax subquadrate, scarcely perceptibly punctured; elytra extremely closely and finely punctate.

Length 1½ line.

Elongate and parallel; the head impunctate, fulvous or testaceous, frontal elevations transverse, rather broad; clypeus strongly raised, triangular, its apex between the antennæ rather broad; antennæ extending to about the middle of the elytra, black, the lower three joints and the base of the fourth flavous, basal joint curved at the base, second scarcely shorter than the third joint, the others more elongate, pubescent; thorax scarcely one-half broader than long, the sides rounded before the middle, narrowed at the base, the posterior margin obliquely rounded at the angles, the surface extremely minutely and closely punctured; scutellum triangular; elytra wider at the base than the thorax, subcylindrical, very closely and scarcely more strongly punctured than the thorax: underside piceous: legs fulvous, rather robust; the tibiæ mucronate; the first joint of the posterior tarsi as long as the following three joints together; claws appendiculate, the anterior coxal cavities open.

Hab. Mashonaland (*G. Marshall*).

LUPERUS INCONSPICUUS, n. sp.

Head, antennæ, the underside, and legs black; thorax subquadrate, impunctate, obscure testaceous, spotted with fuscous; elytra very finely and closely punctured, obscure testaceous or fuscous.

Length 2 lines.

Elongate and parallel; the head broad, entirely impunctate and very finely granulate, black; the frontal tubercles transverse, strongly developed, bounded behind by a deep groove; the clypeus raised, impunctate, black, edged with testaceous; labrum pale; the antennæ extending to the middle of the elytra, black, slender, the

second joint small, the third but slightly longer, the other joints elongate and equal; thorax one-half broader than long, the sides slightly rounded before the middle, all the angles slightly produced outwards, with the setiferous pore at their apex, the surface entirely impunctate, extremely finely granulate, obscure testaceous, with some irregular sometimes very obscure fuscous spots; scutellum transverse; elytra slightly wider at the base than the thorax, of the same colour, very finely and closely punctured, the apex of each elytron rounded: underside and legs piceous or black, finely pubescent, the coxæ often testaceous; all the tibiæ with a small spine; the first joint of the posterior tarsi as long as the following joints together; anterior coxal cavities open.

Hab. Mashonaland (*G. Marshall*). Collection British Museum and my own.

In some specimens the upper surface is nearly black, probably on account of discoloration.

LUPERUS VERTICALIS, n. sp.

Fulvous, the upper portion of the head, the antennæ, and the underside black; thorax obsoletely foveolate, impunctate; elytra very finely punctured.

Var. The head entirely fulvous.

Length 2 lines.

Head impunctate, the entire upper half black, the lower portion fulvous, frontal tubercles strongly transverse and raised; clypeus narrowly triangular; antennæ extending to about half the length of the elytra, black, the base and underside of the lower four joints generally flavous, basal joint rather curved, second one very short, third more than twice as long, the others nearly equal; thorax twice as broad as long, the sides nearly straight, the angles not prominent, the surface impunctate, with a more or less distinct fovea at each side, fulvous; elytra narrowly parallel, wider at the base than the thorax and of the same colour, very finely but not very closely punctured, the sides from the shoulder strongly deflexed, their epipleuræ broad; breast and abdomen black; legs fulvous, the first joint of the posterior tarsi as long as the following three joints together.

Hab. Mashonaland (*G. Marshall*). Collection British Museum and my own.

This species may be known by the black upper portion of the head in connection with the foveolate thorax. The variety differs in no way whatever from the type except in the colour of the head.

LUPERUS MADAGASCARIENSIS, n. sp.

Testaceous, antennæ piceous, the eighth joint flavous; thorax finely punctured, the sides with a longitudinal dark band; elytra closely and strongly punctured, the suture and the sides with a greenish narrow stripe; tibiæ and tarsi fuscous.

Length 2 lines.

Head finely granulate, the frontal elevations narrowly transverse; clypeus with a central ridge; labrum piceous, as well as the apex of the mandibles; antennæ extending to the middle of the elytra, blackish, the eighth joint flavous, basal joint elongate, thickened at the apex, second short, third twice as long as the second, fourth joint longer than the preceding two joints together; thorax twice as broad as long, the sides slightly constricted at the base, rounded before the middle, anterior angles furnished with a small tubercle bearing a single seta, the surface minutely granulate and finely punctured, testaceous, the sides with a narrow dark band not extending to the margins; scutellum large and broad: elytra strongly and closely punctured, the sides with a strongly raised longitudinal costa, extending from below the shoulder to the apex, preceded by a deep longitudinal depression, a narrow sutural and another sublateral band, connected at the apex, metallic greenish: underside and legs testaceous; the femora above and the tibiæ and tarsi fuscous; tibiæ with a small spine; the first joint of the posterior tarsi as long as the following joints together.

Hab. Madagascar.

This species is evidently allied to *L. quaternus*, Fairm., likewise from Madagascar, but is much larger, and differs in the colour of the antennæ and that of the thorax, as well as in the green bands of the elytra and their strong punctuation, and in the pale underside. I received a specimen from Herr Brancsik of Hungary, another is in that gentleman's collection.

LUPERUS NIGROSUTURALIS, n. sp. (Plate XXXIV. fig. 11.)

Black, the basal joints of the antennæ, the head, thorax, and legs fulvous; elytra testaceous, finely punctured, the suture more broadly, the margins narrowly black.

Length 1¾ line.

Head impunctate, fulvous, the frontal tubercles only indicated; the clypeus with a short central ridge; antennæ extending rather beyond the middle of the elytra, black, the lower three joints fulvous, the third joint slightly longer than the second, the following joints elongate; thorax twice as broad as long, the sides rather rounded, the anterior angles somewhat oblique and thickened, the surface with a few very minute punctures, only visible under a strong lens, fulvous; scutellum black; elytra elongate and parallel, pale testaceous or flavous, finely and very closely punctured, the margins narrowly black, the suture more broadly so in some specimens: underside black, clothed with greyish pubescence; legs fulvous, the first joint of the posterior tarsi longer than the following joints together, last joint and the claws infuscate.

Hab. Mashonaland (*G. Marshall*). Coll. Brit. Mus. and my own.

Somewhat allied in coloration to the European *L. nigrofasciatus*, Goeze, but with entirely fulvous thorax and legs, and narrower elytral black margins.

LUPERUS BREVICORNIS, n. sp.

Black, finely pubescent; joints of the antennæ short; thorax and elytra finely coriaceous, opaque.

Length 1½ line.

Narrowly elongate and parallel, the head finely rugose and pubescent, with the frontal tubercles small and obsolete; clypeus with a central ridge; antennæ not extending to the middle of the elytra, black, the second joint small, the following triangularly dilated, but distinctly longer than broad, clothed with stiff pubescence; thorax one-half broader than long, the sides straight, the anterior angles thickened, the posterior margin slightly rounded, the surface very finely wrinkled, opaque, clothed with whitish pubescence, the middle with an obscure central ridge; scutellum pubescent, triangular; elytra convex, but depressed along the suture, finely but more distinctly wrinkled than the thorax, and similarly clothed with whitish hairs: underside more shining, sparingly pubescent; the femora rather robust; all the tibiæ mucronate; the first joint of the posterior tarsi longer than the following joints together; the anterior coxal cavities open.

Hab. Mashonaland (*G. Marshall*). Coll. Brit. Mus. and my own.

A well distinguished species on account of the structure of the antennæ and the pubescence, but otherwise a typical *Luperus*.

LUPERUS MASHONANUS, n. sp.

Bluish black, above metallic green or blue, the antennæ and legs black; thorax minutely punctured; elytra very closely and finely punctate.

Length 3 lines.

Elongate and parallel; the head minutely granulate, impunctate, the frontal tubercles broad and flat; the clypeus triangular, also impunctate, its anterior edge testaceous; labrum and palpi black; antennæ filiform, black, the second joint one-half smaller than the third, the others elongate and pubescent, extending to about the middle of the elytra; thorax twice as broad as long, subquadrate, the sides straight, narrowly margined, the anterior angles slightly thickened and somewhat rounded, the posterior ones acute, the surface minutely granulate and extremely closely and finely punctured, metallic green or blue, sometimes with an obsolete fovea at each side; scutellum black, impunctate; elytra as closely but more strongly punctured than the thorax, the interstices finely transversely wrinkled: underside and legs black with a metallic blue tint; legs slender; the tibiæ with a short spine; the metatarsus of the posterior legs longer than the following joints together; anterior coxal cavities open.

Hab. Mashonaland (*G. Marshall*). Coll. Brit. Mus. and my own.

LUPERUS SCUTELLATUS, n. sp.

Flavous, the scutellum and the breast black; head finely

punctured; thorax nearly impunctate; elytra testaceous, closely and finely punctured.

Length 1½ line.

Head fulvous, finely punctured at the vertex, transversely grooved between the eyes, the frontal tubercles narrowly transverse; clypeus broad, distinctly raised between the antennæ, the latter extending nearly to the end of the elytra, fuscous, the lower three joints flavous, the third joint scarcely longer than the second, fourth and following joints elongate, slender; thorax twice as broad as long, the sides distinctly narrowed at the base, rounded before the middle, anterior angles thickened, posterior ones rather oblique, surface extremely finely punctured, testaceous or flavous; scutellum black; elytra very finely and closely punctured, flavous; legs darker; tibiæ mucronate, the first joint of the posterior tarsi longer than the following joints together; breast and abdomen black, the last segment of the latter more or less flavous.

At once distinguished by the black scutellum and underside.

MALACOSOMA DONKIERI, n. sp.

Below black, above obscure testaceous, as well as the antennæ and the legs; head impunctate; thorax and elytra closely and strongly punctured.

Length 1¼ line.

Head impunctate at the vertex, the latter with a slight æneous gloss, frontal tubercles strongly transverse, lower portion of face testaceous; clypeus in shape of a triangular strongly raised ridge; antennæ extending to the middle of the elytra, pale fulvous, the basal joint elongate, the second scarcely shorter than the third joint, the following joints about as long as the third, each widened towards the apex; thorax about one-half broader than long, the sides rounded at the middle, the angles not prominent, the surface rather depressed at the sides, strongly and closely punctured throughout, obscure testaceous, stained with some piceous markings; elytra of the same colour, the suture rather darker, the surface punctured like the thorax: underside nearly black; legs testaceous, the tibiæ with a very small spine; prosternum narrowly convex; the anterior coxal cavities open.

This small species might be compared to *M. basimarginata*, Jac., from Zanzibar, which it resembles somewhat in colour, but differs entirely from that species and most of its allies by the strong punctuation of the thorax and the elytra.

MALACOSOMA CAPITATUM, n. sp.

Head and the underside piceous; antennæ black, the basal joints flavous; thorax subquadrate, testaceous, impunctate; elytra extremely finely and rather closely punctured, testaceous, shining.

Length 2 lines.

Head impunctate, piceous, the frontal elevations transverse, rather strongly raised; the clypeus very broad at its upper portion, its anterior margin straight; labrum pale; the antennæ rather

widely separated, extending to about the middle of the elytra, shorter in the female, black, the lower four joints testaceous, the second and third joint short, equal, fourth and following joints longer, equal; thorax scarcely one-half broader than long, the sides rounded before the middle, very little constricted at the base, the basal margin obliquely rounded at the angles, the surface rather convex, not perceptibly punctured, testaceous, very shining; elytra wider at the base than the thorax, of the same colour, very minutely and rather closely punctured: underside pale piceous; legs rather robust, testaceous, the tibiæ mucronate, the first joint of the posterior tarsi as long as the following two joints together; claws appendiculate; the anterior coxal cavities open; prosternum very narrow, convex between the coxæ.

Hab. Mashonaland (*G. Marshall*). Coll. Brit. Mus. and my own.

One of the smaller species, which may be known by the piceous head and underside and the impunctate thorax.

MALACOSOMA PALLIDUM, n. sp.

Pale testaceous, shining; thorax subquadrate, impunctate; elytra microscopically punctured.

Length 2½ lines.

Much larger than the preceding species and of very pale testaceous colour; the head broad, impunctate, the frontal tubercles broadly transverse, the apex of the clypeus very broad, apex of the mandibles black; the antennæ rather widely separated at the base, testaceous, the second and third joints short, nearly equal, all the following joints elongate; thorax one-half broader than long, subquadrate, the sides very slightly rounded in front of the middle, anterior angles oblique, indistinct, posterior margin somewhat sinuate, the surface entirely impunctate; scutellum triangular; elytra scarcely wider at the base than the thorax, subcylindrical, extremely minutely punctured, only visible under a strong lens: underside and legs coloured like the upper surface; all the tibiæ mucronate, the metatarsus of the posterior legs as long as the following two joints together; the prosternum in shape of a very narrow ridge, convex; the anterior coxal cavities open.

Hab. Mashonaland (*G. Marshall*). A single specimen in the British Museum.

This *Malacosoma* may be known by its uniform very pale colour and the impunctate thorax and extremely finely punctured elytra. The following species is closely allied.

MALACOSOMA DALMANI, n. sp.

Pale testaceous; antennæ long and slender; thorax transverse with rounded sides, nearly impunctate; elytra very finely and closely punctured.

Length 2½–3 lines.

Head rather long, impunctate, the frontal elevations transverse, bounded behind by a deep groove; carina acute, linear; eyes large;

antennæ extending beyond the middle of the elytra, flavous, the basal joint long and slender, thickened at the apex, the second short, the following joints very elongate, the third shorter than the fourth joint; thorax more than twice as broad as long, the sides rather strongly rounded, anterior angles slightly oblique, posterior ones acute, the disc rather convex, extremely finely and closely punctured; elytra wider than the thorax, but similarly punctured: underside and legs coloured like the upper surface; prosternum narrow but distinct, very convex, the last abdominal segment of the male trilobate, the median lobe elongate, deeply longitudinally sulcate.

Hab. Sierra Leone. My collection.

Of this species I possess three specimens; they are rather larger than the preceding species, and of the same coloration, but the head is longer and the structure of the frontal elevations and carina totally different; the thorax is also much more transverse and has the sides strongly rounded; the legs are less robust and more slender.

MALAXIA MARSHALLI, n. sp.

Black, the head and thorax fulvous, pubescent, the former with one, the latter with three fuscous spots; elytra bright green, finely rugose and pubescent; legs pale fulvous.

Length 3 lines.

Elongate and parallel; the head rugosely punctured, pale fulvous, the middle of the vertex occupied by a broad fuscous band; clypeus strongly raised in shape of a transverse ridge, flavous; antennæ extending beyond the middle of the elytra, black, the lower three joints and the base of the three or four following joints pale fulvous, third joint much shorter than the fourth, double as long as the second; thorax twice as broad as long, the sides strongly rounded at the middle, narrowed at the base, the anterior angles in shape of a small tubercle, posterior angles placed in front of the basal margin, the latter straight, the anterior margin concave, the surface transversely sulcate, finely rugose and pubescent, pale fulvous, the middle with a smaller, the sides with a larger fuscous spot, somewhat the shape of a band and narrowed posteriorly; scutellum black, strongly pubescent; elytra finely rugose and wrinkled, bright metallic green, clothed with greyish pubescence: underside piceous or black, the last abdominal segment obscure fulvous; legs entirely of that colour, the last joint of the tarsi fuscous.

Hab. Mashonaland (*G. Marshall*). Coll. British Museum and my own.

Closely allied to *M. alluaudi*, Alld., but in that species, of which I possess a typical specimen, the entire upper portion of the head is fuscous, and the thorax is not transversely sulcate, but has some depressions anteriorly and at the middle, and in the specimen before me, named by Allard, there are also two lateral spots at the sides of the thorax instead of one.

AULAMORPHUS, n. gen.

Body ovately subquadrate; antennæ subfiliform, the terminal joints thickened, the second and third joints short; thorax transverse, with the anterior angles oblique, the disc with two transverse sulci; elytra irregularly punctured, their epipleuræ broad and continued below the middle; legs robust, the tibiæ unarmed, the first joint of the posterior tarsi as long as the following three joints together; claws appendiculate; prosternum very narrow and rather convex; the anterior coxal cavities closed.

The species for which this genus is proposed has entirely the appearance of those belonging to the genera *Galerucida* and *Sphenoraia*, inhabiting China and India, and can only be separated by the unarmed tibiæ, no spines being visible, even under the microscope. The place of the genus will be near *Galeruca*, from which it differs in the transverse sulci of the thorax and in the unarmed tibiæ. Two specimens were obtained by Mr. C. Hollis in Uzumbara, German East Africa, and kindly given to me by that gentleman.

AULAMORPHUS HOLLISI, n. sp. (Plate XXXIV. fig. 12.)

Testaceous, the antennæ (the basal joints excepted) and the legs black; head with one, thorax with three black spots, strongly punctured; elytra closely and strongly punctured, a narrow longitudinal stripe at the disc and two spots before and below the middle at the sides, together with the apical margins, black.

Length $2\frac{3}{4}$ lines.

Head with a few fine punctures and a short central groove, testaceous, the vertex with a black spot, frontal tubercles transverse, broad; clypeus with a central groove, black; palpi moderately thickened; antennæ extending to about the middle of the elytra, black, the lower three joints testaceous below, the second joint short, the third slightly longer, fourth joint the longest, the following rather thickened and shorter; thorax nearly three times broader than long, the sides straight, the anterior angles oblique, the posterior margin strongly obliquely shaped at the sides, the disc with an obsolete transverse depression before the middle, and a deeper sulcus at each side, not extending to the middle or the lateral margin, the surface deeply and irregularly punctured, testaceous, with a larger central and a smaller spot at each side; scutellum broad, black; elytra wider at the base than the thorax, slightly depressed below the former, very strongly and closely punctured, testaceous, the suture posteriorly and the apical margins narrowly black, a narrow similarly coloured stripe extends from the middle of the base to below the middle of each elytron, to this is joined a rounded spot below the shoulder and another at the apex of the stripe at the sides: underside testaceous; legs black; the abdominal segments also marked with a piceous spot at the sides.

Hab. Uzambara, East Africa (*C. Hollis*).

CANDEZEA NIGRITARSIS, n. sp.

Fulvous, the antennæ (the basal joints excepted) and the tarsi black; thorax sparingly, elytra very closely and finely punctured.

Length 1¾ line.

Head impunctate, fulvous, frontal tubercles transverse, eyes very large; antennæ robust and long, extending nearly to the end of the elytra, black, the lower three joints fulvous, second and third joints small, the latter slightly longer and trigonate in shape, the other joints elongate and pubescent; thorax at least twice as broad as long, the sides slightly rounded, the anterior angles oblique, the disc very finely and rather sparingly punctured, fulvous, shining; elytra of the same colour, very closely and finely punctured, their epipleuræ continued below the middle: the underside and the legs fulvous; tarsi black, the metatarsus of the posterior legs very long, all the tibiæ mucronate; the anterior cavities closed.

Hab. Mashonaland (*G. Marshall*). British Museum and my own collection.

From *C. varipennis* and some nearly similarly coloured species the present one may be at once distinguished by the black antennæ and tarsi in connection with the fulvous underside and legs.

CANDEZEA NIGROCÆRULEA, n. sp.

Black, the head, the basal joints of the antennæ, the thorax and legs fulvous; elytra dark metallic blue, finely and closely punctured.

Length 1½ line.

Head with a few extremely minute punctures, fulvous, the frontal tubercles and the carina obsolete, labrum testaceous; antennæ extending to half the length of the elytra, black, the lower four joints fulvous, basal joint long and slender, second and third joints short, nearly equal, the following more elongate; thorax more than twice as broad as long, the sides straight and obliquely narrowed towards the front, the posterior margin rounded, the disc impunctate, fulvous; scutellum black; elytra strongly convex and subcylindrical, the apex of each rounded, the surface closely and finely punctured, dark metallic blue, below black; legs fulvous, all the tibiæ mucronate, the first joint of the posterior tarsi very long.

Hab. Mashonaland (*G. Marshall*). Collections British Museum and my own.

CANDEZEA DUVIVIERI, n. sp.

Pale fulvous, the breast piceous; thorax and elytra minutely punctured, the latter with ten or twelve large black spots, placed obliquely at the lower portion.

Length 2½ lines.

Head very finely and closely punctured, the frontal tubercles

trigonate, labrum black; antennæ extending below the middle of the elytra, fulvous, the second joint rather short, the third one-half longer; thorax more than twice as broad as long, the sides rounded, the anterior angles oblique, the disc extremely finely and closely punctured; elytra nearly similarly sculptured, pale fulvous, with a sutural fovea below the base, each elytron with ten or twelve larger and smaller round black spots, which extend from before the middle obliquely towards the suture, forming two more or less regular rows, the outer one placed near the lateral margin, but varying in position and number of spots on each elytron, their epipleuræ broad and extending below the middle; the breast piceous, rest of the underside and the legs fulvous.

Hab. Africa, Niger-Benué Expedit. (*Staudinger*). My collection.

Closely allied to *C. irregularis*, Rits. (*inconstans*, Duviv.), but of only half the size, the antennæ entirely fulvous, most of the elytral spots larger, the elytra with a sutural fovea, and the metatarsus of the hind legs longer than the following joints together.

CANDEZEA VARIOPENNIS, n. sp. (Plate XXXIV. figs. 9, 10.)

Black, the basal joints of the antennæ and the anterior legs fulvous; sides of the thorax nearly straight, the disc closely punctured, fulvous or black; elytra fulvous, spotted or striped with black, or entirely black with the apex fulvous.

Var. *a*. Elytra with two black narrow stripes, abbreviated behind.

Var. *b*. The elytral stripes more or less connected and extending to the suture and the margins.

Var. *c*. Elytra fulvous, with two black stripes connected below the middle.

Var. *d*. Elytra entirely black, the apex fulvous.

Var. *e*. Head and thorax fulvous; elytra black, the apex fulvous.

Length 2 lines.

This is one of the most variable species in regard to coloration that has come under my observation; but as I am quite unable to find any structural differences I have no doubt about the identity of all the forms before me.

The head is minutely granulate, either black or fulvous, with the frontal elevations oblique and moderately raised; the antennæ extending to the middle of the elytra, black, the lower four joints flavous, second and third joints short, equal in the male, subequal in the female; thorax at least twice as broad as long, narrowed anteriorly, the sides straight, the anterior angles slightly thickened, the posterior ones distinct, the basal margin moderately rounded at the middle, the surface very closely impressed with small and slightly larger punctures; scutellum black; elytra extremely closely punctured, the punctures larger than those of the thorax, the interstices slightly rugose, the colour either entirely fulvous or with the following markings:—

Var. *a*. Each elytron with two narrow black stripes, one near the suture, narrowed at the middle, the other near the lateral

margin, both abbreviated behind, but the sublateral stripe extending to the base; head and thorax fulvous.

Var. *b*. The head and thorax black; the elytra with a black sutural stripe, widened into a square-shaped spot below the middle, the sides and apex likewise narrowly black.

Var. *c*. Elytra marked like var. *b*, but the sutural stripe connected by a transverse band below the middle with the lateral stripe.

Var. *d*. Head black, the base fulvous; thorax fulvous, elytra entirely black.

Var. *e*. Head and thorax fulvous; elytra black, the apex fulvous.

There are, besides these forms, still others in which the elytra are black with a fulvous spot at the middle and another at the apex; this latter variety seems identical with *Monolepta elegans*, Alld., but the author gives the head, thorax, and underside as fulvous. In all the above forms the underside is black, as well as the four posterior femora; the anterior legs in nearly all are fulvous, but sometimes the posterior tibiæ and tarsi are black as well; the elytral epipleuræ are continued below the middle.

PLATYXANTHA (?) ABDOMINALIS, n. sp.

Below black, above testaceous, the terminal joints of the antennæ, the apex of the tibiæ, and the tarsi black; thorax scarcely perceptibly, elytra very finely and closely punctured; last abdominal segment flavous.

Length $2\frac{3}{4}$–3 lines.

Of elongate parallel shape; the head impunctate, the frontal elevations strongly raised, trigonate; clypeus triangular, in shape of a transverse ridge; labrum and palpi flavous; antennæ slender, extending to two-thirds the length of the elytra, black, the lower four joints flavous, basal joint slightly curved, second very short, third slightly shorter than the fourth joint, the rest nearly equal in length; thorax subquadrate, scarcely one-half broader than long, the sides straight, slightly narrowed at the base, the angles in shape of a small tubercle, the anterior ones oblique and produced outwards, the surface rather depressed, extremely minutely and closely punctured, testaceous; elytra wider at the base than the thorax, with a depression bounding the shoulders within, the surface as closely and scarcely more strongly punctured than the thorax, their epipleuræ broad and extending beyond the middle; legs fulvous; the tibiæ unarmed, their apex black as well as the tarsi, their first joint as long as the following two joints together; breast and abdomen black, the last segment flavous; anterior coxal cavities closed.

Hab. Mashonaland (*G. Marshall*).

Of the three specimens obtained, one has the breast black only and the legs are entirely fulvous: this specimen is a male; it differs in no other way from the others except being rather smaller. The species is one of the few in which the thorax shows no sign of a depression.

PLATYXANTHA (?) SCUTELLATA, n. sp.

Fulvous, the antennæ (the basal joint excepted), the scutellum, and the tibiæ and tarsi black; thorax without depression, finely punctured; elytra very closely and finely punctate.

Length 3 lines.

Head broad, impunctate, the frontal tubercles very strongly raised, transverse; clypeus rather broadly swollen; eyes large; antennæ slender, fuscous or black, the basal joint (sometimes the first three joints) fulvous, the second small, the third double the length but much smaller than the fourth joint; thorax transversely subquadrate, rather convex, the sides evenly rounded, the anterior angles slightly produced outwards, posterior ones slightly thickened, the surface very finely and closely punctured, without depressions; scutellum black, shining; elytra wider at the base than the thorax, convex, parallel, the punctures like those of the thorax and extremely closely placed: underside and legs fulvous; the tibiæ and tarsi black, finely pubescent, like the rest of the underside; the metatarsus of the posterior legs as long as the following three joints together; claws appendiculate.

Hab. Mashonaland (*G. Marshall*). British Museum and my own collection.

The shape of the thorax is quite different in this species from that of the preceding, not being narrowed at the base; it resembles in this respect that of a species of *Malacosoma*. I cannot, however, find any structural differences of importance to separate the insect from *Platyxantha*.

PLATYXANTHA (?) PALLIDA, n. sp.

Pale testaceous, antennæ fulvous; thorax transversely subquadrate, minutely punctured; elytra extremely finely and closely punctured.

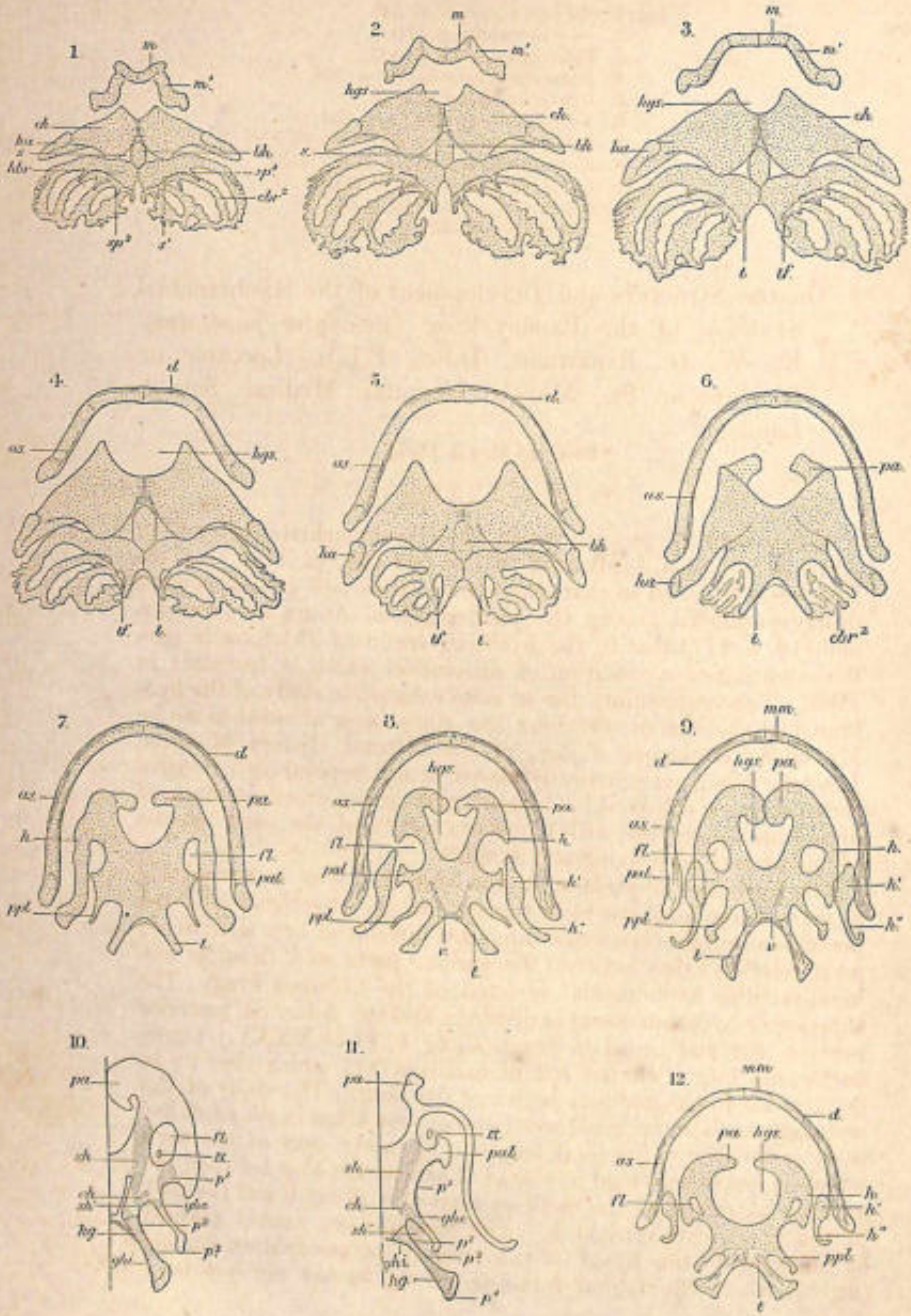
Length 3¼ lines.

Head as in the preceding species, impunctate; antennæ nearly extending to the apex of the elytra, pale fulvous, the second joint half the length of the third, the fourth twice as long as the preceding joint, the following joints still more elongate and slender; thorax of exactly the same shape as in *P. scutellata* and as finely punctured; scutellum pale; elytra punctured like the thorax: underside and legs entirely pale fulvous or testaceous.

Hab. Mashonaland (*G. Marshall*). British Mus. coll. and my own.

Rather larger than *P. scutellata* and entirely of pale coloration, the antennæ still longer and the punctuation also rather finer.

NOTE.—*Diorrhabda maculiceps*, Jac., doubtfully referred by me to this genus, must find its place in *Galerucella*, as the coxal cavities are open, not closed. I have lately received specimens of this species from the Cameroons which do not differ from the Abyssinian type, but vary greatly in coloration.



HYOID OF PELODYTES PUNCTATUS.

EXPLANATION OF PLATE XXXIV.

Fig. 1. *Euryope bipartita*, p. 549.
2. —— *nigricollis*, p. 550.
3. *Lefevrea æneicolle*, p. 527.
4. *Rhembastus maculicollis*, p. 538.
5. *Diboloides bicolor*, p. 553.
6. *Neodera transversicollis*, p. 564.
7. *Serraphula ænea*, p. 557.
8. *Eugonotes longicornis*, p. 559.
9, 10. *Candezea variopennis*, p. 574.
11. *Luperus nigrosuturalis*, p. 567.
12. *Aulamorphus hollisi*, p. 572.

4. On the Structure and Development of the Hyobranchial Skeleton of the Parsley-Frog (*Pelodytes punctatus*).

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[Received May 3, 1897.]

(Plate XXXV.)

When writing recently upon the Hyobranchial Skeleton of *Xenopus* and *Pipa* I adverted to the fact (**16.** p. 116) that the hyoglossal foramen so characteristic of these two genera is most nearly paralleled among the phaneroglossal Anura in *Pelodytes*, and (**16.** p. 117) that in the hyoidean cornu of *Pelodytes* is seen the retention of a condition of dissolution which is transient in *Pipa*. The opportunity for a more exhaustive study of the hyobranchial skeleton of *Pelodytes* has since been afforded to me by Mr. G. A. Boulenger, F.R.S., of the Natural History Museum, London, who most generously placed at my disposal an extensive series of larvæ collected by himself, and in an excellent state of preservation, together with numerous adults of the same species (*P. punctatus*) both living and in spirit.

The hyobranchial skeleton of the adult *Pelodytes* is remarkable in many ways, and, except in the case of the thyrohyals and the postero-lateral processes adjoining, it is difficult at first sight to see what relation exists between the various parts and those of the more familiar hyobranchial skeleton of the Common Frog. The anterior or hyoidean cornu is divided; and the detached posterior portion, flat and broad in front (*h'*, fig. 9, Plate XXXV.), tapers backwards into a curved rod of cartilage (*h''*), which rises up to be attached to the auditory region of the skull. The study of the metamorphosis of the hyoid arch (*postea*) shows that in the adult but little is missing of its total length. The only part of the arch which is not represented in the adult skeleton is that between the anterior extremity of the cartilage marked *h'* in fig. 9 and the part of the great plate marked *h*. The relations are readily grasped by referring to the hyoid of the recently metamorphosed animal (fig. 8), where the lateral foramen (*fl*, fig. 9) has not yet been

enclosed. The lateral foramen of the adult skeleton is thus not due to a secondary fenestration in a continuous plate of cartilage as might be supposed, but owes its origin to the closure of a deep notch or sinus. By a similar process of overgrowth of marginal cartilage the hyoglossal sinus (*hgs.*, fig. 9), constant in all tongued Anura, is, in *Pelodytes*, very nearly converted into a foramen such as occurs in the Aglossa. The enclosing cartilages (*pa.*) are secondary additions to the most anterior parts of the hyoidean cornua (see figs. 8, 7, and 6), and in some specimens actually overlap one another. The posterior and anterior thirds of the hyoglossal space are closed by membrane, while the middle third transmits the large hyoglossal muscles.

If we disregard for the moment the detached parts of the hyoidean cornua, the outline of the hyobranchial skeleton is definitely elliptical in shape, the continuity of the ellipse being broken in six places. There is nothing remarkable about the thyrohyals (*t*, fig. 9); they are broadest behind and are narrowest at two thirds of their length from the posterior end. The cartilaginous processes (*ppl.*, fig. 9) running parallel to the thyrohyals on their external side are more strongly developed than is usual in Phaneroglossa, and their swollen extremities touch the circumscribing ellipse. The deep notches in front of and behind this process are closed by imperforate membrane.

On the ventral surface of the basal plate or body of the hyoid is a curious splint-bone (*v*, fig. 9), consisting of a short central transverse bar, from the extremities of which project a pair of long antero-lateral processes and a pair of short tapering postero-lateral horns. The extremities of the latter extend along the ventral surface of the anterior ends of the thyrohyals. The ossification is partly buried in the hyoglossus muscle, some of the fibres of which pass between the bone and the basal plate. The bone is attached to the rest of the hyobranchial skeleton only by its extremities and is readily dissected off. It is not an ossification of the cartilage of the basal plate like the paired and frequently unsymmetrical ossification of *Bombinator*, but rather corresponds with the V-shaped ventral bone of *Alytes* and the paired ossification of *Discoglossus* [1].

There are numerous muscles in relation with the hyobranchial skeleton of Anura, and, in making a comparative study of this portion of the skeleton in different genera, the evidence which the muscles afford towards the recognition of homologous skeletal parts is not infrequently of the greatest value. It is only in the Frog (*Rana*) that the muscles of this region of the body have been studied with any degree of precision, and, since the hyobranchial skeleton of this genus is most familiar to anatomists, I have instituted a comparison between the areas of muscle insertion in the hyobranchial skeleton of *Pelodytes* and *Rana*. The muscles of

[1] Parker (**12**. pl. 20. fig. 10) does not show these splint-bones; but, as he himself has since admitted (Phil. Trans. Roy. Soc. vol. 173. 1882 (1883), p. 139), the specimen there figured is one of *Rana esculenta*, and not of *Discoglossus*.

Pelodytes are so similar to those of the Frog that no difficulty besets their determination; but differences occur in the relative sizes of certain of the muscles in the two genera, and also in the extent of their surfaces of attachment. The impression of the ventral trunk of the m. sternohyoideus is large and of the same shape in both (*sh.*, figs. 10 and 11). Its anterior broader end lies to the outer side of the hyoglossal notch. Since it lies to the inner side of the lateral foramen in *Pelodytes*, and is just internal to the deep depression in the edge of the hyoid plate of the Frog bounded anteriorly by the curving hyoidean cornu, these latter spaces would appear to be homologous; and the assumption is supported by the fact that they are covered in by a membrane which is perforated in both cases by the glossopharyngeal nerve and the lingual branch of the carotid artery (ix., figs. 10 and 11). The antero-lateral process of the Frog (*pal.*, fig. 11), therefore, is represented in *Pelodytes* by the cartilage (*pal.*, fig. 9) which bounds the lateral foramen posteriorly. The chief difficulty in the way of the interpretation of the hyobranchial skeleton of *Pelodytes* is now practically overcome. The cartilage bounding the lateral foramen externally is in part the hyoidean cornu and in part a forward growth of the processus antero-lateralis—a conclusion which is supported by a study of the development (see fig. 8); while the internal boundary represents the first or proximal portion of the hyoidean cornu of the Frog—the part which Gaupp (**5**) calls the "manubrium" and which Parker (**12**) in some of his figures of Anura marks "hypohyal."

Returning to the muscles, the area of attachment of the sternohyoideus ventralis extends relatively farther forward in *Pelodytes* than in *Rana*, but that is all. The petrohyoideus primus is in *Pelodytes* a smaller muscle than in *Rana*. Its insertion is purely marginal in the latter genus, but in *Pelodytes* the muscle spreads on to the flat surface of the cartilage (p^1, figs. 10 and 11). In both cases the muscle lies between the processus antero-lateralis and the processus postero-lateralis. The petrohyoideus secundus and petrohyoideus tertius are attached to the dorso-external surface of the thyrohyal bone in both genera (p^2 and p^3, figs. 10 and 11), but in *Pelodytes* the petrohyoideus tertius is inserted more posteriorly than in *Rana*. The fourth division of the petrohyoideus of the Frog (p^4, fig. 11), attached to the posterior extremity of the thyrohyal, is absent in *Pelodytes*. In both genera the geniohyoideus externus is inserted into the proximal end of the processus postero-lateralis, the area of attachment of the omohyoideus (*oh.*) lying between those of the sternohyoideus ventralis and the geniohyoideus externus. The space between the thyrohyal and the processus postero-lateralis is closed by a tough membrane, to the middle of which, in the Frog, the dorsal constituent of the sternohyoideus (*sh.'*, fig. 11) and a part of the geniohyoideus externus are attached. In *Pelodytes*, however, the sternohyoideus dorsalis is a smaller muscle (*sh.'*, fig. 10), and it is attached to the cartilage at the bottom of the sinus, close to the insertion

of the omohyoideus. The hyoglossus in *Pelodytes* (*hg.*, fig. 10) is attached to nearly the whole of the ventral surface of the thyrohyal and to the posterior part of the basal plate or body of the hyoid. As already remarked, the greater part of the ventral splint-bone lies buried in the muscle. In the Frog the area of insertion of the hyoglossal muscle (*hg.*, fig. 11) is more restricted, and hardly extends on to the basal plate. The posterior end of the geniohyoideus internus is, in the Frog, inserted mainly into the ventral fascia of the hyoglossus, only a few stray fibres extending round this muscle to be inserted into the thyrohyal in the position marked *ghi.* in fig. 11. In *Pelodytes* the geniohyoideus internus is less bound to the hyoglossus, and its insertion into the thyrohyal (*ghi.*, fig. 10) extends to the posterior extremity of this bone.

Only two original figures of the hyoid apparatus of *Pelodytes* have been published. In the first, by Dugès (**4.** pl. 3. fig. 21), the lateral foramina are shown correctly, and their presence is rightly accounted for (**4.** p. 56) by the union of the hyoid cornua with the antero-lateral processes; but the dismembered parts of the hyoid arch are wanting. The ventral ossification is represented as of the form of a pair of triradiate bones. The hyoglossal sinus is not sufficiently enclosed in front, nor is the postero-lateral process of the hyoid shown of sufficient length. The second figure, by Parker (**12.** pl. 23. fig. 3), shows the lateral foramina, but the external enclosing cartilages are represented as in contact, and not confluent with one another. The dismembered parts of the hyoidean cornua are introduced into the figure, but they are too rod-like in shape and fail to exhibit the lamellar expansion. The hyoglossal sinus is more enclosed than in Dugès's figure, and is consequently more true to nature. The ventral splint-bone, however, is triradiate and unsymmetrical, like one of those figured by Dugès. The figure given by Cope (**2.** pl. 76. fig. 6) is admitted to be based on those of Dugès and Parker, and thus calls for no special criticism.

In the tendency for the processus anteriores to narrow the opening of the hyoglossal sinus, in the presence of lateral foramina, and in the dismemberment of the hyodean cornua, the hyobranchial skeleton of *Pelobates* very closely resembles that of *Pelodytes*. My attention was directed towards this genus by Mr. Boulenger, who kindly supplied me with specimens of *Pelobates fuscus*, and at the same time expressed his conviction that the hyoidean cornua were disjointed in all those genera which he includes in the family Pelobatidæ (**1.** p. 432), and that Parker's figure of the hyobranchial skeleton of *Pelobates* (**12.** pl. 25. fig. 9) showing the hyoidean cornua continuous was incorrect. I am happy to be in a position to confirm his suspicions with regard to Parker's figure, and, as the matter is so important, I trust I may be pardoned for a slight digression here from the genus which forms the subject of this contribution. In the hyobranchial skeleton of *Pelobates* (fig. 12) the anterior processes are directed inwards and slightly backwards, exactly as in *Pelodytes*, but they do not reach the median line. The lateral foramina are smaller and more pear-shaped, and in

half-grown specimens the cartilage bounding the foramen postero-externally is very thin and readily tears away, giving the impression that there exists here an unenclosed sinus such as is shown by Dugès (**4.** pl. 3. fig. 18) and Parker (**12.** pl. 25. fig. 9). Both Dugès and Parker fail to depict the hyoid arch correctly. The liberated part of the cornu (*h'*, *h''*, fig. 12) resembles very closely in size and shape that of *Pelodytes*. It is lamellar in front, and ends behind in a hooked process attached to the skull. Parker errs by representing it as rod-like and not separated from the rest of the arch, while Dugès fails to notice it at all in pl. 3. fig. 18, but shows it as a rod-like cartilage in pl. 13. fig. 79. Parker (**12.** p. 261) says that there are two small centres of ossification on each side in the anterior cornua of *Pelobates*, but this statement I cannot confirm. Cope's figure (**2.** pl. 76. fig. 5) of the hyoid of *Pelobates* is not original, but is admitted to be based on the figures of Dugès and Parker. The thyrohyals of *Pelobates* are massive, more especially in old specimens; and the epiphysis is produced laterally beyond the outer edge of the shaft, giving to the thyrohyal a hooked appearance.

There is no ventral ossification such as occurs in *Pelodytes*. But whether this fact points to a closer alliance between *Pelodytes* and *Alytes* than between *Pelodytes* and *Pelobates* is, I take it, very doubtful. The bones, in the first place, are not ossifications of the hyobranchial skeleton, but ossifications applied to the surface of it at a late stage of development. If we compare the adult hyoids of *Pelobates*, *Pelodytes*, and *Alytes* we find that the two former resemble one another and differ from the third in the disjointing of the hyoidean cornua, the presence of lateral foramina, and the partial enclosure of the hyoglossal sinus; while the two latter resemble one another and differ from the first only in the presence of the ventral splint-bone. Also, if we compare the larval hyobranchial skeleton of the three, we find that in *Alytes* the basihyal extends so far back as to completely separate the hypobranchial plates from one another, whereas in both *Pelodytes* and *Pelobates* the two hypobranchial plates are in contact in the median line for some distance behind the basihyal. And in *Alytes* there is a well-marked median plate of cartilage (the "erste Copula" of Gaupp, **5.** p. 412) situated in front of the opaque fibrous band connecting the ceratohyals; but I find no trace of this in larvæ of *Pelobates* and *Pelodytes*. And these latter are fundamental differences appearing early, and of an importance which it would be difficult to exaggerate.

Development of the Hyobranchial Skeleton of Pelodytes punctatus.

The method employed in the investigation of the larval hyobranchial skeleton was of the simplest character. The tadpoles were dissected under spirit, the mandible and hyoid arch disarticulated from the palatoquadrate cartilage, and the branchial skeleton

carefully freed from the skull. The œsophagus was then cut in front of the liver, and the whole of the floor of the pharynx thus liberated. The heart and larynx were then dissected away, the gills, muscles, and mucous membrane removed, and only sufficient connective tissue left to keep the skeletal parts in their natural relations. No staining reagents were employed, and the whole of the dissection was performed under a simple microscope of a magnification of ten diameters, in powerful reflected light. The series of larvæ examined was very extensive, but it will suffice to select eight stages only of these for description. The important changes in the hyobranchial skeleton do not begin until the tail is reduced to about one-third of its maximum length, but they then proceed with considerable rapidity. In fact, two larvæ exactly similar in external appearance and having the merest stump of the tail remaining may show considerable differences in the structure of the hyobranchial skeleton. In such cases it is necessary to make the dissections first and to arrange the specimens in series afterwards. The youngest tadpole I have been able to examine is one with the hind limbs just appearing as buds on the surface of the body, but from this onwards, as far as the adult condition, the series is as complete as could be wished. It should be noted that the hyobranchial skeleton of the first seven stages is drawn from the dorsal side, in order to show the spicula and the articular ends of the hyoidean cornua. Figs. 8 and 9, however, exhibit the ventral surface, because the spicula have by this time disappeared, the hyoidean cornu has no longer an articular surface, but is firmly adherent to the auditory capsule, and because the interesting ventral ossification is only to be seen in this view. In order to facilitate comparison the figures are not drawn to the same scale, but as nearly as possible of the same absolute size. The approximate magnification is given in each case. The introduction of the mandible into the figures serves to show not only the gradually increasing size of the gape, but also illustrates the interesting manner in which the distal extremities of the hyoidean cornua get pushed farther and farther back as the mandibular rami elongate posteriorly. Throughout this contribution, although ostensibly devoted to a consideration of the hyobranchial skeleton, I have purposely avoided all reference to the columella auris and stapedial cartilages.

Stage 1. *Distance from snout to root of tail*, 13 *mm.* *Length of tail*, 16 *mm.* *Length of hind limbs*, 1 *mm.* (Plate XXXV. fig. 1.)

There is nothing very remarkable about the hyobranchial skeleton of *Pelodytes* in its early stages, since it conforms tolerably well with what might be considered the normal for tadpoles in general. There is but a single unpaired median constituent, and not two, as, for instance, in *Alytes*. Although Parker (**12**) speaks of this skeletal part of the Anuran larva as the "basibranchial" and Stannius (**19**. p. 64), Hoffmann (**7**. p. 45), and Gaupp (**5**) apply to it the non-committal name "copula," the general

consensus of opinion (Dugès (**4**), Götte (**6**), Schulze (**18**), and others) is that it represents the "basihyal." Not wishing to enter upon an exhaustive and possibly futile discussion of the morphological value of this part, I accept the latter determination and call the median plate of cartilage (*bh.*, fig. 1) the basihyal. This median cartilage is connected with two pairs of large lateral cartilages, the so-called "ceratohyals"[1] in front and the branchial plates behind. The ceratohyals (*ch.*, fig. 1) stand out nearly at right-angles to the long axis of the body, and slope but slightly backwards. Their distal ends articulate by an obliquely elongated convex surface (*ha.*, fig. 1) with the under surface of the palato-quadrate cartilage. The internal or mesial extremities are broad and flat, with a delicately curved inner edge, and are united together in front of the basihyal by a broad band of fibrous tissue (the "queres, fibröses Band" of Rathke, **14**. p. 132, *Pseudis paradoxa*; and the "pars reuniens" of Gaupp, **5**, *Rana fusca*). In front of this is the hyoglossal notch, at present V-shaped, but later semicircular.

The branchial skeleton consists of two branchial plates, right and left, attached to the posterior part of the basihyal, and in contact with one another for a short distance in the median line behind it. Each is connected, at about one-fourth of its width from the median line, with the backwardly projecting cusp of the flattened part of the ceratohyal. The small triangular space (*s*, fig. 1) thus enclosed between the basihyal and the ceratohyal and branchial plate of each side is filled with a loose connective tissue, which only undergoes chondrification in Stage 4. The antero-internal part of each branchial plate is on the same level as the basihyal and ceratohyal, but the remaining grid-like portion of the plate is deeply concave above. The four curved bars, the so-called "ceratobranchials," are directed outwards and backwards and are connected together at their distal end by an irregular marginal band of cartilage ("commissura terminalis" of Gaupp, **5**; "epibranchiale" of Schulze, **18**) and at their proximal ends by the common hypobranchial plate (*hbr.*, fig. 1). The distal halves of the ceratobranchials bear on their anterior and posterior surfaces a series of four or five irregular, short, blunt outgrowths of

[1] I fail to see the practical utility of the introduction by Gaupp (**5**) of new non-committal terms, such as hyale, branchialia, and planum branchiale. It is doubtful, most anatomists will admit, whether the structures so designated correspond exactly to the ceratohyal, ceratobranchials, and hypobranchials of the fish, and it would have been desirable if, in the first instance, less definitive terms had been employed until the true homologies of the parts had been determined. But now that the names have been in use for so long and are so familiar, it is only confusing matters to attempt to replace them by names more vague in their significance. When the implied homology has been definitely disproved, when the so-called ceratohyal of the tadpole has been shown to be something quite different from the ceratohyal of the fish, and so on, then will be the time for a radical change in our nomenclature. We are, however, still in the dark with regard to the morphological significance of the Anuran hyobranchial skeleton, and the onus of the proof of the false homology implied by the terms at present in use lies with the objectors.

cartilage. On the external edge of the first ceratobranchial these processes are of considerable length and form a series of five or six. Similar, but more irregular, cartilaginous processes stand out from the postero-internal border of the fourth ceratobranchial and from the external border of the commissural cartilage. If, now, these irregular finger-shaped processes of the first ceratobranchial were confluent laterally so as to form a continuous curved wall, and if the same coalescence occurred with regard to the processes of the commissural cartilage and fourth ceratobranchial, the whole branchial skeleton would assume the form of two approximately hemispherical cartilaginous basins perforated at the bottom by three oblique slits—a form of branchial skeleton which is peculiar to *Xenopus* (**16**). Which of the two forms is the more primitive, that with the irregular palisade, or that with the continuous marginal wall, it is difficult to say; but I am inclined to regard the branchial skeleton of the early *Xenopus* larva as more primitive than that of any other Anuran larva yet described[1]. The fourth branchial cleft (the last of the three perforations in the branchial cartilage) is shorter than the two preceding. The distal end of the third ceratobranchial is exceptionally broad, and is characterized by the constant presence of either a deep notch or a foramen.

The proximal end of the first ceratobranchial is broad, and merges indistinguishably into the cartilage of the hypobranchial plate. It bears a backwardly directed spicule of cartilage (*sp*^{1}, fig. 1). The second ceratobranchial (*cbr*^{2}, fig. 1) is bound by connective tissue to the posterior surface of the first ceratobranchial, to the median side of this spicule. The proximal part then curves upwards and backwards, and giving off a backwardly directed spicule of its own, diminishes in thickness and becomes continuous with the cartilage of the proximal end of the third ceratobranchial, just where the latter unites with the hypobranchial plate[2]. The third ceratobranchial curves over in a similar manner, and has its own spicule (*sp*^{3}, fig. 1). The fourth ceratobranchial is broader and far more irregular in shape than the other three. It curves up, is confluent with the hypobranchial plate, and sends backwards a curved cartilaginous process, which may possibly represent the spicule of this arch. It should be noted that the whole of the cartilage of the branchial plate is continuous throughout. This continuity is obvious at the distal ends of the arches, but, on account of the sharp curvature of the

[1] Schulze (**18**. p. 11) and Naue (**9**. p. 14) seem to regard the front wall belonging to the first ceratobranchial as a thin, continuous, concave plate of cartilage in the forms of Anura which they respectively studied. The plates are probably subject to a great amount of individual variation, but in none of the numerous larvæ which I have examined (*Rana, Bufo, Alytes, Pelobates, Pelodytes, Hyla*) have I found the wall nearly so continuous and entire as in *Xenopus*.

[2] I fail to see the force of Gaupp's argument (**5**. p. 403) for considering the parts of the first two branchial bars lying internal to their spicules as belonging to the hypobranchial plate rather than to the ceratobranchials (branchialia) themselves.

proximal ends and the consequent angle which they make with the plane of the hypobranchial plate, it requires very careful observation to demonstrate the fact in this region. The only fibrous connection is that between the first and second ceratobranchials just anterior to the second spicule. The spicular cartilages are definitely continuous with the cartilage of the ceratobranchials, and do not give one the impression of their having arisen independently. These spicules (I have adopted Gaupp's name for these processes) of the Anuran larva have been the subject of a good deal of controversy by reason of the interpretation which Parker put upon them in his third contribution to our knowledge of the skull of Batrachia (**12**). I have already in an earlier communication (**16**. p. 113) expressed my views on the subject and do not propose to discuss the matter farther. My observations on the specimens which form the subject of this paper tend to confirm the view of Gaupp (**5**. p. 408), that the spicules have no morphological value, but that they are merely processes of cartilage developed from the proximal ends of the ceratobranchials to support the horizontal fold or velum which covers over the anterior half of the branchial cavity, and which undergoes reduction at the same rate as the spicules.

The mandible is quite diminutive, and consists of four subequal cartilages. The median pair of these (*m*, fig. 1) carry the lower horny beak, the lateral pair (*m'*) are articulated with the palatoquadrate cartilage.

STAGE 2. *Distance from snout to root of tail*, 20 *mm*. *Tail at its maximum development*, 28 *mm*. *in length*. *Length of hind limb, extended*, 21 *mm*. *Fore limb not yet extended*. *Horny beaks still present*. (Plate XXXV. fig. 2.)

But few differences are to be noted between this and the preceding stage. The whole skeleton is considerably larger, the hyoglossal notch is more rounded than before, and the four constituent cartilages of the mandible are beginning to straighten out. Except for these features the description already given of the hyobranchial skeleton in the first stage would apply equally well in this Stage 2. In fact, my chief object in introducing this into the series was to show that the hyobranchial skeleton attains its maximum larval dimensions without any appreciable change in shape.

STAGE 3. *Distance from snout to root of tail*, 16 *mm*. *Length of tail*, 20 *mm*. *Length of hind limb, extended*, 19 *mm*. *Length of fore limb, extended*, 8 *mm*. *Horny beaks no longer present*. (Plate XXXV. fig. 3.)[1]

The metamorphosis of the hyobranchial skeleton is now

[1] I have here given the measurements of the specimen the hyobranchial skeleton of which is shown in fig. 3. It will be observed that the specimen is smaller than the average; but if all the above measurements be multiplied by $\frac{5}{4}$ the figures will be seen to be intermediate between those of the specimens chosen to represent Stages 2 and 4.

beginning. The hyoidean constituents are slightly larger than before, and the branchial are smaller. There is still a triangular space on either side of the basihyal: the spicula of the ceratobranchials are shortening up. The most interesting feature to be noted in this stage is the fenestration of the hypobranchial plate in those regions situated immediately over the thyroid bodies. The cartilage in the area marked *tf.* in fig. 3 is extremely thin, and becomes converted into a distinct perforation in Stage 4. The postero-internal margin (*t*) of the incipient foramen soon becomes rod-like. It enlarges rapidly, and when, later, the absorption of the external boundary causes the thyroid foramen to open laterally, it becomes recognizable as the thyrohyal (*t*, figs. 4–7). When recounting recently the mode of development of the hyobranchial skeleton of *Pipa*, it was with considerable hesitation that I described (**16.** p. 106 *et seq.*) the thyrohyals as persistent parts of the hypobranchial cartilage left by the perforation of the plate and the subsequent conversion of the foramina into deep sinuses. This view of the mode of development was so opposed to all preconceived notions that it seemed little short of heresy to give expression to it, and it was only after repeated examinations of the specimens that I could bring myself to publish the observation. The present discovery of a similar origin of the thyrohyals in a less aberrant type of Batrachian not only confirms my former view, but opens up the broader question whether, after all, this may not be their normal mode of development in Anura. A glance at figs. 3, 4, and 5 shows that the thyrohyals are terminated by those processes which, following Gaupp, I interpret as the spicula of the fourth branchial arch. These might easily be mistaken for the free ends of newly outgrowing thyrohyals, although, as a matter of fact, they are absorbed with the ceratobranchial cartilages, leaving the extremities of the true thyrohyals freely exposed. And thus become reconciled the apparently conflicting views of Saint-Ange (**17.** pp. 410 and 417), who considers the thyrohyals as the persistent spicules of the fourth branchial arch, and Cuvier (**3.** p. 397), Rathke (**14.** p. 39), Dugès (**4.** pp. 99, 101, 102), Stannius (**19.** p. 65), Götte (**6.** p. 332), Parker (**11.** pp. 164, 170, 171, 185, and **12.** p. 259), and Gaupp (**5.** pp. 422 and 433), who regard them as outgrowths of the hypobranchial plate situated behind and to the mesial side of the fourth branchial arch. The alternative view that the thyrohyals of Anura are persistent ceratobranchials has been supported by Reichert (**15.** pp. 59 and 258), by Owen (**10.** p. 90), by Parker, who in his textbook (**13.** p. 173) unfortunately departs from the views expressed in his memoirs (*l. c.*) and states that the thyrohyals are the fourth ceratobranchials, and by Walter (**21**) and Cope (**2.** p. 234), who accept Parker's determination without reserve. Stöhr (**20.** p. 84), also, ventures upon a positive statement in favour of the thyrohyal being the ventral or proximal end of the fourth branchial arch; and that he does not mean by this the hypobranchial constituent of the arch is evident from his

criticism of Parker's paper contained in the footnote which he appends. The mode of development of the thyrohyals of *Pelodytes* by the formation of thyroid foramina and their subsequent disruption is calculated to shake one's faith in the recognition in the thyrohyals of Anura of late and rapidly developing fifth ceratobranchials as suggested by Meckel (**8**. p. 240) and Cuvier (**3**. p. 397); and, although the arguments which I have previously adduced in favour of this view (**16**. p. 112) still hold good, I must confess to entertaining a suspicion that, after all, these bones belong to the hypobranchial rather than to the ceratobranchial part of the visceral skeleton.

The mandible no longer exhibits the sharp angulation of its earlier stages. It is considerably longer than before, but the four constituents can still be clearly recognized. The membrane on the internal or mesial surface of the ramus is much thickened, and it is this which, when ossified, becomes the angulosplenial bone. There is as yet no trace of a dentary.

Stage 4. *Distance from snout to root of tail*, 20 *mm*. *Length of tail*, 23 *mm*. *Length of hind limb, extended*, 28 *mm*. *Length of fore limb, extended*, 12 *mm*. (Plate XXXV. fig. 4.)

The whole aspect of the hyobranchial skeleton is beginning to change. The ceratohyals are now massive cartilages at their maximum of development, and they slope more posteriorly than before. The hyoglossal notch is both broader and deeper than in Stage 3. The triangular space on either side of the basihyal has now become filled up, not by encroachment of the surrounding cartilages, but by the differentiation of new cartilage: the outlines of the three cartilages bounding the former space are still very clearly marked. There are unmistakable signs that the branchial skeleton is past its prime. The arches exhibit a condition of incipient collapse, but are not very much smaller than in the preceding stage. The spicula have almost disappeared. There is a stump remaining of that of the second ceratobranchial, and the developing thyrohyal is still tipped with a remnant of that cartilage which probably represents the fourth spicule, but the first and third spicules have been completely absorbed. The thyroid foramen (*tf*., fig. 4) is now a distinct perforation of the cartilage, and the thyrohyal is beginning to assume shape.

Lying at the bottom of the laryngeal sinus, between the two thyrohyals, is a tract of soft cartilage of crescentic form which only in this stage acquires a definite outline. The sinus in which it lies has been increasing in size from the very first stage, and, as will be seen by referring to the figures 5–8, continues on the increase. In the first three stages the loose cartilage occupies a larger proportion of the space, but the tissue is of such an ill-defined character that it is a matter of personal opinion whether to regard it as cartilage at all; and, on account of its undifferentiated nature, it is impossible to recognize its posterior limit. It is therefore omitted in the first three figures. The cartilage is in

the later stages gradually absorbed from behind, and disappears altogether at about Stage 8.

The mandible has elongated considerably, and the articular ends have lost the sharp bend which they possessed during the first three stages. The four segments of the mandible are still just recognizable. The angulosplenial and dentary ossifications of the perichondrium (*as.* and *d.*, fig. 4) are both present, but they are very fibrous and perfectly flexible.

STAGE 5. *Distance from snout to root of tail*, 20 *mm.* *Length of tail*, 8 *mm.* *Length of hind limb, extended*, 30 *mm.* *Length of fore limb, extended*, 12 *mm.* (Plate XXXV. fig. 5.)

The branchial skeleton is in an advanced stage of reduction, and its maximum width is considerably smaller than the width across the hyoidean cornua, which has not been the case previously. The specimens of this stage which I have examined confirm my previous observation with regard to the branchial skeleton of *Pipa* (**16.** p. 105) that there is a marked shrinkage of the cartilage, and consequently of the clefts, before the latter are broken open by the absorption of the cartilage. The three clefts in the branchial plate are, in this stage, still enclosed by the cartilage, but they are not more than one-half of the length of the clefts in Stage 4. There are marked indications that, as in *Pipa* (**16.** p. 106), the first commissural cartilage to yield is that joining the first and second ceratobranchials. The thyrohyals have enlarged considerably, and are composed of a firm hyaline cartilage in sharp contrast with the softer, whiter, and more opaque cartilage of the parts of the branchial skeleton undergoing absorption. The thyroid foramen is also larger than before, and there now remains but a thin neck of cartilage between it and the first branchial cleft; so that the second and third ceratobranchials appear to be connected with the hypobranchial parts of the skeleton by a common isthmus, while the first and fourth ceratobranchials are attached more directly. These facts were to be observed in Stage 4, but are more obvious here in consequence of the branchial skeleton being flatter.

There is still recognizable on the anterior edge of the second ceratobranchial the cartilaginous promontory which was in the earlier stages bound to the first ceratobranchial by fibrous tissue. The ceratohyals are directed more backwardly than in Stage 4, the outlines of their inner edges are becoming obscured, and, curiously enough, more removed from one another—a fact which is emphasized still more in Stage 6. The basihyal is still recognizable, but its contour is becoming fainter. The hyoglossal notch or sinus is now at its maximum size.

The mandible is of large size and is distinctly **U**-shaped. There are now only two segments to the mandible, the more median parts (the lower labial cartilages of Parker) having fused with the more lateral parts. The angulosplenial and dentary ossifications are much larger than before.

Stage 6. *Distance from snout to root of tail*, 19 *mm*. *Length of tail*, 2·5 *mm*. *Length of hind limb, extended*, 27 *mm*. *Length of fore limb, extended*, 11 *mm*. (Plate XXXV. fig. 6.)[1]

At this stage the branchial arches are on the verge of dissolution, and it requires the very greatest care in dissection to avoid losing the relations of the dismembered parts. The whole aspect of the hyobranchial skeleton has changed. In the middle is a faint Y-shaped mark representing the lines of junction of the two hypobranchial plates and the basihyal. The mesial edges of the ceratohyals can still be identified, but they are wider apart than before. The hyoglossal notch is reduced in size by the addition of cartilage (*pa.*, fig. 6) to the front half of the antero-internal free edges of the ceratohyals. Although this new cartilage is confluent with that of the ceratohyal, what was previously the edge of the latter is still well-marked, thus showing that the new process is not due to an outgrowth of the original hyoidean cartilage. These new cartilages represent the anterior processes of the hyoid apparatus of the Frog (*pa.*, fig. 11) which develop late and about this stage. In fact, the figure which Gaupp gives of the hyoid of the metamorphosing tadpole of *Rana fusca* with tail reduced to 5 mm. (**5**. Taf. 19. fig. 8) agrees tolerably well with fig. 6 of *Pelodytes*. Gaupp applies the name "processus anterior" indifferently to the most anterior point of the original ceratohyal ("hyale") and to the later developed cartilage which constitutes the foremost part of the adult hyobranchial skeleton; but, seeing that the latter has a morphological significance different from the former, and is, moreover, absent in such genera as *Alytes*, *Discoglossus*, and *Bombinator* possessing the former, I have elected to restrict the application of the term to the latter. Parker's terminology does not help matters, but rather tends to confusion, for he marks these anterior processes of the adult hyoid as parts of the ceratohyals (**12**. pl. 13. fig. 10), as hypohyals (pl. 5. fig. 4), as epihyals (pl. 15. fig. 14), and as extrahyals (pl. 43. fig. 6), without offering any explanation of the want of uniformity.

The backward slope of the ceratohyals is now very strongly marked and the posterior parts are becoming reduced in width. The terminal articular surface is quite small compared with its previous extent, and the articulation will shortly give place to a rigid connection with the auditory cartilage. The thyrohyals continue to grow, but their posterior extremities are still capped with unabsorbed ceratobranchial cartilage. The outlines of the branchial arches are very indistinct, the softness of the cartilage making it difficult to distinguish them from the surrounding connective tissue and pharyngeal mucous membrane. The triradiate cartilage at the proximal end of the second and third branchial arches appears to be constant in its occurrence, and is

[1] These measurements are those of the figured specimen, which is slightly smaller than the average; but if the above figures be multiplied by $1\frac{1}{5}$ the measurements will be seen to be intermediate between those of the specimens representing Stages 5 and 7.

evidently to be regarded as the remnant of the external boundary of the thyroid foramen.

Probably the most important fact from a morphological point of view to be learned from this stage is the mode of formation of the postero-lateral processes of the hyobranchial skeleton of the adult (*ppl.*, fig. 9). The proximal portion of the first ceratobranchial does not share in the general absorption of ceratobranchial and commissural cartilage, but is continued as a tapering central core into the middle of the distal part of the arch, which is disintegrating. This central core is of firm cartilage similar to that of the hypobranchial plate and has a sharp contour. The postero-lateral process of the adult is formed by the subsequent enlargement of this persistent proximal portion of the first ceratobranchial, and the sinus which in the later stages exists between the postero-lateral process and the thyrohyal lies morphologically between the cartilage bounding the second branchial cleft antero-externally and the cartilage which forms the postero-internal border of the thyroid foramen. Saint-Ange (**17**. p. 418, *Rana*), Dugès (**4**. pp. 98–99, pl. 13. figs. 76–79, *Pelobates*), and Götte (**6**. figs. 332–334, *Bombinator*) are all agreed that the process in question is either the persistent basal portion of the first branchial arch or else an outgrowth of that part of the hypobranchial plate with which the first branchial arch was formerly united [1].

On the under surface of the hyobranchial skeleton the ventral splint-bone has appeared, but it is not yet adherent to the cartilage. It is a single bone from the first, and is not formed by the coalescence of a pair. The mandible is now shaped as in the adult, and except in size and the extent of ossification does not differ materially from that of the latter.

Stage 7. *Distance from snout to cloaca*, 21 *mm*. *No tail*. *Length of hind limb, extended*, 30 *mm*. *Length of fore limb, extended*, 12 *mm*. (Plate XXXV. fig. 7.)

Those parts of the branchial skeleton which were undergoing absorption in the preceding stage have now completely disappeared, so that the thyrohyal is separated from the postero-lateral process by a deep sinus as in the adult. The basal plate or body of the hyoid is now a continuous sheet of cartilage in which the outlines of the five constituent parts can no longer be distinguished, except that there still exists near the middle the Y-shaped mark adverted to in the description of Stage 6. Whether the hyoglossal notch deepens by absorption of the cartilage of the basal plate as, according to Gaupp (**5**), occurs in *Rana fusca*, I am unable definitely to say. There is no trace of the soft cartilage which is

[1] Since Gaupp (**5**. p. 428) has already exposed the fallacy of Parker's views on the mode of origin of the antero-lateral and postero-lateral processes of the Frog's hyobranchial skeleton, and has called attention to the confusion which Walter (**21**. p. 6) has introduced into the subject by calling the antero-lateral process the "hypohyale,"—the result of a mistaken reading of Parker's text-book (**13**. p. 173),—I refrain from further criticism of these works.

usually to be found in regions where such absorption is proceeding, but at the same time the general proportions of the basal plate suggest that it is quite possible that this process does take place. The newly added cartilages (*pa.*, fig. 7) at the inner edges of the anterior ends of the hyoid arch are now directed towards one another, having lost their forward slope; and the line of junction between them and the original hyoidean cartilage is still apparent. The greater part of the ceratohyal has become diminished in thickness so as now to have the form of a bent rod of approximately uniform diameter. About the level of the bottom of the hyoglossal sinus the ceratohyals exhibit the first indications of the absorption which later results in the dismemberment of the arch (*h*, fig. 7). A new notch or sinus (*fl.*, fig. 7) has developed at the side of the basal plate, mainly by the absorption of the cartilage in that position. But the sinus is rendered more complete by the simultaneous outgrowth of a process (*pal.*, fig. 7) which is to be identified with the antero-lateral or alary process of the hyoid apparatus of the Frog (*pal.*, fig. 11). In consequence also of this outgrowth of cartilage the middle of the three lateral sinuses, that between the antero-lateral and the postero-lateral processes, is beginning to make its appearance.

Stage 8. *Distance from snout to cloaca*, 17 *mm.* *Length of hind limb, extended*, 25 *mm.* *Length of fore limb, extended*, 9 *mm.* (Plate XXXV. fig. 8.)[1]

The basal plate or body of the hyoid is now small in proportion to the size of the outstanding processes. The postero-lateral process (*ppl.*, fig. 8) is longer than before but not appreciably thicker; the sinus of which it forms the posterior boundary is much deeper than in the last stage. The antero-lateral process (*pal.*) has enlarged and is already somewhat dilated at its extremity. The first of the three lateral sinuses (*fl.*) has now the form of an ellipse, incomplete externally. One of the most noteworthy features about this stage is the separation of the distal part of the hyoidean cornu. The absorption of cartilage leading to such separation occurs antero-externally to the last-mentioned sinus, and the pointed form of the cartilage in this region shows that the dismemberment has only recently occurred. Now that the outlines of the constituents of the body of the hyoid have completely disappeared, it is very difficult to define the limits of that part of the ceratohyal which is not detached, but I should judge that a line drawn through the bottom of the hyoglossal sinus and through the middle of the lateral sinus marked *fl.* would indicate the proximal limit of the anterior or hyoidean cornu. The recently added anterior processes (*pa.*) are now indistinguishably fused with the cartilage of the ceratohyal and are directed backwardly as well as inwardly. It is curious to note how these processes first

[1] The above specimen, the hyoid of which is shown in fig. 8, happens to be slightly smaller than that representing Stage 7, but otherwise the two are perfectly indistinguishable externally.

slope inwards and forwards (fig. 6), then directly inwards (fig. 7), and afterwards inwards and backwards (fig. 8). They are nearly in contact in the middle line, and it requires but little additional growth to close the hyoglossal sinus and convert it into a foramen. The liberated part of the ceratohyal expands slightly behind its anterior pointed extremity and then diminishes again into a curved rod, the posterior end of which is attached to the back of the auditory capsule. The thyrohyals have increased in width at their posterior extremities, and, although they cannot yet be said to be ossified, the shaft is slightly more opaque than the cartilage of the epiphysis behind and the basal plate in front. The ventral ossification is disposed as in the adult, but its postero-lateral rays are very short. The anterior parts of the mandibular cartilage have not yet ossified to form the mentomeckelian bones.

Stage 9. *Adult. Distance from snout to cloaca*, 37 *mm. Length of hind limb, extended*, 62 *mm. Length of fore limb, extended*, 26 *mm.* (Plate XXXV. fig. 9.)

Since the structure of the adult hyobranchial skeleton has already been described in the opening paragraphs, it will be sufficient to confine attention here to those changes which have occurred since Stage 8. The differences in appearance are due chiefly to the addition of cartilage to the periphery. This marginal addition in the case of the anterior part of the hyoid arch and the antero-lateral process has been so great as to completely enclose the first of the three lateral sinuses, forming a lateral foramen. The anterior processes of the hyoid have grown inwards in front of the hyoglossal sinus so as to touch one another, or even to overlap. It is only by analogy with the Frog that the term "processus anteriores" is applied to these enclosing cartilages; it is highly probable that the most anterior points of the hyobranchial skeleton belong to the original hyoidean cartilage and not to these processes (*cf.* figs. 7 and 8).

The postero-lateral process has developed an irregular plate of cartilage at its extremity, and, since the extremity of the antero-lateral process has grown backwards as well as forwards, the middle of the three lateral sinuses exhibits a tendency to become enclosed and converted into a foramen like that situated in front of it. The thyrohyals are now completely ossified and are more parallel than before. The postero-lateral rays of the ventral splint-bone have increased in length and underlie the anterior parts of the thyrohyals. The free parts of the hyoidean cornua are variable in shape, but the anterior end is always flat and lamellar, while the posterior has the form of a curved rod of cartilage. A comparison of this stage with the two preceding shows that the part of the hyoidean cornu missing is quite inconsiderable, and is to be estimated by the mean distance from the point marked *h* in fig. 9 to the anterior extremity of the detached part of the arch. Mentomeckelian bones are now present, and are inseparable from the dentary membrane-bones. They are not, as might be supposed,

the ossified median constituents of the larval mandible (lower labial cartilages of Parker), the outlines of which disappeared between stages 4 and 5.

Summary.

The almost complete closure of the hyoglossal sinus of *Pelodytes* (*hgs.*, fig. 9) is due to the extensive development and inward slope of the processus anteriores (*pa.*, fig. 9).

The lateral foramina of *Pelodytes* (*fl.*, fig. 9) are not primary fenestrations of the basal plate, but are formed by the enclosure of the foremost lateral sinus by the confluence of the expanded end of the processus antero-lateralis with the cartilage of the hyoidean cornu.

Although in *Pelodytes* the hyoidean cornu (*h*, *h'*, *h''*, fig. 9) is broken, the portion missing is comparatively insignificant.

The spicula (*sp.*, fig. 1) are larval structures of no morphological significance. They are processes of cartilage developed from the proximal ends of the ceratobranchials to support the horizontal pharyngeal velum.

The processus postero-lateralis (*ppl.*, fig. 9) is the persistent proximal portion of the first ceratobranchial.

The processus antero-lateralis (*pal.*, figs. 8 & 9) is a secondary outgrowth of the basal plate or body of the hyoid having no relation whatever to the larval branchial bars.

The thyrohyal (*t.*, fig. 9) is the part of the hypobranchial plate of the larva which forms the inner boundary of the thyroid foramen (*tf.*, fig. 4). Its posterior end becomes free on the absorption of the ceratobranchials and the consequent conversion of the foramen into a sinus.

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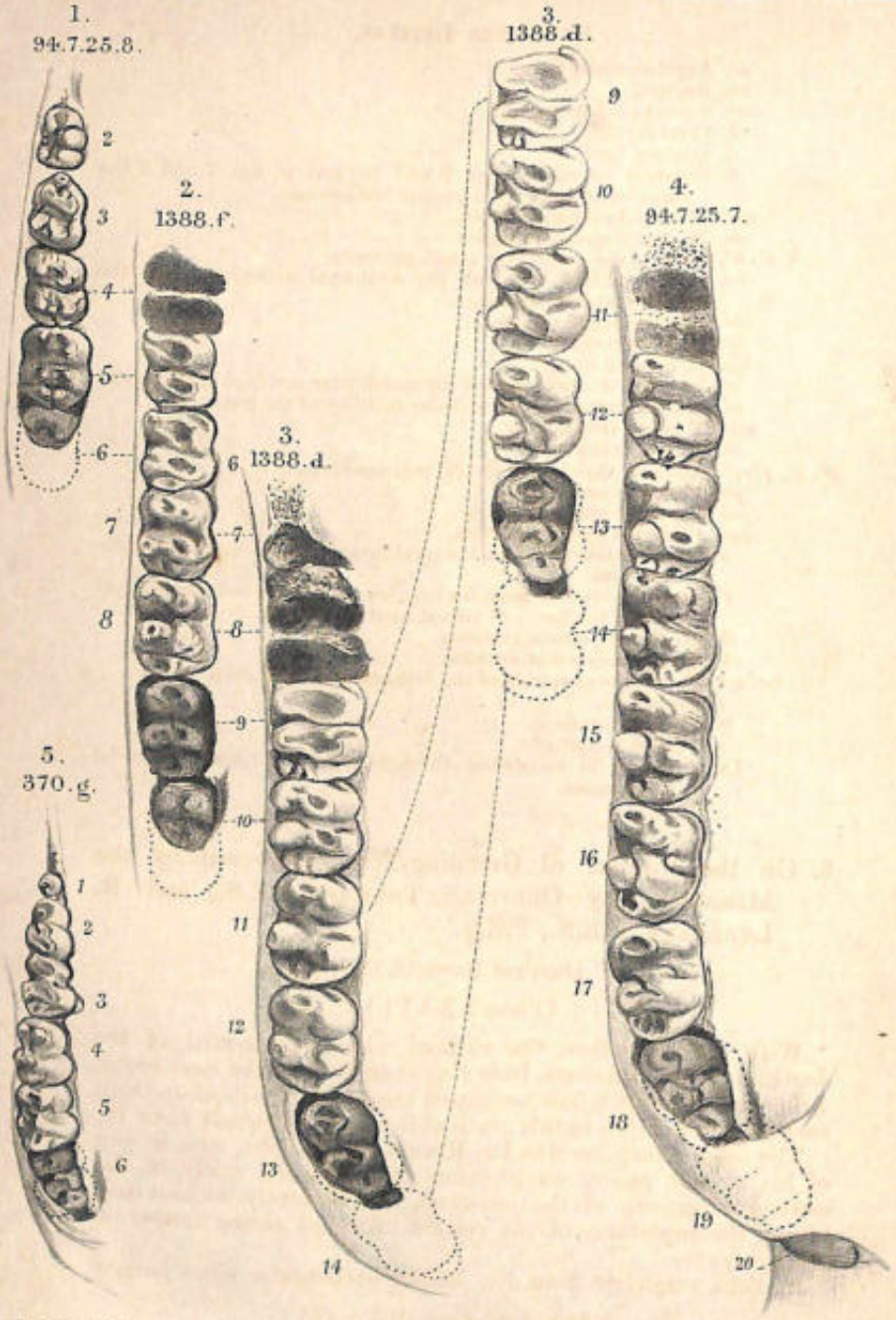
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EXPLANATION OF PLATE XXXV.

Fig. 1. Hyobranchial skeleton and mandible of *Pelodytes punctatus*. Stage 1 (see p. 582). Dorsal view. (×4.)
2. Same. Stage 2 (see p. 585). Dorsal view. (×4.)
3. Same. Stage 3 (see p. 585). Dorsal view. (×4.)
4. Same. Stage 4 (see p. 587). Dorsal view. (×4.)
5. Same. Stage 5 (see p. 588). Dorsal view. (×4.)
6. Same. Stage 6 (see p. 589). Dorsal view. (×4.)
7. Same. Stage 7 (see p. 590). Dorsal view. (×3¾.)
8. Same. Stage 8 (see p. 591). Ventral view. (×3¾.)
9. Same. Stage 9, adult (see p. 592). Ventral view. (×2.)
10. Half of the hyobranchial skeleton of *Pelodytes punctatus*, adult male, showing the areas of muscle insertion. Ventral view. (×2¾.)
11. Half of the hyobranchial skeleton of *Rana temporaria*, adult male, showing the areas of muscle insertion. Ventral view. (×1¼.)
12. Hyobranchial skeleton and mandible of *Pelobates fuscus*, adult male. Ventral view. (×1¼.)



J. Smit. del. et lith.

Mintern Bros. imp.

LOWER CHEEK-TEETH OF MANATEES.

1-4. Trichechus senegalensis. 5. T. inunguis.

Reference Letters.

as. Angulosplenial bone.
bh. Basihyal.
cbr^2. Second ceratobranchial.
ch. Ceratohyal.
d. Dentary bone.
fl. Foramen laterale in figs. 9 and 10; and in figs. 7 and 8 the sinus which later develops into the foramen.
ghe. M. geniohyoideus externus.
ghi. M. geniohyoideus internus.
h, *h'*, *h''*. Parts of the anterior or hyoidean cornu.
ha. Convex surface by which the ceratohyal articulates with the palatoquadrate cartilage.
hbr. Hypobranchial plate.
hg. M. hyoglossus.
hgs. Hyoglossal sinus.
m. Internal or mesial part of the mandibular cartilage of the larva.
m'. Lateral part of the mandibular cartilage of the larva.
mm. Mentomeckelian bone.
oh. M. omohyoideus.
p^1, p^2, p^3, p^4. The four divisions of the M. petrohyoideus.
pa. Processus anterior.
pal. Processus antero-lateralis.
ppl. Processus postero-lateralis.
s. Space enclosed between the ceratohyal, basihyal, and first ceratobranchial.
s'. Space enclosed between the hypobranchial plate and the proximal ends of the first and second ceratobranchials.
sh. M. sternohyoideus ventralis.
sh'. M. sternohyoideus dorsalis.
sp^1, sp^3. Cartilaginous spicula of the first and third branchial arches.
t. Thyrohyal.
tf. Thyroid foramen.
v. Ventral splint-bone.
IX. Aperture in membrane through which the glossopharyngeal nerve passes.

5. On the Number of Grinding-Teeth possessed by the Manatee. By Oldfield Thomas, F.Z.S., and R. Lydekker, F.R.S., F.Z.S.

[Received March 16, 1897.]

(Plate XXXVI.)

With one exception, the authors who have treated of the dentition of the Sirenians, from Cuvier in 1817 to the most recent writer on the subject, have estimated the number of cheek-teeth on each side of each jaw in this genus at from 6 to 8 to about 11 or 12.

The single exception was Dr. Krauss, of Stuttgart, who, in one of his several papers on Sirenian skulls, writing solely of the method of growth of the jaw-bone, and evidently without any idea of the importance of the remark in regard to the number of teeth, says[1]:—

"Allein, vergleicht man den letzten Backenzahn eines jungen

[1] Arch. Anat. Phys. 1862, p. 422.

Thiers mit dem ersten eines alten, so ist dieser viel grösser als jener, so dass wenigstens eine ganze Zahnreihe gebildet und hinausgeschoben sein muss bis diese Zähne die gleiche Grösse erreicht haben."

Commenting on this sentence, Lepsius [1], in his classical work on *Halitherium*, ridicules the idea of any such continued succession of teeth, on the ground that if true there would at least be 20 teeth in all, and states that, like other parts of the animal, the teeth increase in size as age advances.

We now know, however, that this latter statement is incorrect, and that the teeth, when once formed, do not grow at all; and this fact must be kept in mind when examining what we shall show to be the really wonderful and unique dentition of the genus *Trichechus* [2].

Our attention was first drawn to the subject by seeing the teeth of the young specimen of *T. inunguis* on which Mr. Beddard based the observations he read before this Society on January 19th, 1897 [3]. These teeth are so remarkably small as compared to those of adult animals, that, bearing in mind the absence in the Manatee of a vertical tooth-change, and the exceedingly gradual increase in size of the teeth as they progressively grow up behind and are thrown out in front, it becomes evident that the whole series of teeth must be very much longer than has been generally supposed. A second skull of *T. inunguis* slightly younger, which has been for many years in the British Museum, fully bears out this statement. (See Plate XXXVI. fig. 5.)

But since *T. inunguis* is only represented by these two young specimens, and their comparison with adult examples of other species might readily lead to material error, we have in the succeeding part of the paper restricted ourselves entirely to the African species (*T. senegalensis*), of which the British Museum possesses a good series of specimens. Thus, besides a good number of more or less adult skulls, there is one very young example obtained by the late Mr. Alvan Millson at Benin, with a lower jaw 120 mm. long, a larger one from Lagos (180 mm.), and others with this measurement 200 mm. and upwards.

In the youngest skull (B.M. 94. 7. 25. 8) the mandible has apparently already lost the tooth corresponding to the most anterior of the teeth in the young *T. inunguis*, and has in use three teeth, respectively 8, 10·2, and 10·9 mm. in length, and these would therefore be numbers 2, 3, and 4; while within the jaw

[1] Abh. mittelrhein. geol. Vereins, i. p. 106 (1882). Lepsius also refers to the statement by Gervais (Zool. Pal. Gén. i. p. 184, 1868) that the molars are "en nombre indéterminé"; but as Gervais goes on to say that in number they are "supérieur à cinq," the statement, however true, can hardly be said to be of any importance for our present purpose.

[2] Still often called *Manatus*, in spite of the clear proof of the incorrectness of the latter term given by many systematists and anatomists, among whom may be mentioned Wiegmann, Von Baer, Müller, Stannius, J. A. Allen, Merriam, &c. The proper scientific name of the Walrus is *Odobænus*.

[3] P. Z. S. 1897, p. 47.

there are two more, 11·5 and 12·2 mm. long, which would be nos. 5 and 6 of the full set (Plate XXXVI. fig. 1).

Comparing this with the next-sized mandible (B.M. 1388 *f*), which shows the alveolus of one recently lost tooth, 4 teeth in place, and 2 within the jaw, we cannot match the two posterior teeth of the youngest jaw (nos. 5 and 6) with any teeth further back in it than the 1st and 2nd of the standing teeth, respectively 10·7 and 11·3 mm. long, while they may belong still further forward, as there is a considerable difference in the ages of the two specimens. However, even this matching makes the 7 teeth of this second jaw to be numbers 4 to 10, the last having a length of 14·2 mm. (Plate XXXVI. fig. 2).

The next jaw, 200 mm. long (B.M. 1388 *d*), gives evidence of 8 teeth, and comparing these with the last set we may match no. 10 with the fourth, so that the posterior four would be nos. 11 to 14; but it is by no means certain that the numbers should not be even higher (Plate XXXVI. fig. 3).

A similar comparison with another mandible 242 mm. long (B.M. no. 94. 7. 25. 7) seems to show that the ten teeth of which evidence is shown may be nos. 11 to 20 at the lowest, a result that is fully supported by the other skulls available (Plate XXXVI. fig. 4). Any error there may be in the enumeration is on the side of making the total too low.

No essential difference appears to exist between the dentition of the upper and lower jaws, and we have therefore confined our observations to the latter as being more convenient. It is true that Dr. Kükenthal assigns three premolars to the lower jaw and none to the upper; but all the skulls we have seen appear to have a perfectly similar dentition above and below.

Among the adult skulls both sexes seem to be represented, and we have failed to find any possible cause of error in our calculations due to the factor of sex.

We have therefore, by a method which appears to be perfectly sound, arrived at a number identical with that which Lepsius considered would be the minimum outcome of Krauss's observations.

But in trying to find out how many teeth a Manatee may have in its life, a further complication is introduced by the remarkable fact that in not a single specimen available to us, however large, has the growth of additional teeth behind come to an end, so that fresh teeth are apparently being produced to the close of the animal's life. It would thus seem that a long-lived Manatee might have a much larger number of teeth even than the 20 above referred to, and, in fact, if any certain method of finding out the exact number could be discovered, we should not be surprised if the total were to amount to 30 or more.

But even if there are only 15 or 18 teeth to be dealt with, we are confronted with the very difficult problem of the origin and homologies of these numerous teeth, and, after that, with the bearing that their evolution has on that of other many-toothed mammals.

Firstly, it will not, we think, be contended by anyone, especially in face of the palæontological evidence referred to below, that the great number of the teeth of the Manatee has any direct connection with the polyphyodontism of the primitive Mammalia recognized [1] by many recent authors, even though Dr. Kükenthal, in his account of the embryonic distribution of the Manatee, says [2]: "Ich nehme demnach an, dass nicht weniger als drei auf einander folgende Dentitionen sich am Aufbau dieses Backzahnes beteiligen."

Apart from "pre-lacteal" and "post-permanent" teeth, in whose existence, with Messrs. Wilson and Hill, we should be glad to disbelieve, the utmost number that can be made out of the ordinary mammalian set is 12, of which 4 would be milk-molars, 4 premolars, and 4 molars. This is allowing for the possibility of the milk-molars being regularly retained and the premolars coming up behind instead of below them. Since, however, even with this rather far-fetched explanation, the numbers are still far short of the total required, we are disposed to think it unlikely, and prefer to consider only the first three or four teeth as premolars, and the rest as true molars. Whether such premolars belong to the permanent or to the milk series, we have no evidence on which to base a suggestion. In Elephants, where the tooth-succession is somewhat similar, the corresponding teeth belong to the milk and not to the permanent series.

If the presence of a specially large number of teeth in this genus had any connection with a primitive multiplication of the sets of teeth, the ancestors of *Trichechus* should have possessed an equally redundant dentition, and on this point we are provided with evidence to the contrary. For it fortunately happens that there are fossil Sirenians so closely allied to the modern ones that we may almost treat them as if they were direct ancestors.

Of these, by far the most important—because the best known—is the Oligocene *Halitherium*, of which large numbers of specimens have been described and figured by various authors, notably Drs. Krauss [3] and Lepsius [4].

In this genus a careful examination of the teeth seems to show that although there was a distinct tendency towards the rapid wear and degeneration of the anterior cheek-teeth so characteristic of *Trichechus*, yet that the series of molars did not exceed four in number, and in any case came to an end as soon as the animal was adult. This latter point, so important for our present purpose, is clearly demonstrated by Krauss's plate vi. and Lepsius's plate x. fig. 96, where may be seen a terminal molar, considered to be $m.^4$, fully up, beginning to be worn, and yet without any trace of a posterior tooth rising up to succeed it, as would be the case in the Manatee.

[1] This, apparently with good reason, is altogether denied by the latest writers on the subject, Messrs. Wilson and Hill, Quart. Journ. Micr. Sci. 1897, p. 427 *et seqq.*

[2] Anat. Anz. xii. p. 524 (1896).

[3] N. Jahrb. Min. 1862, pp. 385–414, pls. vi. & vii.

[4] Abh. mittelrhein. geol. Vereins, 1882, pp. 100–200, pls. i. to x.

Prorastomus [1], again, believed to be also of Oligocene age, whose dentition has been recorded as $i.\frac{3}{3}$, $c.\frac{1}{1}$, $p.\frac{4}{4}$, $m.\frac{4}{4}$, has—whether this dental formula is correct in details or not—quite clearly no trace of a continuous succession of teeth such as occurs in *Trichechus*. This observation we have been able to make on the type specimen of *P. sirenoides* from Jamaica (B.M. no. 44897), which Dr. Woodward has been good enough to have further developed from the matrix with a special view to the settlement of the point under discussion.

From these facts it results that the continuous succession of teeth in *Trichechus* is not a primitive character, but a new development, evolved to make up for the rapid wear and tear of the cheek-teeth which must take place in an animal living on seaweed and water weeds, and consequently having a large amount of sand mixed with its food.

The evolution of these extra teeth may be supposed to have taken place by a gradual extension of the process seen in the early development of the posterior molars of ordinary mammals. There it is generally considered that the appearance of the budding-out of the posterior molars from the germs of the anterior ones is really merely due to the retardation of the growth of the posterior end of the dental lamina in relation to the shortness of the jaw in the young animal. Then, as the jaw lengthens, the lamina grows further backwards, the molars budding off from it in succession [2]. Now there seems to be no inherent reason why, if the jaw were to go on lengthening indefinitely, the dental lamina should not also go on lengthening, and equally go on budding-out more and more molars behind. And although there is of course no indefinite lengthening of the jaw in the Manatee, the exact effect of such a lengthening, so far as the teeth are concerned, is attained by the steady progression forwards of the teeth in the jaw, which would equally leave a space behind the teeth, needing further teeth to fill it.

We may note in this connection that Mr. M. F. Woodward has suggested—on the jaw-lengthening theory—that the late-appearing fourth molar of *Centetes* is similarly a new development [3], and not a primitive character, but up to the number of four, common to *Otocyon* and most Marsupials, there are not the objections to bringing in the primitive theory that are so strong in the case of the Manatee. Still, with the fourth molars of *Centetes* and *Otocyon*, the fifth of *Bettongia* [4], and even the fifth and sixth of *Myrmecobius*, our views on the dentition of *Trichechus* make it clear that their primitive origin must not be too confidently presumed, as has often been the case.

[1] Owen, Quart. Journ. Geol. Soc. vol. xi. p. 541 (1855), and xxxi. p. 559 (1875). See also Lydekker, Cat. Foss. Mamm. Brit. Mus. pt. v. p. 12 (1887), and P. Z. S. 1892, p. 77.

[2] Mr. M. F. Woodward has been good enough to supply us with a concise account of the present state of opinion on this vexed question.

[3] P. Z. S. 1896, p. 572.

[4] See Thomas, Cat. Marsup. B.M. p. 105 (footnote).

Whether the possibility that mammals may secondarily develop a practically unlimited number of teeth has any bearing at all on the case of the Cetacea, we are not at present prepared to say. But it is evident that the complexity of the Manatee's numerous teeth quite disproves the idea that Mammal-teeth cannot be at the same time both numerous and complex—an idea on which the theory that cetacean teeth are the separated portions of a smaller number of complicated teeth was very largely based. That the same theory in another form may still be true—viz., that they are the separated cusps of Seal-like or Zeuglodon-like teeth highly developed and then separated by hypsodontism,—we are not at present disposed to deny.

From what is said above, it will be evident that we think the multiplicity of the teeth in the Cetaceans has in any case an entirely different origin to that in the Sirenians and does not indicate any unsuspected affinity between them. In fact we still think that the probabilities are on the whole in favour of a Carnivorous origin for the Cetacea, and an Ungulate one for the Sirenia.

In any case, whatever bearing the secondary development of a continuous and indefinite multiplication of teeth may have on general problems of tooth-evolution, the mere fact itself is sufficiently interesting to be recorded.

EXPLANATION OF PLATE XXXVI.

Fig. 1. Young lower jaw of African Manatee, showing teeth 2 to 5.
2. Somewhat older jaw of same, with teeth 5 to 10.
3. Still older jaw of same, with teeth 9 to 13.
4. Very old jaw of same, with teeth 12 to 19.
5. Very young lower jaw of Amazonian Manatee, showing the first six teeth.

June 1, 1897.

Dr. A. Günther, F.R.S., V.P., in the Chair.

A communication was read from Dr. John Anderson, F.R.S., who sent for exhibition a coloured drawing of the Egyptian Weasel (*Mustela subpalmata*), accompanied by the following remarks:—

"The three examples of the Egyptian Weasel now living in the Society's Gardens were obtained in Lower Egypt, but the exact locality where they were caught I shall not know until Mr. Birdwood arrives in this country, I hope, about the middle of June.

"On two previous occasions living examples of this species captured for me have unfortunately died on their way to this country.

"I have made many enquiries about the Weasel in different parts of Egypt, during my frequent visits to that country, and as it is familiar to the natives by its well-known name *Ersa*, there can be no question that they clearly understood the animal I had in view. My informants have been unanimous in saying that it frequents houses, and that it is found not only in villages and towns throughout Lower Egypt, but even in the cities of Cairo and Alexandria.

Two specimens that died on their way to London were captured in Cairo. The natives say that it is most useful to them in destroying the rats and mice with which their houses are infested, and it seems to me probable that its services in this respect may account for the difficulty that is experienced in getting them either to capture it or kill it.

"Hemprich and Ehrenberg, in their description of it (Symb. Phys., Mamm. sig. K), under the specific term *Mustela subpalmata*, also state[1] that it frequents houses, attracted to them by the presence of rats and mice. The term *subpalmata* has reference to the rather marked palmation of the digits; but how it compares in this respect with *Putorius boccamela* I cannot at present say. I have never met with the Weasel in my wanderings in Egypt, and I have never learned of any one who has. The natives say that they only see it at night. The material at present existing in London is not sufficient to enable the question of ther elation in which the Egyptian Weasel stands to *Putorius boccamela*, Bechstein, and *P. africanus*, Desm., to be settled. The six specimens that have come under my observation are unquestionably of one species and are examples of *M. subpalmata*, Hempr. & Ehrenb., but whether this species differs from *P. boccamela* has yet to be ascertained. I therefore prefer to speak of the Egyptian Weasel tentatively as *M. subpalmata*, Hempr. & Ehrenb. I hope, however, soon to obtain additional materials for the solution of this question.

"I have the pleasure to submit a coloured drawing made from life of the largest specimen in the Society's Gardens, as this is the first time that this most interesting animal has been seen alive out of its own country.

"It is thus a most valuable addition to the Gardens, and we are much indebted to Mr. Birdwood, our Corresponding Member in Egypt, for the three specimens.

"The drawing has been made by Mr. P. J. Smit for my work on the Mammals of Egypt, now in progress."

Mr. E. Cavendish Taylor, F.Z.S., exhibited a skin of the Egyptian Weasel (*Mustela subpalmata*), on which he made the following remarks:—"This Weasel was obtained by me at Cairo about the end of January 1896. It was caught close to Cairo by an Arab, who sold it alive to Mr. Bramly, the then Curator of the Cairo Zoological Gardens. On the first day of its arrival at the Gardens it killed and ate a rat, but unfortunately died the next day. Mr. Bramly kindly sent me the dead body to my hotel, and I made of it the skin I now exhibit. The animal is a male, very large in size, with the tail very long and the throat very yellow. These characters are, I believe, constant in the Egyptian Weasel. In one respect I have been more fortunate than Dr. Anderson, for I have once met with the Weasel alive in Egypt. I well remember

[1] "Quarta *Mustelinorum* forma *Mustelæ vulgari* admodum affinis est. In itinere *Mustelæ subpalmatæ* nomine eam distinximus, digiti enim membrana latius coniuncti erant, statura minor. In domibus ægyptiacis Cahiræ et Alexandriæ murium vulgaris socius."

that in the winter of 1891, during an afternoon walk just outside the walls of Cairo, on the desert side of the town, I came across a large Weasel with a yellow throat, which on my approach ran off and took refuge in a hole in the old city walls."

Professor T. W. Bridge, F.Z.S., read a memoir on "The Morphology of the Skull in the Paraguayan *Lepidosiren* and other Dipnoi."

The first portion of this paper treated in detail of the structure of the skull in one of the specimens of *Lepidosiren* collected in the region of the Paraguay river by the German traveller Dr. Bohls. In the second portion was included a revision of the cranial structure of *Ceratodus* and *Protopterus*, and a detailed comparison of the two genera with one another and with *Lepidosiren*.

As compared with *Protopterus*, the most noteworthy distinctive features of the skull of *Lepidosiren* were stated to be:—

(*a*) The further atrophy of the occipito-periotic portion of the chondrocranium, and the reduction in height and thickness of the tubercular rods which form the connection between the occipito-periotic and ethmo-nasal regions.

(*b*) The extension of the antorbital cartilages into the upper labial folds as far forwards as the extremity of the snout.

(*c*) The rotation backwards of the axis of the suspensorial cartilage to a greater extent than in either *Protopterus* or *Ceratodus*: hence it followed that the suspensorium made a more open angle with the fore part of the basicranial axis than was the case with either of the two last-mentioned genera.

(*d*) The greater development of the fronto-parietal bone, which not only completely covered the dorsal surface of the cranium, but also invested the auditory capsules, formed the lateral bony cranial walls of the interorbital region, and, moreover, strengthened each suspensorial cartilage by investing its outer surface nearly as far ventrally as the articular condyle for the lower jaw.

In comparing the three types the conclusion arrived at was, that the skull of *Ceratodus* was by far the most generalized and primitive, and further, of the two remaining genera the skull of *Lepidosiren* represented but a slightly more specialized type than that of *Protopterus*. Briefly, it might be affirmed that if the skull of *Ceratodus* were taken to represent a relatively early larval stage, those of *Protopterus* and *Lepidosiren* were comparable to two immediately succeeding but much later stages, while, with one or two exceptions, the differences between the two latter genera were much the same in nature and extent as those which, for example, characterized the skulls of first and second year frogs.

The third section of the paper included a brief summary of the present state of our knowledge of the structure of the skull in the fossil Dipnoi, and a comparison of it with existing types. On the evidence afforded by the skull alone, it was inferred that *Ceratodus* was the most primitive of known Dipnoi, and that *Protopterus* and *Lepidosiren* were the specialized and direct descendants of some *Ceratodus*-like ancestor. Of the fossil Dipnoi, *Ctenodus* certainly,

and possibly *Phaneropleuron*, approached more closely to *Ceratodus* than did *Dipterus* and its allies. The last-mentioned Dipnoi, on the contrary, seemed to represent a divergent and terminal branch of the Dipnoan stem and to include the most highly specialized examples of the group.

This memoir will be published entire in the Society's 'Transactions.'

The following papers were read:—

1. On the Classification of the *Thyrididæ*—a Family of the Lepidoptera Phalænæ. By Sir George F. Hampson, Bart., F.Z.S.

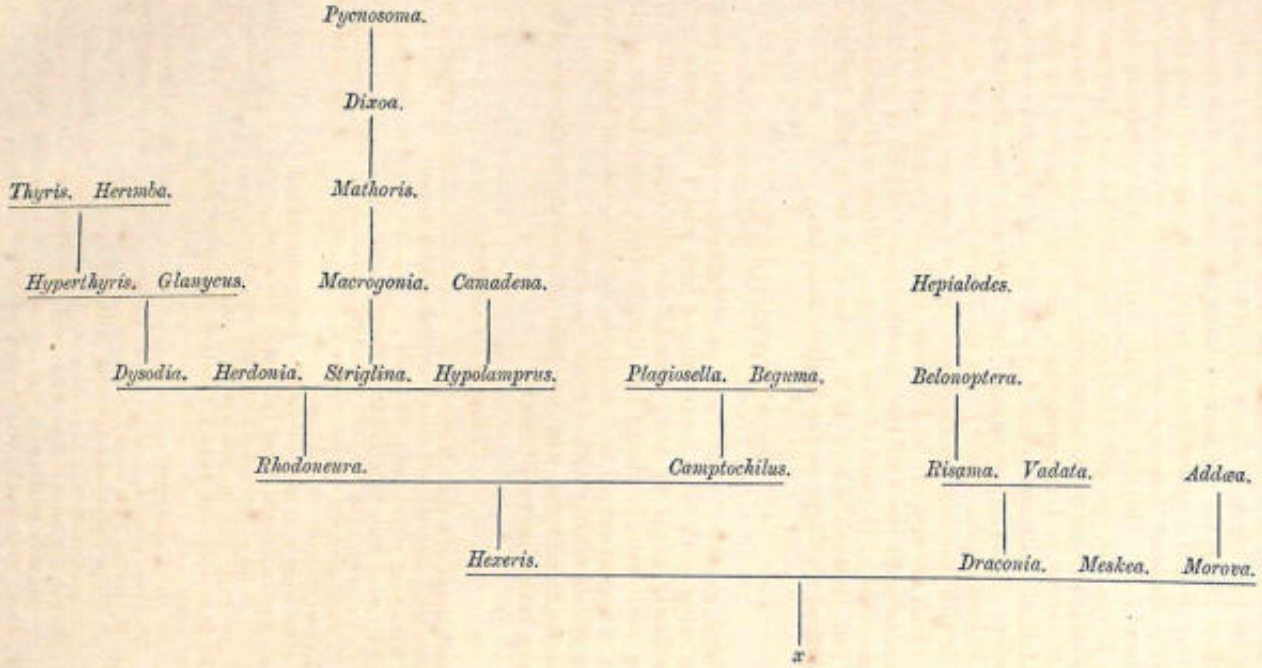
[Received April 8, 1897.]

The *Thyrididæ*, of which a classification is here given, is a small family of Lepidoptera closely related to the ancestral stock of the *Pyralidæ*, in which family they are most nearly allied to the Indian *Simæthistis* and to two Australian species, *asuridia*, Butl., and *magnifica*, Meyr., for which a genus requires to be made. Most of the genera have veins 2 to 11 of the fore wing arising from the cell, and vein 8 of the hind wing approximated to 7 at or beyond the end of the cell, not anastomosing with 7 as in the majority of the *Pyralidæ*. These characters show a very generalized type of structure, but as specialized developments we have the abortion of the maxillary palpi and of the vein in the submedian fold of the hind wing, which prevents their being regarded as the ancestors of the *Pyralidæ*, in all of which the latter character is retained and also the former in all except a specialized subfamily, the *Chrysauginæ*.

From the *Thyrididæ* were derived the *Drepanidæ*, closely related to them and differing principally in the more complicated neuration of the subcostal veins of the fore wing and in vein 1 *a* of the hind wing being absent or short, these again giving rise to the small Oriental day-flying family *Callidulidæ*; the whole group of families, which includes also the *Pterophoridæ* and *Orneodidæ*, having sprung from the *Tineid* stock near the ancestors of the *Sesiadæ* and *Zygænidæ*.

The *Thyrididæ* are almost entirely confined to the Tropical zone; the genus *Thyris* itself is Palæarctic and Nearctic, but of the rest of the family only two or three species spread into the Southern States, a few more to Japan and N. Asia, and one to New Zealand. The ancestral form of the family would have short porrect palpi, all the veins of the fore wing from the cell, the hind wing with vein 5 from the middle of the discocellulars and vein 8 free; with such a form *Morova* conforms except that veins 8 and 9 of the fore wing are stalked. From this ancestral type have developed forms of abnormal shape and appearance culminating in *Hepaliodes*—forms with the subcostal neuration of the fore wing modified in various ways, such as *Beguma*, *Plagiosella*, and *Pycnosoma*, and forms with the discocellulars aborted, such as *Glanycus* and *Thyris*.

PHYLOGENY OF THE THYRIDIDÆ.



In aid of the preparation of this paper and one on the subfamily *Chrysauginæ* I have to thank the Hon. Walter Rothschild for the loan of the whole of his material to work out and classify; Mr. Herbert Druce for the loan of many species from the Neotropical region; Mr. W. Schaus for the gift of many species from the same region; Madame Ragonot for the loan of types described by her husband; Mr. Meyrick for help with the Australasian species; Mr. Elwes for the gift of types described by Mr. Meyrick from the Malayan region; Dr. Staudinger for the loan of types described by Möschler and Pagenstecher; and Prof. Poulton for the loan of Oxford Museum types. As in my other papers on groups of *Pyralidæ* in the 'Proceedings' for 1896 and the 'Transactions of the Entomological Society' for the same year, types of species in the British Museum are marked with a †; species I have examined but which are not in the Museum, with a *; whilst species I have been unable to see and the classification of which is doubtful, are enumerated at the end of the genera. When it is stated "Types in Coll. Rothschild and B.M.," the type is in Mr. Rothschild's collection, a co-type in the British Museum.

Family THYRIDIDÆ.

Palpi slender; maxillary palpi absent; proboscis present. Fore wing with vein 1 *a* forming a fork with 1 *b*; 5 from or from near lower angle of cell; 6 to 11 usually from the cell. Hind wing with vein 1 *c* absent; 5 usually from near lower angle of cell; 8 approximated to 7 at upper angle of cell, or approximated to or anastomosing with it after the angle.

Larvæ Pyraliform, with five pairs of prolegs, in the case of many species being internal feeders.

Key to the Genera.

A. Both wings with the cell open ..... 1. *Thyris*, p. 606.
B. Fore wing with the cell closed, hind wing with it open. [p. 608.
  a. Fore wing with veins 7, 8 stalked ..... 4. *Glaucyes*, [p. 607.
  b. Fore wing with veins 7, 8 from the cell.
    a'. Palpi with the 3rd joint upturned ..... 3. *Hyperthyris*,
    b'. Palpi with the 3rd joint porrect ..... 2. *Herimba*, p. 607.
C. Both wings with the cell closed.
  a. Hind wing with vein 5 from near lower angle of cell.
    a'. Fore wing with veins 7, 8 and 9, 10 stalked. [p. 610.
      a^2. Palpi with the 3rd joint long and porrect ..... 7. *Pycnosoma*,
      b^2. Palpi with the 3rd joint short and upturned ... 8. *Dixoa*, p. 611.
    b'. Fore wing with veins 7, 8 stalked; 9 and 10 from cell. [p. 625.
      a^2. Palpi upturned ..... 15. *Plagiosella*,
      b^2. Palpi porrect ..... 17. *Camptochilus*,
    c'. Fore wing with veins 7, 8 from cell; 9, 10 stalked. [p. 627.
      a^2. Palpi upturned; fore wing with the apex not produced ..... 9. *Mathoris*,
      b^2. Palpi porrect; fore wing with the apex extremely produced ..... [p. 611. 22. *Vadata*, p. 630.
    d'. Fore wing with vein 8 anastomosing with 9, which is given off from 10 to form an areole ... 16. *Beguma*, p. 626

e'. Fore wing with veins 8, 9 stalked, 7 and 10 from cell.
a^2. Palpi upturned. [p. 613.
a^3. Hind wing with the apex produced and acute. 12. *Camadena*,
b^3. Hind wing with the apex not produced ..... 13. *Hypolamprus*,
b^2. Palpi porrect; fore wing with vein 5 from below middle of discocellulars ..... [p. 614. 24. *Meskea*, p. 631.
f'. Fore wing with veins 6 to 11 from cell.
a^2. Fore wing with veins 9 and 10 from a point well before angle of cell.
a^3. Both wings with the outer margin angled at middle ..... 10. *Macrogonia*,
b^3. Both wings with the outer margin evenly curved..... [p. 612. 11. *Striglina*,
b^2. Fore wing with veins 9 and 10 from close to angle of cell. [p. 612.
a^3. Palpi upturned.
a^4. Hind wing with the outer margin nearly evenly curved.
a^5. Fore wing with the costa not excised at middle ..... 14. *Rhodoneura*,
b^5. Fore wing with the costa excised at middle ..... [p. 615. 6. *Herdonia*,
b^4. Hind wing with the outer margin much excurved at middle; the build stout ..... [p. 610. 5. *Dysodia*, p. 608.
b^3. Palpi porrect.
a^4. Palpi extending about twice the length of head, the 3rd joint long ..... 18. *Hexeris*, p. 627.
b^4. Palpi extending about the length of head, the 3rd joint moderate.
a^5. Hind wing with the costa excised before apex, which is produced upwards into a lobe..... 19. *Hepialodes*,
b^5. Hind wing with the costa not excised towards apex. [p. 628.
a^6. Hind wing with the apex produced and falcate ..... [p. 628. 20. *Belonoptera*,
b^6. Hind wing with the apex not produced. 21. *Risama*, p. 629.
c^4. Palpi hardly extending beyond the frons... 23. *Draconia*,
b. Hind wing with vein 5 from middle of discocellulars. [p. 630.
a'. Palpi upturned ..... 25. *Addæa*, p. 632.
b'. Palpi porrect ..... 26. *Morova*, p. 633.

Genus Thyris.

Thyris, Lasp. Ill. Mag. ii. p. 39 (1803), non descr.
Thyris, Ochs. Schmett. Eur. ii. p. 115 (1808).

Proboscis well developed; palpi upturned, the 2nd joint clothed with rough hair and reaching vertex of head, the 3rd acute; head clothed with rough hair; antennæ of male thickened by appressed serrations; tibiæ clothed with rough hair; abdomen of male with long tubular anal tuft. Fore wing with the costa slightly arched at base and towards apex, the outer margin excised below apex and excurved at middle; veins 3, 4, 5 well separated at origin; the cell open; 6, 7, 8, 9, 10 from upper angle. Hind wing with the outer margin excised below apex and excurved at middle; the cell open; veins 3, 4 from a point; 5 from above angle; 6, 7 from a point, 8 approximated to the cell to near their origin.

Fig. 1.



Thyris fenestrella, ♂. ½.

Type. (1) THYRIS FENESTRELLA, Scop. Ent. Carn. p. 217. Europe.
Sphinx pyralidiformis, Hübn. Sph. 16.

(2) THYRIS DIAPHANA, Staud. Cat. p. 19. S. Europe.
„ *vitrina*, H.-S. ii. p. 81, f. 11 (nec Boisd.).

(3) THYRIS MACULATA, Harris, Cat., Am. Journ. Sci. xxxvi. p. 313. U.S.A.

†*Sagalassa perspicua*, Wlk. viii. 7.

(4)†THYRIS USITATA, Butl. A. M. N. H. 1879, ii. p. 367. Japan.

(5) THYRIS LUGUBRIS, Boisd. Spec. Gén. pl. 14. f. 11. U.S.A.
„ *sepulchralis*, Boisd. Guér. Icon. pl. 84. 2. f. 1.

Genus HERIMBA.

Herimba, Moore, Lep. Atk. p. 20 (1879).

Palpi upturned, the 2nd joint not reaching vertex of head, the 3rd porrect; antennæ of male ciliated; tibiæ hairy. Fore wing with vein 3 from before angle of cell; 4, 5 from angle; 6 from below upper angle; 7, 8 from upper angle; 9, 10 from close together before the angle. Hind wing with veins 3, 4, 5 from angle of cell which is open; 6, 7 from upper angle; 8 well separated from 7.

Fig. 2.



Herimba atkinsoni, ♂. ½. (From Moths Ind. vol. i.)

Type. HERIMBA ATKINSONI, Moore, Lep. Atk. p. 21, pl. 2. f. 3. N.E. India; Burma.

Genus HYPERTHYRIS.

Hyperthyris, Leech, Trans. Ent. Soc. 1889, p. 121.

Palpi upturned, the 2nd joint clothed with hair and reaching vertex of head, the 3rd naked and acute; antennæ of male minutely ciliated; tibiæ clothed with long hair. Fore wing with

the costa and outer margin evenly curved; vein 3 from before angle of cell; 4, 5 from angle; the cell closed; 6 from below upper angle; 7, 8, 9 from angle. Hind wing with the cell open; veins 4, 5 and 6, 7 given off near the margin; 8 approximated to the cell at middle.

Fig. 3.



Hyperthyris aperta, ♂. ½. (From Moths Ind. vol. i.)

Type. *Hyperthyris aperta, Leech, Trans. Ent. Soc. 1889, p. 122, pl. vii. f. 7. China; Sikhim.

Genus Glanycus.

Glanycus, Wlk. iii. 634 (1855).

Palpi upturned, thickly scaled, and hardly reaching vertex of head; antennæ of male fasciculate; tibiæ clothed with rough hair; build stout. Fore wing long and narrow; the outer margin very obliquely curved and excised towards outer angle; veins 3, 4, 5 from angle of cell which is closed; 6 from upper angle; 7, 8 stalked; 9, 10, 11 free. Hind wing with the cell open; veins 4, 5 and 6, 7 given off very near the margin; 8 anastomosing with the cell at middle.

Fig. 4.



Glanycus insolitus, ♀. ½. (From Moths Ind. vol. i.)

Sect. I. Hind wing with the anal angle truncate.

Type. (1)†Glanycus insolitus, Wlk. iii. 635; Butl. Ill. Het. v. pl. 84. f. 12 (♀). N.E. India; Borneo.

Sect. II. Hind wing with the anal angle produced and lobed.

(2)†Glanycus tricolor, Moore, Lep. Atk. p. 38; Waterh. Aid, ii. pl. 131. f. 1. N.E. India.

Genus Dysodia.

Dysodia, Clem. Pr. Ac. N. Sc. Phil. 1860, p. 349.
Platythyris, Gr. & Rob. Ann. N. Y. Lyc. viii. p. 361 (1867).
Varnia, Wlk. Journ. Linn. Soc. vii. p. 69 (1864).
Pachythyris, Feld. Reis. Nov., Lep. pl. 75. f. 1 (1867).

Palpi upturned, the 2nd joint thickly scaled and reaching vertex

of head, the 3rd naked; antennæ almost simple in both sexes; femora and tibiæ clothed with very long hair; build stout. Fore wing with the outer margin excurved at middle; vein 3 from before angle of cell; 4, 5 from angle; 6 from below upper angle; 7, 8, 9, 10 from angle. Hind wing with the outer margin excurved at middle; veins 3, 4, 5 from angle of cell; 6, 7 from upper angle; 8 approximated to cell at upper angle.

Fig. 5.



Dysodia ignita, ♂. ½. (From Moths Ind. vol. i.)

Type. (1) DYSODIA VITRINA, Boisd. Mon. Zyg. p. 19, pl. 1. f. 5. U.S.A.

(2) DYSODIA OCULATANA, Clemens, Pr. Ac. N. Sc. Phil. 1860, p. 349. U.S.A.; Panama.
†*Varnia plena*, Wlk. xxxiii. 826.
Platythyris fasciata, Gr. & R. Ann. N. Y. Lyc. viii. pl. 13. ff. 4, 5.
Thyris montana, H. Edwards, Pr. Cal. Ac. Sc. v. p. 413.
Varnia aurea, Pag. Iris, v. p. 32.

(3)†DYSODIA INTERMEDIA, Wlk. xxxiii. 827. Natal.
†*Varnia crassa*, Wlk. xxxiii. 827.

(4) DYSODIA SPECULIFERA, Sepp, Surinam, iii. pl. 135. Florida; Tropical America.
Varnia æqualis, Wlk. xxxiii. 825.
„ *flagrata*, Wlk. xxxiii. 826.
Pachythyris thyridina, Feld. Reis. Nov. pl. 117. f. 20.

(5)†DYSODIA IGNITA, Wlk. xxxiii. 825. India; Ceylon;
Varnia inæqualis, Wlk. xxxiii. 828. Sumatra; Java.
Pachythyris rajah, Boisd. Lép. Hét. p. 492.
„ *siculoides*, Feld. Reis. Nov. pl. 75. f. 1.
Varnia fenestrata, Moore, P. Z. S. 1881, p. 376.
„ *ypsiloides*, Pag. Iris, v. p. 35.
Subsp. 1.
Varnia miniata, Wlk. Journ. Linn. Soc. vii. p. 69. N.E. India.
Subsp. 2.
Varnia incudigera, Pag. Iris, v. p. 33. Java.
Subsp. 3.
†*Varnia taprobana*, Moore, Lep. Ceyl. iii. p. 67, pl. 151. f. 7. Ceylon.

(6)*DYSODIA ALBIFURCA, Hmpsn. Moths Ind. i. p. 369. Sikhim.

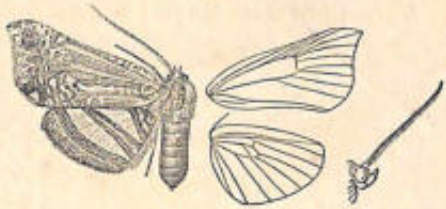
(7)†DYSODIA VIRIDATRIX, Wlk. xv. 1777. India; Ceylon.
Eutelia siccifolia, Moore, P. Z. S. 1881, p. 375.

Genus Herdonia.

Herdonia, Wlk. xix. 963 (1859).

Palpi short and porrect; antennæ with short uniseriate branches in male; tibiæ nearly smooth. Fore wing with the costa arched at base and towards apex, slightly excised at middle; vein 3 from well before angle of cell; 4, 5 from angle; 6 from below upper angle; 7, 8, 9, 10 from near upper angle; 11 free. Hind wing with veins 3, 4, 5 widely separated at origin; 6, 7 from upper angle, 8 approximated to 7 after end of cell; a forked veinlet in cell.

Fig. 6.



Herdonia osacesalis, ♂. ½. (From Moths Ind. vol. i.)

Type. (1)†Herdonia osacesalis, Wlk. xix. 964; Feld. Reis. Nov. pl. 134. f. 4. China; N.E. India; Burma.

(2)†Herdonia botydana, Wlk. xxxii. 522. Brazil.

Genus Pycnosoma, nov.

Palpi with the 2nd joint obliquely upturned, the 3rd long and porrect; antennæ thickened and flattened; tibiæ smoothly scaled. Fore wing with vein 3 from before angle of cell; 4, 5 from angle; 6 from below upper angle; 7, 8 and 9, 10 stalked. Hind wing with vein 3 from before angle of cell; 4, 5 from angle; 6, 7 stalked; the outer margin excurved at middle.

Fig. 7.



Pycnosoma angulata, ♂. ½.

Type. †Pycnosoma angulata, n. sp.

♀. Head, thorax, and abdomen yellow suffused with rufous; wings golden yellow closely striated with rufous. Fore wing with oblique postmedial line sharply angled below costa, met by an oblique streak from apex and terminating at middle of inner margin. Hind wing with large dark discocellular spot followed

by hyaline and brown spots and with brown spots between it and inner margin; an obliquely curved postmedial rufous line terminating close to anal angle.

Hab. Espiritu Santo, Brazil. *Exp.* 32 mm.

Genus Dixoa.

Dixoa, Hmpsn. Moths Ind. i. p. 355 (1892).

Palpi upturned, slender, and hardly reaching vertex of head; antennæ ciliated; tibiæ smoothly scaled. Fore wing with vein 3 from before angle of cell; 4, 5 from angle; 6 from below upper angle; 7, 8 and 9, 10 stalked. Hind wing with vein 3 from before angle of cell; 5 from just above angle; 6 from below upper angle.

Fig. 8.



Dixoa albatalis, ♂. ½. (From Moths Ind. vol. i.)

Type. †Dixoa albatalis, Swinh. P. Z. S. 1889, p. 422, pl. 44. ff. 1, 2. W. India.

Genus Mathoris.

Mathoris, Guen. Ann. Soc. Ent. Fr. 1877, p. 282.

Palpi upturned and reaching vertex of head, the 3rd joint short; frons with a rounded prominence; antennæ somewhat thickened; mid tibiæ with a tuft of hair on outer side from base. Fore wing with vein 3 from before angle of cell; 4, 5 from angle; 6, 7 from below upper angle; 8 from angle; 9, 10 stalked. Hind wing with veins 3, 4, 5 from close to angle of cell; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 9.



Mathoris vocata, ♂. ½.

Type. (1)†Mathoris vocata, Wlk. xxii. 662. Brazil.
†*Cambogia procurata*, Wlk. xxii. 672.
Siculodes roseola, Feld. Reis. Nov. pl. 134. f. 5.
Mathoris crepuscula, Guen. Ann. Soc. Ent. Fr. 1877, p. 283.

(2)*Mathoris mediaria, Wlk. xx. 229. Brazil.

Genus Macrogonia.

Macrogonia, H.-S. Samml. aussereur. Schmett. p. 62 (1850).

Palpi upturned, reaching vertex of head; antennæ of male strongly ciliated; tibiæ clothed with long hair. Fore wing with the outer margin slightly angled at middle; vein 3 from before angle of cell; 4, 5 from angle; 6 from below upper angle; 7, 8 from angle; 9, 10 from well before angle. Hind wing with the outer margin angled at middle; veins 3, 4, 5 from angle of cell; 6, 7 from upper angle.

Fig. 10.



Macrogonia igniaria, ♂ ½.

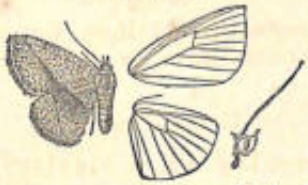
Type. Macrogonia igniaria, H.-S. Samml. aussereur. Schmett. p. 62, f. 315. Brazil.

Genus Striglina.

Striglina, Guen. Ann. Soc. Ent. Fr. 1877, p. 283.
Tanyodes, Möschl. Surinam, iv. p. 25 (1881).
Sonagara, Moore, Lep. Atk. p. 179 (1882).

Palpi upturned, the 2nd joint thickly scaled and reaching vertex of head, the 3rd short and naked; frons with a tuft of hair; antennæ of male somewhat thickened and flattened; tibiæ fringed with long hair. Fore wing with vein 3 from before angle of cell;

Fig. 11.



Striglina scitaria, ♂. ½. (From Moths Ind. vol. i.)

4, 5 from angle; 6 from below upper angle; 7, 8 from angle; 9, 10 from well before angle. Hind wing with veins 3, 4, 5 from angle of cell; 6, 7 from upper angle.

(1)†Striglina xanthopera, n. sp.

♂. Head rufous; collar yellow; thorax and abdomen pinkish brown: wings pinkish brown thickly speckled with yellow; fore

wing with a patch of bright yellow on costa before apex; a yellow line outwardly edged by fuscous from apex of fore wing to middle of inner margin of hind wing.

Hab. Rio Janeiro. *Exp.* 28 mm.

(2)†Striglina pyrrhata, Wlk. xxxv. 1575. Australia.
„ *australina*, Guen. Ann. Soc. Ent. Fr. 1877, p. 284.

(3)†Striglina ochracea, Möschl. Surinam, iv. p. 25. Surinam; Amazons.

Type. (4)†Striglina scitaria, Wlk. xxvi. 1488; Moore, Lep. Ceyl. iii. pl. 175. ff. 1, 1 *a*. Amur; Japan;
†*Anisodes pyriniata*, Wlk. xxvi. 1582. Formosa; India, Ceylon
†*Thermesia reticulata*, Wlk. xxxiii. 1062. & Burma; Andamans;
Laginia reticulata, Wlk. xxxv. 1560. Borneo; New Guinea;
Striglina lineola, Guen. Ann. Soc. Ent. Fr. 1877, p. 284. Solomons; Australia; Fiji.
Homodes thermesioides, Snell. Tijd. v. Ent. 1877, p. 28.
Sonagara strigosa, Moore, Lep. Atk. p. 180.
Azazia navigatorum, Feld. Reis. Nov. pl. 117. f. 4.
†*Sonagara superior*, Butl. A. M. N. H. (5) xx. p. 433.
† „ *vialis*, Moore, P. Z. S. 1883, p. 27, pl. 6. f. 9 (var.).
† „ *strigipennis*, Moore, Lep. Atk. p. 180.
Timandra cancellata, Christ. Neue Lep. Amur, p. 23.

(5) Striglina glareola, Feld. Reis. Nov. pl. 134. f. 11. India;
† „ *decussata*, Moore, P. Z. S. 1883, p. 27, pl. 6. f. 8. Ceylon; Burma; Andamans; Borneo;
† „ *bivittata*, Moore, P. Z. S. 1883, p. 27, pl. 6. f. 7 (var.). Java; Australia.
„ *sordida*, Pag. Iris, v. p. 47.
†*Siculodes platyntis*, Meyr. Trans. Ent. Soc. 1894, p. 479 (var.).
Striglina duplicifimbria, Warr. A. M. N. H. (6) xviii. p. 272.

Auctorum.

Orthogramma rufitibia, Feld. Reis. Nov. pl. 117. f. 1. Brazil.
Striglina hyalospila, Lower, Tr. R. Soc. S. Austral. xviii. p. 87. Queensland.

Genus Camadena.

Camadena, Moore, Lep. Atk. p. 214 (1888).

Palpi upturned, reaching vertex of head; antennæ simple; hind tibiæ of male extremely long and swollen, the terminal pair of spurs short, a tuft of long hair from base, and the tarsus very short. Fore wing very acute and produced at apex, the costa straight; veins 3, 4, 5 widely separated at origin; 8, 9 stalked. Hind wing with the outer margin produced to a long point at vein 7; veins 3, 4, 5 widely separated at origin; 6, 7 from upper angle.

Fig. 12.



Camadena vespertilionis, ♀. ½. (From Moths Ind. vol. i.)

Type. CAMADENA VESPERTILIONIS, Moore, Lep. Atk. p. 214, pl. vii. f. 13. Sikhim.

Caustoloma acutipennis, Moore, Lep. Atk. p. 230.

Genus HYPOLAMPRUS.

Hypolamprus, Hmpsn. Moths Ind. i. p. 364 (1892).

Palpi slight, upturned, and reaching just above vertex of head; antennæ thickened and flattened; tibiæ smoothly scaled. Fore wing with vein 3 from before angle of cell; 4, 5 well separated at origin; 6 from below upper angle; 7 from angle; 8, 9 stalked. Hind wing with vein 3 from before angle of cell; 4, 5 from angle; 6, 7 from upper angle.

Fig. 13.



Hypolamprus striatalis, ♂. ½. (From Moths Ind. vol. i.)

SECT. I. Hind wing with the outer margin straight.

(1)†HYPOLAMPRUS TRIFASCIALIS, Moore, P. Z. S. 1877, p. 614, pl. 60. f. 9. Burma; Andamans.

SECT. II. Hind wing with the outer margin excised towards anal angle.

(2)†HYPOLAMPRUS ANGULALIS, Moore, Lep. Atk. p. 214. E. Himalayas; Burma.

(3) HYPOLAMPRUS SUBROSEALIS, Leech, Entom. 1889, p. 66, pl. iv. f. 14. China; N.W. Himalayas; Ceylon; Pulo Laut.

(4)†HYPOLAMPRUS PALLESCENS, n. sp.

♀. Whitish, almost wholly suffused with pale reddish brown. Fore wing with a slight mottled appearance, especially below middle of cell. Hind wing with traces of ante- and postmedial whitish bands. Underside of fore wing striated with black, forming an oblique band from below apex to above middle of inner

margin; a white subapical spot with a black speck on it; hind wing thickly striated with black.

Hab. Mysol (*Wallace*); West Australia. *Exp.* 28 mm.

(5) HYPOLAMPRUS NINNIUSALIS, Wlk. xix. 894. Brazil.

(6)*HYPOLAMPRUS COSTISCRIPTA, Warr. A. M. N. H. (6) xvii. p. 209. Fergusson I., N. Guinea; Queensland.

(7)† HYPOLAMPRUS PERATOPIS, n. sp.

♂. Head, thorax, and abdomen pale ferruginous. Fore wing whitish, almost wholly suffused and striated with ferruginous; the costal area ferruginous, with small pale quadrate patches; antemedial and medial ferruginous bands; a black-centred white subapical spot. Hind wing whitish, thickly striated with ferruginous and with traces of antemedial, postmedial, and submarginal bands, the last irregular and ending on the margin at vein 2. Underside of fore wing with cupreous and black markings in cell and beyond upper angle.

Hab. S.E. Borneo (*Doherty*); Amboina; Fergusson Isl. *Exp.* 22 mm.

SECT. III. Hind wing with the outer margin evenly curved.

(8)†HYPOLAMPRUS STRIATALIS, Swinh. P. Z. S. 1885, p. 875. India; Ceylon.

(9) HYPOLAMPRUS OBSCURALIS, Hmpsn. Moths Ind. i. p. 365. W. Africa; Himalayas; Assam.

(10)*HYPOLAMPRUS HEMICYCLA, Meyr. Trans. Ent. Soc. 1886, p. 216. Fiji.

(11) HYPOLAMPRUS LOBULATUS, Moore, Lep. Atk. p. 214. pl. 7. f. 12. N.E. India.

(12) HYPOLAMPRUS STYLOPHORA, Swinh. A. M. N. H. (6) xv. p. 17. N.E. India; Ceylon.

(13)*HYPOLAMPRUS ATROSTRIATUS, Hmpsn. Moths Ind. i. p. 365. Assam.

(14) HYPOLAMPRUS FIMBRIATA, Warr. A. M. N. H. (6) xvii. p. 207. Sikhim; Assam.

Genus RHODONEURA.

Rhodoneura, Guen. Ur. & Phal. ii. pl. i. f. 8 (1857).
Brixia, Wlk. xix. 889 (1859).
Calindœa, Wlk. xxvii. 87 (1863).
Osca, Wlk. Journ. Linn. Soc. vii. p. 73 (1864).
Canœa, Wlk. Journ. Linn. Soc. vii. p. 73.
Banisia, Wlk. Journ. Linn. Soc. vii. p. 77.
Iza, Wlk. xxxii. 521 (1865).
Pharambara, Wlk. xxxiv. 1274 (1865).

Opula, Wlk. Pr. N. H. S. Glasg. i. p. 371 (1869).
Siculodes, Guen. Ann. Soc. Ent. Fr. 1877, p. 289.
Microsca, Butl. Ill. Het. iii. p. 71 (1879).
Pyrinioides, Butl. Trans. Ent. Soc. 1881, p. 199.
Durdara, Moore, Lep. Atk. p. 176 (1882).
Letchena, Moore, Lep. Ceyl. iii. p. 257 (1887).
Sericophora, Christ. Rom. Mém. vi. p. 636 (1892).

Palpi slight, upturned, and reaching above vertex of head, the 2nd joint thickly scaled, the 3rd naked; frons rounded; tibiæ smoothly scaled. Fore wing with the apex somewhat produced and acute; vein 3 from near angle of cell; 4, 5 from angle; 6, 7, 8, 9, 10 from near upper angle. Hind wing with vein 3 from near angle of cell; 4, 5 from angle; 6, 7 from upper angle.

Fig. 14.



Rhodoneura acacinsalis, ♂. ½. (From Moths Ind. vol. i.)

Sect. I. Antennæ of male bipectinate, of female serrate.

(1)†Rhodoneura munda, Hmpsn. Moths Ind. i. p. 364. N.E. India.

(2) Rhodoneura plana, Swinh. Cat. Het. Mus. Oxon. ined. Aru.

Sect. II. Antennæ of male somewhat thickened.

A. Mid tibiæ of male fringed on outer side with spinous hair; hind tibiæ with a brush of long hair from base.

(3) Rhodoneura setifera, Swinh. A. M. N. H. (6) xvi. p. 298. Assam.

B. Tibiæ smoothly scaled.

a. (*Sericophora*.) Fore wing with the outer margin oblique and crenulate from vein 5 to outer angle.

(4)†Rhodoneura hypoxantha, Hmpsn. Moths Ind. i. p. 364. Himalayas; Assam; Burma.

(5)*Rhodoneura tristis, Hmpsn. Moths Ind. i. p. 364. Sikhim.

(6)*Rhodoneura guttata, Christ. Rom. Mem. vi. p. 636, pl. xiv. f. 14. Amur.

b. Hind wing with the outer margin straight, the inner area with a fold and tuft of long hair below.

(7)*Rhodoneura cervinalis, Pag. Iris, v. p. 82. Peru.

c. Hind wing with the outer margin concave from apex to anal angle.

a^1. Fore wing with the apex not produced and acute.

a^2. Hind wing with the anal angle not produced.

(8) RHODONEURA DORILUSALIS, Wlk. xix. 890. Borneo;
Pyralis imbutalis, Wlk. xxxiv. 1524. Pulo Laut; Mysol.

(9)*RHODONEURA CORTICINA, Pag. Iris, v. p. 112. Borneo.

(10)*RHODONEURA TRITROPHA, Swinh. A. M. N. H. (6) xv. p. 17. Assam.

(11)†RHODONEURA TERMINALIS, Wlk. xxxii. 522. Haiti.

(12)*RHODONEURA LEUCONOTULA, Pag. Iris, v. p. 80, pl. i. f. 15. Panama.

b^2. Hing wing produced to a point at anal angle.

(13)*RHODONEURA FUMATILIS, Pag. Iris, v. p. 81. Panama.

b^1. Fore wing with the apex produced and acute.

(14)*RHODONEURA TIGRIDULA, Guen. Ann. Soc. Ent. Fr. 1877, p. 292, & Ur. & Phal. ii. Siculides, f. 7. Cayenne.

d. Outer margin of hind wing slightly excised below apex.

a^1. Hind wing with the costa excised beyond middle.

(15)*RHODONEURA NIGROPUNCTULA, Pag. Iris, v. p. 109.
Dar-es-Salaam, E. Africa; Natal.
Rhodoneura seriata, Warr. Nov. Zool. iv. p. 20.

b^1. Hind wing with the costa not excised.

(16) RHODONEURA RUFARETA, Hmpsn. Moths Ind. i. p. 363. Sikhim.

(17)†RHODONEURA BRACTEATA, Hmpsn. Moths Ind. i. p. 363. Assam; Andamans.

(18)†RHODONEURA INTIMALIS, Moore, Lep. Atk. p. 213.
Assam; Ceylon; Java.
Pharambara compunctalis, Warr. A. M. N. H. (6) xvii. p. 208.
„ *ulterior*, Warr. A. M. N. H. (6) xvii. p. 212 (var.).

(19)*RHODONEURA BULLIFERA, Warr. Nov. Zool. iii. p. 343. Assam.

(20)*RHODONEURA MOLLIS, Warr. Nov. Zool. iii. p. 341. Sikhim.

(21)†RHODONEURA STENOSOMA, n. sp.

♂. Palpi with the third joint long and reaching well above vertex of head; abdomen very long.

Grey; abdomen with some dark marks on dorsum; wings sparsely irrorated with black scales and closely striated with fine dark striæ; traces of five bands on fore wing and three on hind

wing; fore wing with whitish mark below apex with dark speck on it, more prominent on underside. Underside of hind wing with some dark brown patches.

Hab. Ceylon (*Green*); Padang, Malay Pen.; Báli (*Doherty*). *Exp.* 28 mm. Type in B.M.

e. Both wings with the outer margin evenly rounded.

(22) RHODONEURA MYRTÆA, Drury, Exot. Ins. ii. pl. 2. f. 3. W. Indies; India Andamans; Borneo; Celebes.
Thermesia fenestrina, Feld. Reis. Nov. pl. 117. f. 2 (var.).
Striglina clathrula, Guen. Ann. Soc. Ent. Fr. 1877, p. 285.
†*Durdara fenestrata*, Moore, P. Z. S. 1883, p. 27, pl. vi. f. 6.
†*Microsca plagifera*, Butl. Trans. Ent. Soc. 1886, p. 420 (var.).
†*Durdara ovifera*, Butl. P. Z. S. 1892, p. 129, pl. vi. f. 7.

(23)†RHODONEURA MYRSUSALIS, Wlk. xix. 892. Porto Rico;
†*Letchena elaralis*, Wlk. xix. 901. Brazil; Natal; India;
Pyralis idalialis, Wlk. xix. 903. Ceylon; Burma; Borneo.
Siculodes cinereola, Feld. Reis. Nov. pl. 134. f. 8.
Striglina scallula, Guen. Ann. Soc. Ent. Fr. 1877, p. 287.
„ var. *immaculata*, Möschl. Abh. Senck. Ges. xvi. p. 123.
Durdara pyraliata, Moore, Lep. Atk. p. 177.
„ *lobata*, Moore, Lep. Atk. p. 177.
† „ *zonula*, Swinh. P. Z. S. 1885, p. 469, pl. 28. f. 12.
Striglina radiata, Pag. Iris, v. p. 41.

(24) RHODONEURA LOCUSALIS, Wlk. xix. 903. Ceylon.
†*Pyralis thyralis*, Wlk. xxxiv. 1234; Moore, Lep. Ceyl. iii. pl. 178. f. 10.

(25)†RHODONEURA POLYSTICTALIS, n. sp.

♀. Orange-red; wings orange-yellow, striated with double scarlet waved lines forming obscure bands. Fore wing with the costal area reddish, with four or five black marks on costa; both wings with the marginal area scarlet irrorated and striated with black. Underside of fore wing with the cell suffused with purplish and irrorated with black.

Hab. Mysol (*Wallace*), Jobie (*Doherty*). *Exp.* 14 mm. Types in B.M. & Coll. Rothschild.

(26) RHODONEURA AMETHYSTEA, Feld. Reis. Nov. pl. 134. f. 6. Brazil.

(27) RHODONEURA SEMITESSELLATA, Wlk. Journ. Linn. Soc. vii. p. 73. Burma; Borneo; Australia.
†*Pyralis semitessellalis*, Wlk. xxxiv. 1246.
Siculodes ignotalis, Rob. Tijd. v. Ent. xxxiv. p. 329 & xxxv. pl. 6. f. 7.

(28)†RHODONEURA IMPLETALIS, Wlk. Pr. N. H. S. Glasg. i. p. 371. W. Africa.

(29)*Rhodoneura wirneburgalis, Keferstein, J.B. Acad. Erfurt, new ser. vol. vi. 1870, p. 16, f. 9. Madagascar.
Siculodes plagula, Guen. Ann. Soc. Ent. Fr. 1877, p. 300.

(30)†Rhodoneura nebulosa, Warr. Trans. Ent. Soc. 1889, p. 261. Brazil.
Siculodes rotundula, Pag. Iris, v. p. 107, pl. 1. f. 7.

(31)†Rhodoneura hedilalis, Wlk. xix. 895; Druce, Biol. Centr.-Am., Het. pl. 59. f. 7. Brazil.
Siculodes amethystina, Feld. Reis. Nov. pl. 134. f. 6.

(32)†Rhodoneura micragraphalis, n. sp.

♂. Pale red-brown variegated with dark ferruginous red; wings thickly reticulated with fine brown lines. Fore wing with series of short ferruginous streaks on the costa; indistinct irregular antemedial and medial ferruginous bands defined by dark lines; an obliquely curved postmedial fine dark line, forking towards outer angle; a ferruginous band across apical area defined by fine dark lines. Hind wing with dark marks connecting the reticulation in places, more prominent on underside.
Hab. Sierra Leone (*Clements*). Types in Coll. Schaus & B.M.

(33) Rhodoneura subcostalis, Hmpsn. Moths Ind. i. p. 362. N.W. Himalayas; Assam.
„ *pralanis*, Swinh. A. M. N. H. (6) xvi. p. 298.

(34)*Rhodoneura oligosticta, Hmpsn. Moths Ind. i. p. 362. Sikhim.

(35)*Rhodoneura atriclathrata, Warr. Nov. Zool. iii. p. 340. Assam.

(36)†Rhodoneura alternata, Moore, Lep. Atk. p. 212. N.E. India; Borneo.
Banisia bifimbriata, Warr. Nov. Zool. iv. p. 20.

(37)†Rhodoneura reticulata, Moore, Lep. Atk. p. 212. N.E. India.

(38)*Rhodoneura catenula, Pag. Iris, v. p. 73. Cameroons.

(39) Rhodoneura dissimulans, Warr. A. M. N. H. (6) xvii. p. 227. Assam; Borneo; Queensland.
Banisia ordinaria, Warr. A. M. N. H. (6) xviii. p. 228.

(40)*Rhodoneura nitida, Pag. Nass. Jahrb. f. Naturf. 1888, p. 182. Borneo; Amboina.

(41) Rhodoneura tetragonata, Wlk. Journ. Linn. Soc. vii. p. 78. N.E. India; Borneo; Sumatra.
Rhodoneura quadripunctula, Pag. Iris, v. p. 100.
†*Pharambara vinosa*, Butl. P. Z. S. 1892, p. 130, pl. vi. f. 8.
Rhodoneura jubralis, Swinh. A. M. N. H. (6) xvi. p. 299.

(42)*Rhodoneura fenestrata, Pag. Nass. Jahr. f. Nat. 1888, p. 183, no. 559, & Iris, v. pl. 1. f. 2. Amboina.

(43)*Rhodoneura fulviceps, Feld. Reis. Nov. pl. 134. f. 12. Brazil.

(44)*Rhodoneura lunula, Feld. Reis. Nov. pl. 134. f. 1. Brazil.

(45)†Rhodoneura trigoniphora, n. sp.

♂. Red-brown with a golden tinge; wings closely reticulated with rufous. Fore wing with three greyish triangular patches on the costa, and the apex grey; several irregular transverse lines, of which the most prominent are two postmedial lines widely separated at costa and conjoined just above inner margin; a submarginal line terminating below apex. Hind wing with two white discocellular specks; numerous reticulated lines; a dark spot above middle of inner margin.

Hab. São Paulo, Brazil. *Exp.* 24 mm.

(46)*Rhodoneura albipunctula, Pag. Iris, v. p. 76. Peru.

(47)*Rhodoneura gracilis, Möschl. Surinam, iv. p. 24, pl. 18. f. 49. Surinam.

(48)*Rhodoneura ferruginea, Pag. Iris, v. p. 79. Peru.

(49)†Rhodoneura micacealis, Wlk. xxxiv. 1275. Ceylon; Mysol.

(50)†Rhodoneura cuprea, Butl. A. M. N. H. (5) x. p. 233. New Britain.

(51) Rhodoneura thiastoralis, Wlk. xix. 893. Assam; Malayan subregion and Neotropical region.

† „ *rhodosticta*, Swinh. A. M. N. H. (6) xvi. p. 298.

(52) Rhodoneura astrodora, Meyr. Trans. Ent. Soc. 1897, p. 91. Amboina.

(53) Rhodoneura fallax, Warr. A. M. N. H. (6) xviii. p. 229. Dili; N. Guinea.

(54)*Rhodoneura puncta, Feld. Reis. Nov. pl. 134. f. 7. Brazil.

(55)†Rhodoneura ferrofusa, Hmpsn. Moths Ind. i. p. 362. Bombay.

(56) Rhodoneura melanostigmalis, Swinh. A. M. N. H. (6) xvi. p. 298. Assam.

(57) Rhodoneura semiperforata, Warr. A. M. N. H. (6) xvii. p. 211. Assam.

(58)*Rhodoneura curvilinea, Warr. A. M. N. H. (6) xviii. p. 229. Assam.

(59)†Rhodoneura exusta, Butl. Ill. Het. iii. p. 71, pl. 58. f. 8. Japan; Sikhim.

†*Microsca ardens*, Butl. Ill. Het. iii. p. 71, pl. 58. f. 9.

„ *exusta*, var. *erecta*, Leech, Entom. 1889, p. 66, pl. 4. f. 3.

(60)*Rhodoneura hebra, Swinh. A.M. N. H. (6) xv. p. 18. Assam.

(61)†Rhodoneura atristrigulalis, Hmpsn. Moths Ind. iv. p. 480. Bhután.

(62)†Rhodoneura aurea, Butl. Trans. Ent. Soc. 1881, p. 200. Japan.

(63)†Rhodoneura aurata, Butl. A. M. N. H. (5) x. p. 233. Australia; New Britain.

Siculodes hydreutis, Meyr. Pr. Linn. Soc. N. S. W. 1886, p. 253.

(64)†Rhodoneura atomosalis, n. sp.

Rufous; wings pale, thickly and uniformly chequered with dark rufous spots; fore wing with the costa dark, with nine pure white specks on it; underside of fore wing with two dark-edged white discocellular spots.

Hab. Java; Mysol. *Exp.* 26 mm.

(65)†Rhodoneura uniformis, Hmpsn. Moths Ind. i. p. 362. Andamans.

(66) Rhodoneura emblicalis, Moore, Lep. Atk. p. 213. N.E. India.

†*Pharambara sphoraria*, Swinh. Trans. Ent. Soc. 1892, p. 18, pl. i. f. 11.

(67) Rhodoneura crypsiria, Meyr. Trans. Ent. Soc. 1887, p. 201. Australia.

†*Pharambara reticulata*, Butl. Trans. Ent. Soc. 1886, p. 420 (preocc.).

(68)*Rhodoneura carneola, Feld. Reis. Nov. pl. 134. f. 10. Brazil.

(69)*Rhodoneura apicialis, Pag. Iris, v. p. 70, pl. 1. f. 16. Peru.

(70)*Rhodoneura erythrinalis, Pag. Iris, v. p. 72, pl. 1. f. 17. Brazil.

(71)*Rhodoneura flavula, Pag. Iris, v. p. 111, pl. 1. f. 9. W. Africa.

(72)†Rholoneura disparalis, Hmpsn. Ill. Het. ix. p. 72, pl. 171. f. 11. Ceylon.

(73)†Rhodoneura atripunctalis, Wlk. xxxiv. 1523. Nilgiris; Java.

(74)*Rhodoneura bipuncta, Hmpsn. Moths Ind. i. p. 360. Burma.

(75) Rhodoneura glaphyralis, Hmpsn. Moths Ind. i. p. 359. N.E. India.

(76)†Rhodoneura pallida, Butl. Ill. Het. iii. p. 71, pl. 58. f. 7. Japan; N.E. India.

Pharambara obliquistrigalis, Warr. A. M. N. H. (6) xvii. p. 210.

(77)*Rhodoneura striola, Feld. Reis. Nov. pl. 134. f. 15. Amboina.

(78)†Rhodoneura latizonalis, n. sp.

Pale ochreous brown. Fore wing thickly striated with fine brown lines; a black speck at lower angle of cell; a subapical white patch defined by a fine black line, irrorated with black and with two black specks on it. Hind wings with the basal and outer areas pale reddish, the medial two-thirds whitish, defined by fine black lines and with a medial band of irregular black lines and specks; the basal area irrorated with black, the outer area striated with brown. Underside paler; the striæ more prominent, the subapical patch of fore wing more prominent with some black below it.

Hab. Sierra Leone (*Clements*). *Exp.* ♂ 26, ♀ 30 mm. Types in Coll. Schaus and B.M.

(79)*Rhodoneura xanthina, Feld. Reis. Nov. pl. 134. f. 15. Brazil.

(80)†Rhodoneura rhomboidea, Warr. Trans. Ent. Soc. 1889, p. 262. Brazil.

Siculodes lævigata, Pag. Iris, v. p. 78; Druce, Biol. Centr.-Am., Het. pl. 59. f. 4.

(81)†Rhodoneura nitens, Butl. A. M. N. H. (5) xx. p. 116. Japan; India; Ceylon; Solomons.

†*Pharambara hamifera*, Moore, Lep. Atk. p. 213.

Microsca marginepunctalis, Leech, Entom. 1880, p. 66, pl. 4. f. 10.

†*Siculodes ancylosema*, Meyr. Trans. Ent. Soc. 1894, p. 478.

(82)*Rhodoneura squamigera, Pag. Iris, v. p. 72. Natal.

(83)†Rhodoneura striativena, Hmpsn. Ill. Het. viii. p. 126, pl. 154. f. 1. S. India; Burma.

(84)*Rhodoneura acutalis, Wlk. xxxiv. 1523. Mysol.

(85) Rhodoneura decoratalis, Warr. A. M. N. H. (6) xvii. p. 209. Assam.

(86) Rhodoneura taphiusalis, Wlk. xviii. 720. Singapore; Borneo.

Rhodoneura globulifera, Pag. Iris, v. p. 123.

(87)†Rhodoneura splendida, Butl. A. M. N. H. (5) xx. p. 117. Assam; Andamans; Solomons.

Pharambara parcipunctalis, Warr. A. M. N. H. (6) xvii. p. 210.

(88)*Rhodoneura cuprealis, Hmpsn. Moths Ind. i. p. 361. Burma.

(89) Rhodoneura albiferalis, Wlk. xxxiv. 1524. Batchian; N. Guinea; Queensland.

(90)*Rhodoneura elongatalis, n. sp.

♂. Head chocolate; thorax and abdomen pale brown, the latter fuscous towards extremity which is rufous; wings striated with brown. Fore wing greyish brown, the inner half suffused with purplish; the costa with numerous dark specks; a bright red-brown patch extending from before end of cell to outer margin, enclosing a semicircular greyish patch on costa with a white subapical point defined by black; a rufous band from lower angle of cell to inner margin. Hind wing grey-brown with some fuscous at base; a medial oblique rufous band ending at anal angle and darker externally; a subapical black speck and larger spot on margin near anal angle. Underside of fore wing with strong purple suffusion near lower angle of cell.

Hab. Padang Rengas, Malay Peninsula. *Exp.* 24 mm. Type in Coll. Rothschild.

(91)†Rhodoneura cumulalis, Wlk. xxvii. 87. Borneo.
†*Siculodes chalcosidera*, Meyr. Trans. Ent. Soc. 1894, p. 478.

(92)*Rhodoneura polychloris, Pag. Iris, v. p. 108; Druce, Biol. Centr.-Am., Het. pl. 59. f. 5. Centr. & S. Am.

(93)*Rhodoneura anastomosalis, Pag. Iris, v. p. 76; Druce, Biol. Centr.-Am., Het. pl. 59. f. 6. Centr. & S. Am.

(94)*Rhodoneura violalis, Pag. Iris, v. p. 69; Druce, Biol. Centr.-Am., Het. pl. 59. f. 3. Centr. & S. Am.

(95)*Rhodoneura pulchelloides, Pag. Iris, v. p. 64, pl. 1. f. 4; Druce, Biol. Centr.-Am., Het. pl. 59. f. 1. Centr. & S. Am.

(96) Rhodoneura irias, Meyr. Trans. Ent. Soc. 1887, p. 199. Australia.

(97) Rhodoneura pudicula, Guen. Ur. & Phal. ii., Siculides, f. 8, & Ann. Soc. Ent. Fr. 1877, p. 288. Celebes.
†*Osca guttulosa*, Wlk. Journ. Linn. Soc. vi. p. 73.

(98)*Rhodoneura perlula, Guen. Ur. & Phal. ii., Siculides, f. 6, & Ann. Soc. Ent. Fr. 1877, p. 290. Cayenne.

(99)†Rhodoneura acaciusalis, Wlk. xix. 901. W. Africa; China; N. E. India; Malacca.
Siculodes strigatula, Feld. Reis. Nov. pl. 134. f. 9 (var.).
Rhodoneura minicula, Guen. Ann. Soc. Ent. Fr. 1877, p. 288.
Siculodes sordidula, Plötz, Stett. ent. Zeit. 1880, p. 304, & Pag. Iris, v. pl. 1. f. 8.
„ *rosacea*, Pag. Iris, v. p. 119, pl. 1. f. 3.

(100)*Rhodoneura complicatalis, Warr. Nov. Zool. ined.
Malacca.

(101) Rhodoneura obliqualis, Hmpsn. Moths Ind. i. p. 355.
Sikhim.

(102)†Rhodoneura margaritalis, n. sp.

Pearly white; head and collar fuscous; abdomen slightly tinged with fuscous. Fore wing of male with a tuft of white hair and costal fold at base below; the costal area thickly irrorated with brown to beyond middle; some rufous marks on costa towards apex; seven fairly prominent irregular fine brown lines with other less prominent lines between them, the lines on outer area somewhat reticulated. Hind wing with six or seven fine brown lines, those on outer area somewhat reticulated. Underside of fore wing with the markings on costa cupreous red.

Hab. Madagascar. *Exp.* 40 mm.

(103) Rhodoneura multipunctata, Hmpsn. Moths Ind. i. p. 356.
N.E. India; Burma; Delagoa Bay.

(104)*Rhodoneura sterna, Feld. Reis. Nov. pl. 134. f. 13.
S. America.
Siculodes virginula, Guen. Ann. Soc. Ent. Fr. 1877, p. 289.

(105)†Rhodoneura reticulalis, Moore, P. Z. S. 1877, p. 616.
Andamans.

(106)†Rhodoneura anticalis, Wlk. xxxiv. 1238.
Burma; Andamans; Borneo; Mysol.
Pyralis puralis, Wlk. xxxiv. 1238.
†*Rhodoneura tetraonalis*, Moore, P. Z. S. 1877, p. 616, pl. 60. f. 10.

(107)†Rhodoneura nævina, Moore, Lep. Atk. p. 212. Sikhim
Burma.

(108)†Rhodoneura argentalis, Wlk. xxxiv. 1522. Bhután
Assam; Ceylon; Java.
Var. *tuberosalis*, Warr. A. M. N. H. (6) xvii. p. 212.

(109) Rhodoneura hypargyra, Hmpsn. Moths Ind. i. p. 357.
Burma; Borneo.
†*Siculodes mochlias*, Meyr. Trans. Ent. Soc. 1894, p. 479.

(110)†Rhodoneura bastialis, Wlk. xix. 902. W. & S. Africa;
India; Ceylon; Burma.
Siculodes furcatula, Pag. Iris, v. p. 71, pl. 1. f. 6.

(111)†Rhodoneura polygraphalis, Wlk. xxxiv. 1240.
Oriental Region to Solomons & Queensland.
† „ *marmorealis*, Moore, P. Z. S. 1877, p. 617.
† „ *denticulosa*, Moore, Lep. Ceyl. iii. p. 267.
Siculodes rhythmica, Meyr. Trans. Ent. Soc. 1887, p. 201.

(112)†Rhodoneura citrina, n. sp.

♂. Very pale lemon-yellow; head, thorax, and abdomen slightly marked with fuscous: wings striated with fuscous; fore wing with numerous black specks on the costa, and a slight diffused fuscous patch beyond the cell. Underside of fore wing with a patch of metallic and black scales in the cell and some black scales on veins 6, 7; veins 5, 6, 7 streaked with brilliant pink.

Hab. Pulo Laut (*Doherty*). *Exp.* 26 mm.

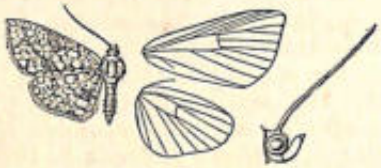
Auctorum.

Siculodes eupithecula, Guen. Ann. Soc. Ent. Fr. 1877, p. 291. Cayenne.
" *unitula*, Guen. Ann. Soc. Ent. Fr. 1877, p. 292. Brazil.
" *theorina*, Meyr. Trans. Ent. Soc. 1877, p. 200. N. Australia.
Rhodoneura notula, Pag. Iris, v. p. 58. Philippines.
" *tessellatula*, Pag. Iris, v. p. 58. Cebu.
Siculodes opalinula, Mab. Ann. Soc. Ent. Fr. 1879, p. 347. Madagascar.
" *paullula*, Pag. Iris, v. p. 55, pl. 1. f. 20. Chiriqui.
" *cuprea*, Pag. Nass. Jahrb. f. Naturf. 1884, p. 117. Amboina.
" *variabilis*, Pag. Nass. Jahrb. f. Naturf. 1886, p. 64. New Guinea.
" *arcuata*, Pag. Iris, v. p. 69. Chiriqui.
" *tristriata*, Pag. Iris, v. p. 77. Monte Video.
" *vittula*, Guen. Ann. Soc. Ent. Fr. 1877, p. 101. N. China.
" *politula*, Pag. Iris, v. p. 101. Philippines.
" *terreola*, Mab. Ann. Soc. Ent. Belg. 1880, p. 108. Madagascar.
" *minutula*, Saalm. Ber. der Senck. Gesells. 1880, p. 295; Mad. Lep. p. 216. f. 59. Madagascar.
" *ænea*, Saalm. Madag. Lep. p. 215. Madagascar.
" *mellea*, Saalm. Stett. ent. Zeit. 1881, p. 442, & Madag. Lep. p. 214, f. 61. Madagascar.
" *ochracea*, Pag. Nass. Jahrb. f. Naturf. xxxix. p. 166. Aru.
" *nullula*, Guen. Ann. Soc. Ent. Fr. 1877, p. 302. Brazil.
" *triangularis*, Pag. Iris, v. p. 122. Philippines.
" *acutipennis*, Pag. Nass. Jahrb. f. Naturf. 1886, 139. Aru.
" *lucidulina*, Pouj. Bull. Soc. Ent. Fr. 1894, p. 186. Thibet.
" *papuensis*, Pag. J.B. Nass. Ver. xxxix. p. 166. Aru.
" *ritteri*, Pag. Semon's Forschungsreise, v. p. 221, pl. xiii. f. 6. Java.

Genus Plagiosella, nov.

Palpi upturned and reaching vertex of head, the 3rd joint short and porrect; antennæ somewhat thickened; tibiæ hairy. Fore wing with vein 3 from before angle of cell; 4, 5 from angle, 6 from below upper angle; 7, 8 stalked; 9, 10, 11 free. Hind wing with vein 3 from before angle of cell; 4, 5 from angle; 6, 7 from upper angle; 8 approximated to cell close to the end.

Fig. 15.



Plagiosella clathrata, ♂. ⅔.

Type. (1)†PLAGIOSELLA CLATHRATA, n. sp.

♂. Head, thorax, and abdomen pale ochreous suffused with rufous; wings pale ochreous strongly reticulated with rufous. Fore wing with rufous discocellular patch; a large patch on middle of inner margin, with an oblique line from it towards apex expanding below apex. Hind wing with rufous patch above middle of inner margin, a small subapical spot and a spot on outer margin near anal angle.

Hab. Aburi, Gold Coast (*Carter*). *Exp*. 20 mm.

(2)†PLAGIOSELLA INTERRUPTA, n. sp.

♀. Pale yellow; head, thorax, and abdomen suffused with rufous; wings slightly striated with rufous. Fore wing with the costa and base rufous; a rufous patch at upper angle of cell and band from vein 2 to middle of inner margin; a marginal line. Hind wing with medial rufous band and marginal line.

Hab. Madagascar. *Exp*. 20 mm.

Genus BEGUMA.

Beguma, Warr. A. M. N. H. (6) xviii. p. 228 (1896).

Palpi upturned and reaching vertex of head, the 2nd joint fringed with scales, the 3rd naked and acuminate; antennæ thickened and flattened. Fore wing with the apex rounded; the outer margin evenly curved; veins 3 and 5 from near angle of cell; 6 from below upper angle; 7 from angle; 8 anastomosing with 9, which is given off from 10 to form an areole. Hind wing with veins 3 and 4 from angle of cell; 5 from above angle; 6, 7 from upper angle; 8 free.

Fig. 16.



Beguma constellata, ♂. ½.

Type. *BEGUMA CONSTELLATA, Warr. A. M. N. H. (6) xviii. p. 228.

Assam.

Genus Camptochilus.

Camptochilus, Hmpsn. Moths Ind. i. p. 351 (1892).

Palpi porrect, reaching just beyond the frons; antennæ of female ciliated; tibiæ thick and smoothly scaled. Fore wing with the costa arched to beyond middle, then excised to apex, which is produced upwards; the outer margin obliquely curved; vein 3 from before angle of cell; 4, 5 well separated at origin; 6 from below upper angle; 7, 8 shortly stalked; 9, 10, 11 free, a forked veinlet in cell. Hind wing with veins 3, 4, 5 widely separated at origin; 6, 7 from upper angle; 8 slightly approximated to 7 beyond cell; male with a slight vesicle between veins 1 *a* and *b*.

Fig. 17.



Camptochilus reticulatum, ♀. ½. (From Moths Ind. vol. i.)

Type. Camptochilus reticulatum, Moore, Lep. Atk. p. 233, pl. 8. f. 3. E. Himalayas; Burma.

Genus Hexeris.

Hexeris, Grote, Can. Ent. 1875, p. 176.
Ottolenguia, Beuten. Journ. N. York Ent. Soc. iv. p. 146 (1896).

Palpi porrect and straight and extending about twice the length of head, the 2nd joint thickly scaled, the 3rd long and naked; frons with a rounded prominence; antennæ of male with appressed serrations; tibiæ smoothly scaled. Fore wing with the outer margin excurved at middle; vein 3 from before angle of cell; 4, 5 well separated at origin; 6 from below upper angle; 7, 8, 9, 10 from close to angle. Hind wing with the outer margin slightly angled at middle; vein 3 from before angle of cell; 4, 5 well separated at origin; 6, 7 from upper angle; 8 approximated to 7 at end of cell.

Fig. 18.



Hexeris enhydris, ♂. ½.

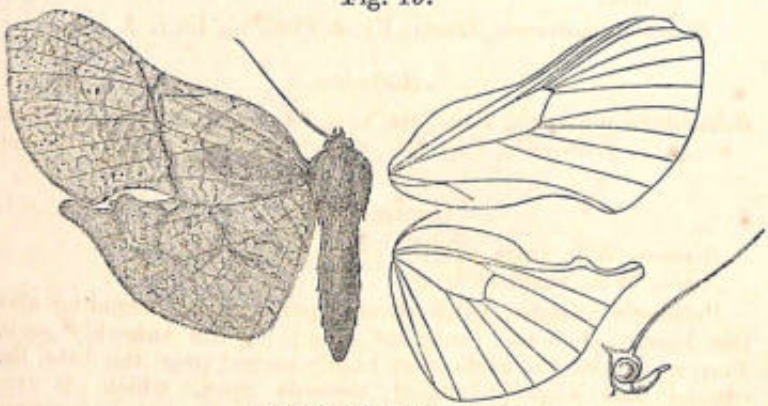
Type. †Hexeris enhydris, Grote, Can. Ent. 1875, p. 176. Florida; *Ottolenguia reticulina*, Beuten. Journ. N. York Ent. Soc. iv. p. 146. California.

Genus Hepialodes.

Hepialodes, Guen. Ann. Soc. Ent. Fr. 1877, p. 303.

Palpi porrect, long, slender, and curved downwards; proboscis minute; legs long, the fore tibiæ clothed with long hair. Fore wing broad; the apex truncate; the outer margin produced to a point below apex. Hind wing with the costa excised towards apex, which is produced upwards to a lobe; venation of *Rhodoneura*; hind wing with vein 7 from before angle of cell.

Fig. 19.



Hepialodes follicula, ♂. ½.

Type. *Hepialodes follicula, Guen. Ann. Soc. Ent. Fr. 1877, p. 304, & Ur. & Phal., Siculides, pl. 1. f. 1. Cayenne.

Genus Belonoptera.

Belonoptera, H.-S. Aussereur Schmett. p. 76 (1858).

Differs from *Rhodoneura* in the costa of fore wing being somewhat excised at middle and highly arched towards apex, which is falcate; hind wing with the outer margin more or less produced to a point at vein 7.

Fig. 20.



Belonoptera selenioides, ♂. ½.

Sect. I. Hind wing with the outer margin produced to a long point at vein 7.

Type. (1)*Belonoptera phyllula, Guen. Ann. Soc. Ent. Fr. 1877, p. 298; H.-S. Samml. aussereur. Schmett. f. 403. Brazil.

(2) BELONOPTERA NERVICULA, Guen. Ann. Soc. Ent. Fr. 1877, p. 298, & Ur. & Phal., Siculides, f. 2. Brazil.

SECT. II. Hind wing with the outer margin produced to a slight point at vein 7.

(3) BELONOPTERA SELENIOIDES, Pag. Iris, v. p. 83, pl. 1. f. 14. Paraguay.

(4)*BELONOPTERA FRONDICULA, Guen. Ann. Soc. Ent. Fr. 1877, p. 299. Brazil.

Siculodes matricula, Guen. Ur. & Phal. pl. 13. f. 3.

Auctorum.

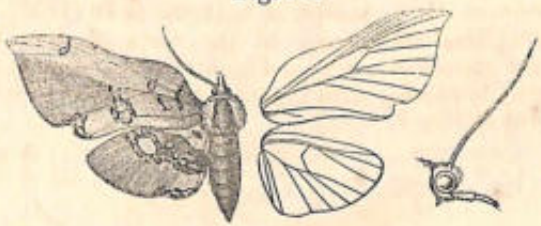
Belonoptera patercula, Pag. Iris, v. p. 94. Brazil.
" *fratercula*, Pag. Iris, v. p. 95. California.

Genus RISAMA.

Risama, Wlk. xxxii. p. 519 (1865).
Aziba, Wlk. xxxii. 520.

Proboscis minute; palpi slender, porrect, and extending about the length of head; antennæ simple; tibiæ smoothly scaled. Fore wing with the costa very highly arched near the base, then excised and slightly arched towards apex, which is very produced and acute; veins 3, 4, 5 widely separated at origin; 6 from below upper angle; 7, 8, 9, 10 from near upper angle. Hind wing with vein 3 from before angle of cell; 4, 5 from angle; 6, 7 stalked; 8 approximated to 7 after end of cell.

Fig. 21.



Risama picta, ♂. ½.

SECT. I. (*Risama*). Fore wing with the outer angle excised.

Type. (1)†RISAMA PICTA, Wlk. xxxii. p. 519.
Siculodes aurorula, Guen. Ann. Soc. Ent. Fr. 1877, p. 294; H.-S. Samml, aussereur. Schmett. f. 402. Brazil.

SECT. II. (*Aziba*). Fore wing with the outer angle not excised.

(2)†RISAMA TRANSVERSA, Wlk. xxxii. 520. Brazil.

(3)†Risama eurymenana, Wlk. xxxii. 517. Brazil.
†*Vadata subchalybœa*, Wlk. xxxii. 517.

(4) Risama reticula, Guen. Ann. Soc. Ent. Fr. 1877, p. 297. Brazil.

(5) Risama falcata, Feld. Reis. Nov. pl. 134. f. 2. Brazil.
Siculodes serpula, Guen. Ann. Soc. Ent. Fr. 1877, p. 296.

(6) Risama avicula, Guen. Ann. Soc. Ent. Fr. 1877, p. 293. Tobago; Brazil.
Aziba macropterana, Druce, Biol. Centr.-Am., Het. pl. 59. f. 8 (*nec* Wlk.).

Auctorum.

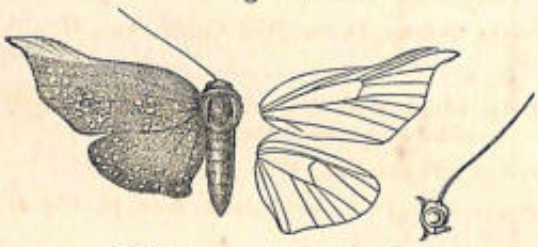
Siculodes mediula, Guen. Ann. Soc. Ent. Fr. 1877, p. 295. Brazil.
„ *straminula*, Pag. Iris, v. p. 92. Brazil.

Genus Vadata.

Vadata, Wlk. xxxii. 516 (1865).

Differs from *Risama* in the fore wing being extremely produced at apex; veins 9, 10 stalked; the palpi not reaching beyond the frons.

Fig. 22.



Vadata macropterana, ♂. ½.

Type. *Vadata macropterana, Wlk. xxxii. 517. Brazil.
Siculodes maculata, Pag. Iris, v. p. 91.

Genus Draconia.

Draconia, Hübn. Verz. p. 197 (1827).

Palpi porrect, reaching beyond the frons; antennæ almost simple. Fore wing with the costa evenly curved; the apex produced; the outer margin angled at middle and excised towards outer angle, which is hooked; veins 3, 4, 5 well separated at origin; 6 from below upper angle; 7, 8, 9, 10 from near upper angle. Hind wing with veins 3, 4, 5 well separated at origin; 6, 7 from upper angle; 8 approximated to 7 after end of cell.

Fig. 23.



Draconia annuligera, ♂. ½.

Sect I. Hind wing with the apex excised, the outer margin produced to a point at vein 7.

A. Fore wing with the outer margin slightly excised towards outer angle; both wings with the margin crenulate.

Type. (1)*Draconia peripheta, Cram. Pap. Exot. ii. p. 54, pl. 131. f. G; Druce, Biol. Centr.-Am., Het. pl. 59. f. 12. W. Indies; Centr. Am.

B. Fore wing with the outer margin twice excised towards outer angle.

a. Hind wing with the outer margin strongly crenulate.

(2)*Draconia mirabilis, Pag. Iris, v. p. 96, pl. 1. f. 10. Peru.

b. Hind wing with the outer margin not crenulate.

(3)*Draconia rusina, Druce, Biol. Centr.-Am., Het. p. 188, pl. 59. f. 9. Guatemala.

C. Both wings with the outer margin strongly angled at middle and non-crenulate.

(4)*Draconia annuligera, Wlk. xxxii. 516. Brazil.

(5)*Draconia oleigutta, Feld. Reis. Nov. pl. 134. f. 3. Brazil.

Sect. II. Hind wing with the apex not excised and the outer margin not produced to a point at vein 7; fore wing with two excisions towards outer angle; both wings with the margin crenulate.

(6)*Draconia denticulata, Pag. Iris, v. p. 98, pl. 1. f. 12; Druce, Biol. Centr.-Am. pl. 59. f. 10. Centr. Am.; Brazil.

Genus Meskea.

Meskea, Grote, Can. Ent. ix. p. 114 (1877).

Palpi porrect, slight, and hardly reaching to frons; antennæ of male thickened and flattened; tibiæ moderately scaled. Fore wing very long and narrow, the apex rounded; veins 2, 3, 4 from close to angle of cell; 5 from near middle of discocellulars; 6 from below upper angle; 7 from angle; 8, 9 stalked. Hind wing very long and narrow, the apex extremely produced and the outer

margin oblique; vein 3 from near angle of cell; 5 from above angle; 6, 7 from upper angle.

Fig. 24.



Meskea dyspteraria, ♂. ½.

Type. MESKEA DYSPTERARIA, Grote, Can. Ent. ix. p. 115. Florida.

Genus ADDÆA.

Addæa, Wlk. xxxiv. 1201 (1865).
Mesopempta, Meyr. Trans. Ent. Soc. 1886, p. 217.

Palpi upturned, thickly scaled and reaching vertex of head; antennæ annulated and minutely ciliated; tibiæ smoothly scaled. Fore wing with the costa nearly straight, the outer margin evenly curved; veins 3, 4, 5 well separated at origin; 6 from below upper angle; 8, 9 stalked. Hind wing with the outer margin evenly curved; vein 3 from before angle of cell; 5 from middle of discocellulars; 6, 7 from upper angle.

Fig. 25.



Addæa trimeronalis, ♂. ½. (From Moths Ind. vol. i.)

(1)†ADDÆA CANDIDALIS, Wlk. xxxiv. 1239. Ceram; Aru;
Pyralis obliqualis, Wlk. xxxiv. 1522. New Guinea.
Siculodes striola, Feld. Reis. Nov. pl. 134. f. 14.
„ *bivittata*, Pag. Nass. Jahrb. f. Naturf. 1886, p. 60.

Type. (2)†ADDÆA SUBTESSELLATA, Wlk. xxxiv. 1201. W. Australia.

(3)†ADDÆA TRIMERONALIS, Wlk. xix. 916. S. India; Ceylon;
†*Mesopempta heliopsamma*, Meyr. Trans. Ent. Soc. 1886, p. 217. New Guinea.

(4)†ADDÆA POLYGRAPHALIS, Wlk. xxxiv. 1245. Borneo; Solomons;
Botys transversalis, Wlk. xxxiv. 1415. W. Australia.
†*Pyralis polyphoralis*, Wlk. xxxiv. 1977.
†*Microsca pusilla*, Butl. A. M. N. H. (5) xx. p. 116.
†*Addæa probolopsis*, Meyr. Trans. Ent. Soc. 1894, p. 477.

(5)†ADDÆA SYNDESMA, Meyr. Trans. Ent. Soc. 1894, p. 478. Borneo.

Genus Morova.

Morova, Wlk. xxxii. 523 (1865).

Palpi porrect, thickly scaled and reaching to the frons, which has a rounded prominence; antennæ of male somewhat thickened; tibiæ smoothly scaled. Fore wing with the costa arched towards apex, the outer margin excurved at middle; veins 3, 4, 5 well separated at origin; 6 from below upper angle; 8, 9 stalked. Hind wing with the outer margin excurved at middle; vein 3 from close to lower angle of cell; 5 from middle of discocellulars; 6, 7 from upper angle.

Fig. 26.



Morova subfasciata, ♂. ½.

Type. †Morova subfasciata, Wlk. xxxii. 523. New Zealand; Fiji.
†*Cacoecia gallicolens*, Butl. Voy. Erebus & Terror, Ins. p. 46.

2. On the Classification of the *Chrysauginæ*, a Subfamily of Moths of the Family *Pyralidæ*. By Sir George F. Hampson, Bart., F.Z.S.

[Received April 8, 1897.]

The *Chrysauginæ* are a highly specialized subfamily of the true Pyralid group of the large family *Pyralidæ*, consisting in addition to the present subfamily of the *Epipaschianæ*, *Endotrichinæ*, and *Pyralinæ*, lately classified by me in the 'Transactions' of the Entomological Society, and characterized by vein 7 of the fore wing being stalked with 8, 9. The *Chrysauginæ* as here defined are primarily distinguished from their allies by the abortion of the maxillary palpi, which are well developed in almost all other *Pyralidæ*. They are closely allied to the *Endotrichinæ* but, as vein 8 of the hind wings is in rare instances free, were probably derived directly from the *Pyralinæ* as a parallel development to the *Endotrichinæ*. The latter are almost confined to the Old World, though a few species are found in the Nearctic region, and one genus in the W. Indies; whilst the *Chrysauginæ* are almost exclusively *Neotropical*, a few genera and species being found in the Southern States, and a few others spreading through the Australian region to the Malayan subregion, the furthest points reached being Burma and Assam.

The subfamily is remarkable for the great sexual diversity found in the subcostal neuration of the fore wing in a large proportion of the species, the females always having veins 7, 8, 9 stalked, as

is typical of the group. This diversity is usually correlated with the development of various other secondary sexual characters, one of the most common and remarkable being an ear-shaped tympanic vesicle at the base of the costa of fore wing covered by a drum of fine corrugated membrane.

A carefully elaborated classification of most of the genera was published by the late E. M. Ragonot in the 'Annales de la Société Entomologique de France'[1]; but a large number of the species were unknown to him, and his material was insufficient for him to discover the large amount of sexual dimorphism that exists. He defined the *Chrysauginæ* as differing from the *Endotrichinæ* in being stoutly-built insects, and includes in the latter subfamily many of the genera which by my definition fall into the former: the paper, however, formed a most important contribution towards a correct classification of the group, which was originally defined and systematized by Lederer in 1863.

None of the genera are of a very generalized structure, but *Chrysauge* itself, apart from its secondary sexual characters, is regarded as the least specialized, with its short porrect palpi and median nervules of both wings arising from the cell in its 1st section. From it were developed a group of genera with downcurved palpi, of which forms like *Anemosa* and *Pelasgis* have very long palpi; *Semnia* with the palpi smooth and a tuft of hair on the antennæ; *Uliosoma* and *Acutia* with one of the median nervules absent in one or both wings; *Condylolomia* with veins 2 and 3 of the fore wing stalked: *Itambe* and *Microzancla* with extremely falcate fore wings; *Macna* with very long straight palpi in female, upturned and angled with hair in front in male; *Psectrodes* and *Acrodegmia* with very long palpi ending in a large rounded tuft of hair on 3rd joint.

Another large group of genera have the palpi upturned, of which the majority have short palpi, such as *Sthenobœa* with vein 4 of hind wing absent; *Dasycnemia* with veins 4, 5 of both wings stalked; *Anisothrix* without a frontal tuft; *Rucuma* with tufts of hair on frons, mid tibiæ, and tarsal joints, and excisions in the costa of fore wing; whilst a few genera have very long upturned palpi, culminating in *Tamyra* with a rounded brush on 3rd joint.

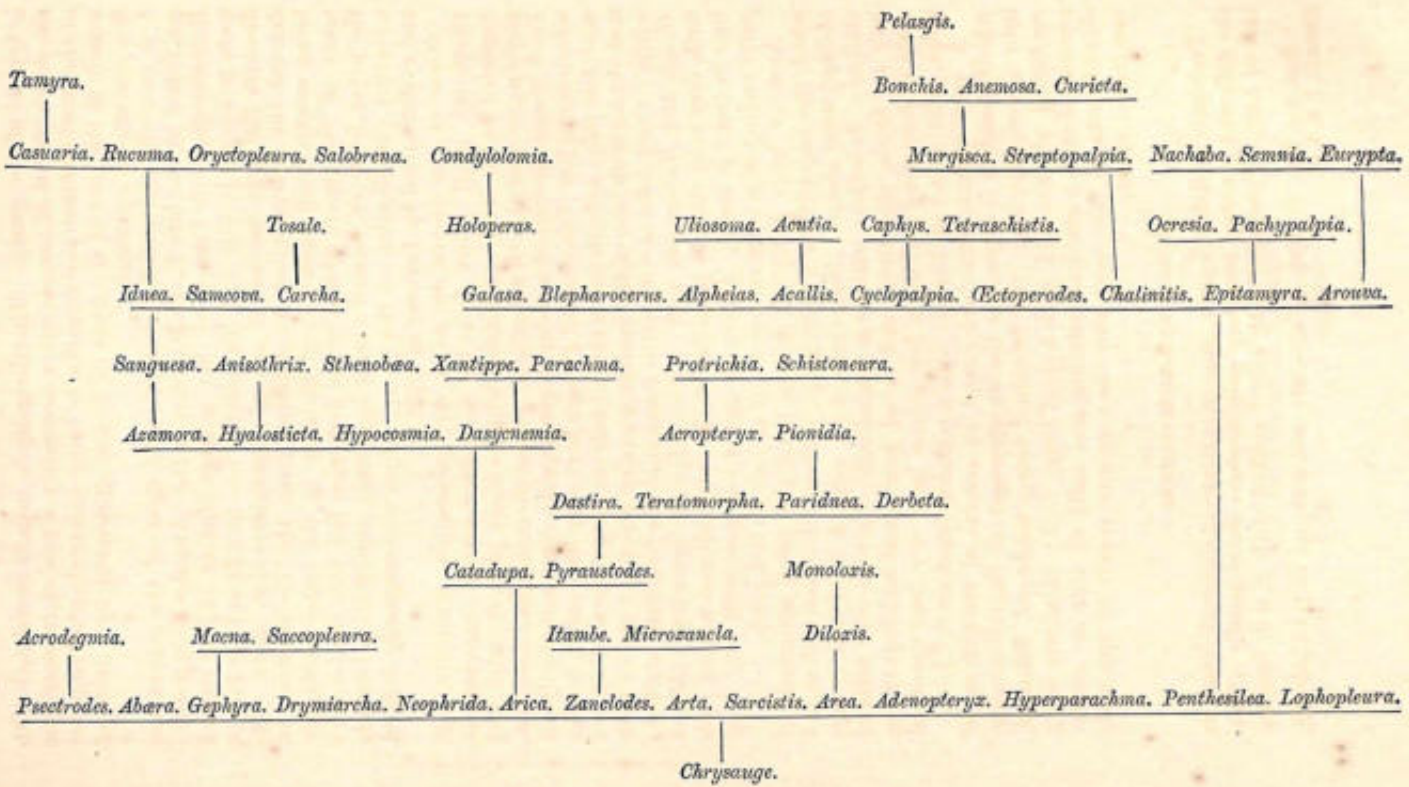
A very curious structure found in several of the genera, of which *Casuaria* is typical, is the development of the retinaculum into a complete ring, the frenulum being thickened, flattened, contorted at base and with a short lower fork; this form being associated with a glandular swelling and tufts of hair on underside of costa of fore wing and the tympanic vesicle on upperside mentioned above.

Subfamily Chrysauginæ.

Proboscis well-developed; palpi of extremely different forms in the different genera; maxillary palpi absent; frons usually with a tuft of hair. Fore wing with vein 7 stalked with 8, 9 in female;

[1] Ann. Soc. Ent. Fr. 1890, pp. 435–546; and 1891, pp. 15–114 & 559–662, plates 5, 7, 8, & 16.

Phylogeny of the Chrysauginæ.



the subcostal neuration of male varying greatly in relation to the secondary sexual characters. Hind wing with the median nervure non-pectinate above; vein 7 almost always anastomosing with 8.

Key to the Genera.

A. Palpi upturned.
- *a*. Palpi about four times length of head, and reaching far above it.
  - a^1. Palpi thickly scaled, the hair on 3rd joint forming a rounded brush ..... 9. *Tamyra*, p. 646.
  - b^1. Palpi fringed with hair below throughout ..... 10. *Casnaria*, p. 647.
- *b*. Palpi about twice the length of head and reaching well above it.
  - a^1. Palpi with the 2nd and 3rd joints strongly angled with hair in front ..... 4. *Macna* (♂), [p. 642.
  - b^1. Palpi with the 3rd joint tufted with hair on inner side ..... 13. *Salobrena*, p. 649.
  - c^1. Palpi with the 3rd joint naked ..... 15. *Samcova*, p. 651.
- *c*. Palpi with the 3rd joint not, or hardly, reaching above vertex of head.
  - a^1. Fore and hind wings with veins 4, 5 from the cell.
    - a^2. Palpi reaching vertex of head.
      - a^3. Palpi with the 3rd joint fringed in front with long downcurved hair ..... 63. *Curicta* (♂), [p. 682.
      - b^3. Palpi with the 3rd joint not fringed with downcurved hair.
        - a^4. Frons with a conical tuft of hair.
          - a^5. Mid tibiæ and tarsal joints with large tufts of scales.
            - a^6. Fore wing with vein 10 stalked with 7, 8, 9.
              - a^7. Fore wing with vein 7 given off from 8 after 9 ..... 16. *Tosale*, p. 652.
              - b^7. Fore wing with vein 7 given off from 8 before 9.
                - a^8. Fore wing with the costa evenly curved ..... 17. *Carcha*, p. 653.
                - b^8. Fore wing with the costa excised beyond middle ..... 12. *Oryctopleura*, [p. 648.
            - b^6. Fore wing with vein 10 free.
              - a^7. Fore wing with the costa not excised beyond middle.
                - a^8. Hind wing with the disco-cellulars curved, the cell of moderate length ..... 19. *Azamora*, p. 654.
                - b^8. Hind wing with the disco-cellulars strongly angled, the lower part of cell produced... 18. *Sanguesa*, p. 654.
              - b^7. Fore wing with the costa excised beyond middle.
                - a^8. Fore wing with the outer margin excised towards outer angle; male with glandular swelling on inner area of hind wing ..... 11. *Rucuma*, p. 648.
                - b^8. Fore wing with the outer margin not excised towards outer angle; male with glandular swelling at base of costa.. 14. *Idusa*, p. 650.

b^3. Mid tibiæ without large tufts of scales; the tarsal joints smooth.
a^6. Fore wing with the apex produced and acute; vein 11 free. [p. 663.
a^7. Hind wing with veins 6, 7 from cell. 31. *Acropteryx*,
b^7. Hind wing with veins 6, 7 stalked. 29. *Protrichia*, [p. 661.
b^6. Fore wing with the apex not produced; vein 11 anastomosing with 12. 30. *Schistoneura*, [p. 662.
b^4. Frons smooth.
a^7. Fore wing with the costa deeply excised beyond middle, the apex produced upwards ..... 32. *Teratomorpha*, [p. 663.
b^5. Fore wing with the costa evenly curved, the apex not produced.
a^6. Palpi closely applied to frons.
a^7. Palpi with the 3rd joint hidden in the hollow of a tuft at end of 2nd ..... 20. *Anisothrix*, [p. 656.
b^7. Palpi with the 3rd joint exposed and thickly scaled; the tarsal joints with tufts of scales ..... 21. *Hyalosticta*, [p. 656.
b^6. Palpi extending widely in front of frons, the 3rd joint naked.
a^7. Hind wing with vein 2 present... 34. *Paridnea*, p. 665.
b^7. Hind wing with vein 2 absent ... 33. *Pionidia*, p. 664.
b^2. Palpi reaching about halfway to vertex of head.
a^3. Frons with a conical tuft.
a^4. Fore wing long and narrow; antennæ of male pectinated..... 35. *Derbeta*, p. 665.
b^4. Fore wing short and broad; antennæ of male ciliated ..... 28. *Dastira*, p. 661.
b^3. Frons smooth ..... 36. *Pyraustodes*, [p. 666.
b^1. Hind wing with vein 4 absent ..... 22. *Sthenobœa*, [p. 657.
c^1. Hind wing with veins 4, 5 stalked.
a^2. Fore wing with veins 4, 5 from cell ..... 23. *Hypocosmia*, [p. 657.
b^2. Fore wing with veins 4, 5 stalked.
a^3. Hind wing with vein 3 from angle of cell .. 26. *Dasycnemia*, [p. 660.
b^3. Hind wing with vein 3 absent ..... 25. *Parachma*, [p. 659.
d^1. Hind wing with veins 3, 4, 5 stalked ..... 24. *Xantippe*, p. 658.

B. Palpi with the 2nd joint upturned, the 3rd porrect; both wings with veins 4, 5 from cell.
a. Hind tarsi smooth; male with a tympanic vesicle. 37. *Arica*, p. 666.
b. Hind tarsi with a tuft of scales on 1st joint; male with no tympanic vesicle .... 27. *Catadupa*, [p. 660.

C. Palpi porrect.
a. Palpi straight and not downcurved at extremity.
a^1. Palpi hardly extending beyond the frons.
a^2. Hind wing with veins 4, 5 from cell.
a^3. Fore wing with vein 3 from cell.
a^4. Both wings with vein 2 present.
a^5. Fore wing with the costa not excised.. 76. *Chrysauge*, [p. 691.
b^5. Fore wing with the costa deeply excised beyond middle, the apex produced upwards..... 40. *Zanclodes*, p. 668.
b^4. Both wings with vein 2 absent ..... 47. *Hyperparachma*, [p. 672.

b^3. Fore wing with veins 3, 4, 5 stalked ..... 75. *Lophopleura*, [p. 690.
b^2. Hind wing with veins 4, 5 stalked.
a^3. Hind wing with vein 3 present; palpi minute; the costa of fore wing excised and the apex produced upwards ..... 38. *Itambe*, p. 667.
b^3. Hind wing with vein 3 absent.
a^4. Fore wing with vein 3 from cell, the costa excised ..... [p. 667.
b^4. Fore wing with veins 3, 4, 5 stalked, the costa not excised..... 39. *Microzancla*,
c^3. Hind wing with veins 3, 4, 5 stalked ..... 42. *Sarcistis*, p. 669.
b^1. Palpi extending about twice the length of head. 41. *Arta*, p. 660.
a^2. Palpi curved towards each other at tips; antennæ of male bipectinate, the basal joint with a hollow in front; fore wing with vein 10 absent..... 7. *Drymiarcha*, [p. 645.
b^2. Palpi straight; fore wing with vein 10 from the cell ..... 8. *Neophrida*, [p. 646.
c^1. Palpi extending about three times length of head.
a^2. Fore wing with the costa excised beyond middle; male with tympanic vesicle ..... 6. *Gephyra*, p. 644.
b^2. Fore wing with the costa evenly arched; male with no tympanic vesicle.
a^3. Palpi with the 3rd joint fringed with hair below ..... 3. *Abæra*, p. 641.
b^3. Palpi with a rounded brush of hair on 3rd joint; hind wing with vein 8 free ... 2. *Pseetrodes*, [p. 640.
d^1. Palpi extending about four times length of head.
a^2. Palpi with a slight upward curve, a rounded brush on 3rd joint; costa of fore wing excised beyond middle ..... 1. *Acrodegmia*, [p. 640.
b^2. Palpi straight; fore wing with the costa slightly excised beyond middle, the apex produced upwards..... 5. *Saccopleura*, [p. 644.
c^2. Palpi straight, the 3rd joint fringed with hair below; fore wing with the costa not excised, the outer margin excised below apex and angled at middle ..... 4. *Macna* (♀), [p. 642.

D. Palpi downcurved.
a. Palpi extending about three times length of head.
a^1. Palpi with the 2nd joint oblique, the 3rd long, naked, and downcurved; hind wing with vein 8 free ..... 63. *Curicta* (♀), [p. 682.
b^1. Palpi rostriform and evenly curved.
a^2. Hind wing with vein 3 present.
a^3. Fore wing with vein 6 stalked with 7, 8, 9. 62. *Anemosa*, p. 682.
b^3. Fore wing with vein 6 from the cell.
a^4. Fore wing with vein 7 given off from 8 before 9.
a^5. Fore wing with the outer margin evenly curved..... 64. *Murgisca*, p. 683.
b^5. Fore wing with the outer margin angled at middle ..... 67. *Ocresia*, p. 684.
b^4. Fore wing with vein 7 given off from 8 after 9.
a^5. Fore wing with vein 10 from cell ... .. 61. *Bonchis*, p. 681.
b^5. Fore wing with vein 10 stalked with 7, 8, 9 ..... 60. *Pelasgis*, p. 681.
b^2. Hind wing with vein 3 absent ..... 52. *Alpheias*, p. 676.

b. Palpi extending once to twice the length of head.
*a*¹. Hind wing with veins 4, 5 stalked.
*a*². Hind wing with vein 2 absent.
*a*³. Fore wing with vein 2 absent ..... 53. *Uliosoma*, p. 676.
*b*³. Fore wing with vein 2 present.
*a*⁴. Fore wing with vein 7 given off from 8 after 9; 10 absent..... 54. *Acutia*, p. 677.
*b*⁴. Fore wing with vein 7 given off from 8 before 9; 10 present ..... 56. *Caphys*, p. 678.
*b*². Hind wing with vein 2 present.
*a*³. Fore wing with vein 3 given off from the cell or from close to the cell.
*a*⁴. Palpi thickly scaled.
*a*⁵. Fore wing with vein 7 given off from 8 before 9; 10 present ..... 58. *Cyclopalpia*, [p. 680.
*b*⁵. Fore wing with vein 7 given off from 8 after 9; 10 absent..... 57. *Tetraschistis*, [p. 679.
*c*⁵. Fore wing with veins 9, 10, 11 absent. 51. *Blepharocerus*, [p. 675.
*b*⁴. Palpi smoothly scaled; fore wing with veins 8, 9 absent in male..... 70. *Nachaba*, p. 686.
*b*³. Fore wing with veins 2, 3 stalked ..... 49. *Holoperas*, p. 674.
*c*³. Fore wing with veins 3, 4 on a long stalk.. 48. *Condylolomia*, [p. 673.

*b*¹. Hind wing with veins 4, 5 from cell or 4 absent.
*a*². Fore wing with veins 2, 3 stalked..... 50. *Galasa*, p. 674.
*b*². Fore wing with vein 3 from the cell.
*a*³. Fore wing with veins 4, 5 stalked.
*a*⁴. Palpi extending about twice the length of head; fore wing with veins 7 and 10 from cell, 8 and 11 absent; hind wing with vein 2 present ..... 46. *Adenopteryx*, [p. 672.
*b*⁴. Palpi extending about the length of head; fore wing with veins 7, 8, 9 stalked, 10 absent; hind wing with vein 2 absent ..... 55. *Acallis*, p. 677.
*b*³. Fore wing with veins 4, 5 from the cell.
*a*⁴. Fore wing with the outer margin evenly curved.
*a*⁵. Palpi slender, the 2nd joint fringed with long hair above; antennæ of male with a tuft of hair towards extremity ..... 71. *Semnia*, p. 687.
*b*⁵. Palpi slender, the 2nd joint not fringed above.
*a*⁶. Fore wing with vein 3 from angle of cell; antennæ of male ciliated... 73. *Arouwa*, p. 689.
*b*⁶. Fore wing with vein 3 from before angle of cell; antennæ of male bipectinate ..... 72. *Eurypta*, p. 688.
*c*⁵. Palpi with a tuft of spatulate scales at extremity; the costa of fore wing excised ..... 59. *Œctoperodes*, [p. 680.
*d*⁵. Palpi thickly and roughly scaled.
*a*⁶. Hind wing with vein 4 present.
*a*⁷. Palpi extending about twice the length of head.
*a*⁸. Both wings with veins 4, 5 widely separated at origin.. ... [p. 689. 74. *Penthesilea*,
*b*⁸. Both wings with veins 4, 5 from angle of cell ..... 66. *Chalinitis*, p. 684.

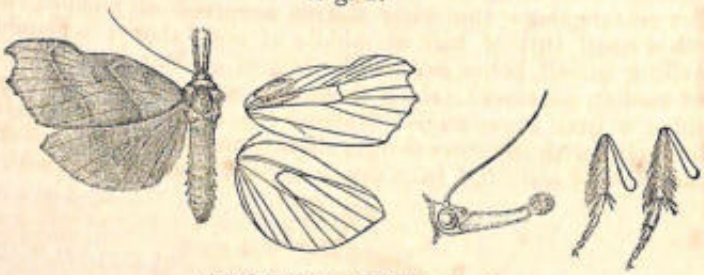
b^7. Palpi extending about the length of head.
a^8. Fore wing with veins 6, 7 stalked. 43. *Monoloxis*, [p. 670.
b^8. Fore wing with veins 7, 8 stalked.
a^9. Fore wing with the costa excised; male with tufts of hair on median nervure and costa ..... 44. *Diloxis*, p. 670.
b^9. Fore wing with the costa straight; male with fovea in cell ..... 45. *Area*, p. 671.
b^6. Hind wing with vein 4 absent ..... 65. *Streptopalpia*, [p. 683.
b^4. Fore wing with the outer margin angled at middle. [p. 686.
a^5. Fore wing with vein 10 present ..... 69. *Epitamyra*,
b^5. Fore wing with vein 10 absent ..... 68. *Pachypalpia*, [p. 685.

Genus Acrodegmia.

Acrodegmia, Rag. Ann. Soc. Ent. Fr. 1890, p. 472.

Palpi porrect, extending about four times length of head with a slight upward curve, thickly scaled, angled in front of head, the 3rd joint with a rounded brush of hair; frons with a tuft of hair; antennæ of male almost simple; mid and hind tibiæ and 1st tarsal joints fringed with long hair. Fore wing of male with a glandular swelling at base of costa below fringed with long hair, met by a fringe from median nervure; the costa highly arched at middle, then excised; the apex acute; the outer margin excised from apex to vein 4, where it is angled; vein 3 from near angle of cell; 4, 5 from angle; 6, 7 stalked; 8 absent; 9, 10, 11 free. Hind wing with the apex produced and acute; veins 3, 4, 5 from angle of cell; 6, 7 stalked, 7 anastomosing with 8.

Fig. 1.



Acrodegmia pselaphialis, ♂. ½.

Type. Acrodegmia pselaphialis, Rag. Ann. Soc. Ent. Fr. 1890, p. 473, pl. 7. f. 2. Surinam; Demerara.

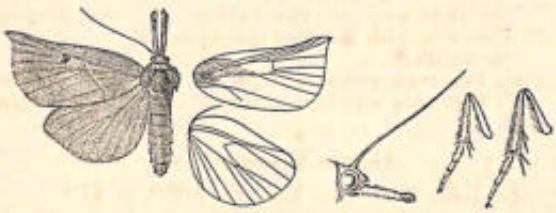
Genus Psectrodes.

Psectrodes, Rag. Ann. Soc. Ent. Fr. 1890, p. 488.

Palpi porrect, straight, and extending about three times length of head, fringed with hair above and below, the 3rd joint with a rounded brush of hair; frons with a large tuft; mid and hind tibiæ and the 1st tarsal joints slightly fringed with hair. Fore

wing with the costa nearly straight; the apex produced and acute; the outer margin excurved at middle; male with a fringe of hair from basal part of costa below met by a fringe of hair from median nervure; the retinaculum hairy; vein 3 from before angle of cell; 4, 5 from angle; 6 from upper angle; 7, 8 stalked; 9 absent; 10, 11 free. Hind wing with veins 3, 4, 5 from angle of cell; 6, 7 from upper angle; 8 free.

Fig. 2.



Psectrodes abrasalis, ♂. ½.

Type. (1)†PSECTRODES ABRASALIS, Wlk. xvi. 39. Mexico; Brazil.
Tamyra splendens, Feld. Reis. Nov. pl. 137. f. 15.
Psectrodes herminialis, Rag. Ann. Soc. Ent. Fr. 1890, p. 488.

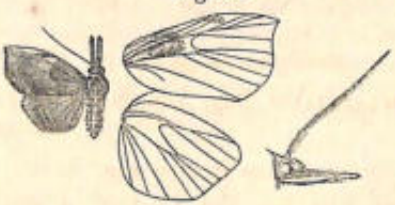
(2)†PSECTRODES ILLAPSALIS, Wlk. xvi. 50. Brazil.

Genus ABÆRA.

Abæra, Wlk. xvi. 76 (1858).

Palpi porrect, straight, and extending about three times the length of head, fringed with long hair above and below; frons with a sharp tuft; antennæ of male minutely ciliated; tibiæ smooth. Fore wing with the costa usually arched at middle; the apex rectangular; the outer margin excurved at middle; male with a small tuft of hair at middle of costa above; a glandular swelling in cell below covered by fringes of hair from subcostal and median nervures; vein 3 from near angle of cell; 4, 5 from angle; 6 from upper angle; 7 absent; 8, 9, 10 stalked; 11 free. Hind wing with the outer margin slightly angled at vein 2; 3 from near angle of cell; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 3.



Abæra mactalis, ♂. ½.

SECT. I. Hind wing with veins 4, 5 well separated at origin.

(1)†ABÆRA MACTALIS, Wlk. xvi. 76. Brazil.

Sect. II. Hind wing with veins 4, 5 from a point.

(2)†Abæra metallica, n. sp.

♂. Dark brown; palpi ochreous on inner side; hind legs whitish. Fore wing with antemedial whitish line slightly angled below costa and with silvery purple on its inner edge; a postmedial whitish line with silvery purple beyond it, broadest at middle, very much excurved from costa to vein 4, then incurved; an ochreous fascia on apical part of costa; a marginal series of white striæ. Hind wing with submarginal whitish striga, with a small patch of silvery purple on its outer edge above anal angle; a marginal white line.

Hab. Ega, Brazil (*Bates*). *Exp.* 28 mm.

(3)†Abæra rubiginea, n. sp.

♀. Dark red-brown; abdomen fuscous. Fore wing with indistinct antemedial line bent inwards to costa; an indistinct medial line whitish at costa, oblique to vein 6, where it is angled, then sinuous; a prominent postmedial white spot on the costa; traces of a sinuous submarginal series of pale specks; cilia pink, ochreous at tips; costa straight, the outer margin strongly excurved at middle. Hind wing fuscous; the cilia pink.

Hab. Dominica (*W. H. Elliot*). *Exp.* 22 mm.

(4)†Abæra chalcea, n. sp.

♀. Brassy yellow. Fore wing with rufous antemedial line angled below costa; the medial area suffused with pale violet; a postmedial rufous line very obliquely curved from costa to vein 2, then bent outwards to outer angle; outer area suffused with rufous. Hind wing pale fuscous; cilia of both wings pale violet.

Hab. Sta. Martha, Brazil (*Bouchard*). *Exp.* 22 mm.

Genus Macna.

Macna, Wlk. xvi. 78 (1855).
Rhabana, Wlk. xxxiv. 1517 (1865).
Goossensia, Rag. Ann. Soc. Ent. Fr. 1891, p. 97.

Palpi of male upturned to above vertex of head and angled with very long hair in front, of female porrect, straight, extending two to four times length of head, the 2nd joint fringed with hair above and below, the 3rd joint fringed below; frons with a tuft of hair; antennæ of male ciliated; tibiæ and tarsi fringed with long hair. Fore wing with the costa arched; the apex produced to a point; the outer margin excised from apex to vein 4, where it is angled; vein 3 from before angle of cell; 4, 5 from angle; 6 from upper angle; 7, 8, 9 stalked; 11 free. Hind wing with the outer margin very slightly angled at vein 2; the anal angle truncate; vein 3 from close to angle of cell; 4, 5 shortly stalked; 6, 7 stalked, 7 anastomosing slightly with 8. Male with a glandular swelling at base of costa of fore wing below, with a thick oblique tuft of hair from it; the basal half of costa fringed with hair.

Fig. 4.



Macna pomalis, ♀. ½. Fore wing of ♂. (From Moths Ind. vol. iv.)

Sect. I. Fore wing with vein 10 stalked with 7, 8, 9; palpi of ♀ three to four times the length of head.

Type. (1) Macna pomalis, Wlk. xvi. 78. N.E. India; Malacca; *Goossensia prasinalis*, Rag. Ann. Soc. Singapore; Salanga. Ent. Fr. 1891, p. 98, & Mon. Phyc. & Gall. pl. 46. f. 4.

(2)†Macna platychloralis, Wlk. xxxiv. 1517. Andamans; Java.

Sect. II. Fore wing with vein 10 from the cell; palpi of ♀ about twice the length of head.

(3)*Macna atribufalis, n. sp.

♂. Head and thorax purplish red-brown; abdomen fuscous black. Fore wing purplish red-brown suffused with fuscous; traces of a dark sinuous antemedial line; two indistinct dark sinuous postmedial diffused lines excurved at middle, with a pale speck between them on costa. Hind wing fuscous brown; both wings with white line at base of cilia. Underside of fore wing with short oblique white postmedial line from costa; hind wing with two dark curved postmedial lines.

♀ with the lines more distinct, the antemedial with a large fuscous patch inside it on inner area; the postmedial with fuscous patch beyond it on costa, the white mark much more prominent; a series of black marginal spots.

Hab. Amboina; Humboldt Bay, N. Guinea. *Exp.* ♂ 34, ♀ 58 mm. Type in Coll. Rothschild.

(4)*Macna ignebasalis, n. sp.

♀. Head and thorax red-brown; abdomen grey; metathorax and base of abdomen tinged with fuscous. Fore wing pale purplish red-brown, with a large subbasal patch of fiery orange and pale yellow scales between cell and vein 1 and with a few scattered black scales on and near it; a black fascia on inner margin; antemedial line black, straight, and obsolete on costal area; a black discocellular spot; traces of a red postmedial line excurved at middle; a straight black submarginal line. Hind wing fuscous brown, with reddish marginal band defined by black lines.

Hab. Humboldt Bay, N. Guinea. *Exp.* 44 mm. Type in Coll. Rothschild.

Genus Saccopleura.

Saccopleura, Rag. Ann. Soc. Ent. Fr. 1890, p. 502.

Palpi obliquely porrect, straight, and extending about four times length of head, and fringed with long curved scales; frons with a tuft of scales; antennæ of male ciliated; hind tibiæ with a tuft of hair from base. Fore wing with the costa strongly arched at base, excised beyond middle; the apex produced to a sharp point; the outer margin excurved at middle; male with a tympanic vesicle at base of costa; underside with a large costal fold fringed with hair; the frenulum thickened, flattened and contorted, with a short fork from base; the retinaculum annular; vein 3 from near angle of cell; 4, 5 from angle; 6 from upper angle; 7, 8, 9 stalked; 10, 11 free. Hind wing with the outer margin somewhat angled at middle; vein 3 from before angle of cell, which is produced; 4, 5 from angle; 6, 7 shortly stalked; 8 free.

Fig. 5.



Saccopleura catocalis, ♂. ½.

Type. *Saccopleura catocalis, Rag. Ann. Soc. Ent. Fr. 1890, p. 503, pl. 7. f. 10. Chiriqui.

Genus Gephyra.

Gephyra, Wlk. xix. 848 (1859).

Palpi porrect, straight, and extending twice to three times the length of head, thickly scaled above and below; frons with a sharp tuft; antennæ of male almost simple; tibiæ nearly smoothly

Fig. 6.



Gephyra getusalis, ♂. ½.

scaled. Fore wing of male with a large tympanic vesicle at base; the basal half of costa arched, the apical half excised; the costal swelling fringed with hair below; vein 3 from near angle of cell;

4, 5 from angle; 6 from near upper angle; 7, 8, 9 stalked; 10, 11 free. Hind wing with vein 3 from near angle of cell; 4, 5 from angle; 6, 7 from upper angle, 7 anastomosing with 8.

Sect. I. Palpi extending about three times length of head; frenulum thickened.

Type. (1)†Gephyra getusalis, Wlk. xix. 849. Brazil.

(2)*Gephyra pusilla, Feld. Reis. Nov. pl. 137. f. 11. Brazil.

Sect. II. Palpi extending about twice the length of head; frenulum normal.

A. Fore wing with a single costal excision.

(3)*Gephyra difficilis, Feld. Reis. Nov. pl. 137. f. 14. Bogotá.

(4)*Gephyra pomponius, Druce, Biol. Centr.-Am., Het. ii. p. 193, pl. 59. f. 24. Mexico; Guatemala.

B. Fore wing with two costal excisions.

(5)*Gephyra cynisca, Druce, Biol. Centr.-Am., Het. ii. p. 193, pl. 59. f. 23. Mexico; Guatemala.

Genus Drymiarcha.

Drymiarcha, Meyr. Trans. Ent. Soc. 1885, p. 441.

Palpi porrect, about twice the length of head, thickly scaled and curved towards each other, enclosing the space between; frons with large tuft; antennæ of male with the basal joint dilated and enclosing a hollow, the shaft given off at an angle with a tooth at base and bipectinate with short branches; large paired tufts of hair behind the antennæ; metathorax with paired tufts at origin of hind wing above; tibiæ moderately hairy. Fore wing with the apex somewhat produced and the outer margin excurved; vein 3 from before angle of cell; 4, 5 from angle; 6 from upper angle; 7, 8, 9 stalked; 10 absent; 11 sinuous. Hind wing with vein 3 from near angle of cell; 4, 5 from angle; the discocellulars highly angled; 6, 7 stalked; 8 free.

Fig. 7.



Drymiarcha exanthes, ♂. ½.

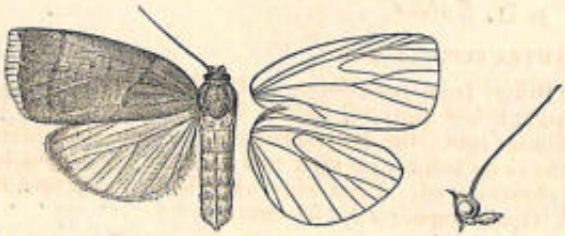
Type. *Drymiarcha exanthes, Meyr. Trans. Ent. Soc. 1885, p. 441. Australia.

Genus Neophrida.

Neophrida, Möschl. Lep. Surinam, p. 26 (1881).

Palpi porrect, straight, extending about twice the length of head and clothed with rough hair; frons smooth; antennæ of female nearly simple. Fore wing with the costa highly arched near base, the apex rectangular; vein 3 from before angle of cell; 4, 5 from angle, which is much produced; 6 from upper angle, which is also much produced; 7, 8, 9 stalked, and 10 approximated to them; 11 free. Hind wing with vein 3 from close to angle of cell, which is very much produced; 4, 5 stalked; 6, 7 stalked; 8 free.

Fig. 8.



Neophrida aurolimbalis, ♀. ½.

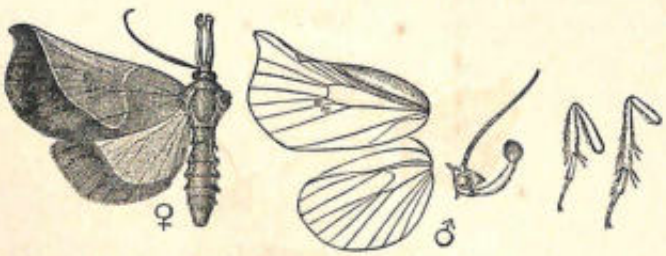
Type. *Neophrida aurolimbalis, Möschl. Lep. Surinam, p. 27.
British Guiana; Surinam.

Genus Tamyra.

Tamyra, Herr.-Schäff. Samml. aussereur. Schmett. p. 76 (1855).
Lametia, Wlk. xvi. 77 (1858).
Tamyrodes, Rag. Ann. Soc. Ent. Fr. 1890, p. 476.

Palpi upturned, four or five times the length of head and reaching far above it, thickly scaled, the 3rd joint clothed with

Fig. 9.



Tamyra ignitalis. ½.

hair, forming a rounded brush; frons with a sharp tuft; antennæ thickened and flattened; mid and hind tibiæ and 1st joint of hind

tarsus above fringed with hair. Fore wing broad, the costa nearly straight in female, excised beyond middle in male and with a small triangular fold; two postmedial tufts of raised scales between veins 2 and 4 and a glandular swelling at base of costa below; the apex slightly produced and acute; the outer margin very much excurved at middle; vein 3 from near angle of cell; 4, 5 from angle; 6 from upper angle; 7, 8, 9 stalked in female, in male 7 from angle and 8, 9, 10 free from before the angle; 11 anastomosing with 12, in female free. Hind wing with the cell short; veins 3, 4, 5 from angle; the discocellulars curved; 6, 7 from upper angle, 7 anastomosing slightly with 8.

Type. (1)*Tamyra penicillana, Herr.-Schäff. Samml. aussereur. Schmett. p. 76, f. 453. Brazil.

(2)†Tamyra cuprina, n. sp.

♀. Differs from *penicillana* in the fore wing having a diffused red patch below the cell before the antemedial pale line; no discocellular spot: the postmedial oblique line straighter, arising from the costa before the apex and with the whole area beyond it bright chestnut-red. Hind wing with the marginal area reddish.

Hab. Guadaloupe. *Exp.* 54 mm.

(3)†Tamyra ignitalis, Wlk. xvi. 77. Brazil.

Auctorum.

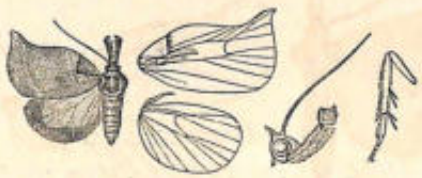
Tamyrodes papulalis, Rag. Ann. Soc. Ent. Fr. 1890, p. 475, pl. 7. f. 4. Cayenne.

Genus Casuaria.

Casuaria, Wlk. xxxv. 1807 (1866).

Palpi upturned, 4 or 5 times the length of head and reaching far above it, the 2nd and 3rd joints roughly scaled and fringed with long hair below; antennæ of male almost simple; tibiæ and 1st joint of hind tarsi fringed with hair above. Fore wing with

Fig. 10.



Casuaria armata, ♂. ½.

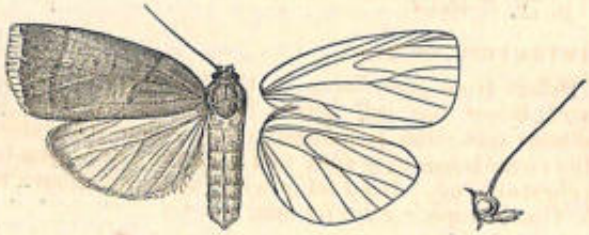
tympanic vesicle at base of costa above with ridged membrane across it; the costa highly arched at middle, excised beyond middle; the apex produced upwards and acute; the outer margin

Genus NEOPHRIDA.

Neophrida, Möschl. Lep. Surinam, p. 26 (1881).

Palpi porrect, straight, extending about twice the length of head and clothed with rough hair; frons smooth; antennæ of female nearly simple. Fore wing with the costa highly arched near base, the apex rectangular; vein 3 from before angle of cell; 4, 5 from angle, which is much produced; 6 from upper angle, which is also much produced; 7, 8, 9 stalked, and 10 approximated to them; 11 free. Hind wing with vein 3 from close to angle of cell, which is very much produced; 4, 5 stalked; 6, 7 stalked; 8 free.

Fig. 8.



Neophrida aurolimbalis, ♀. ½.

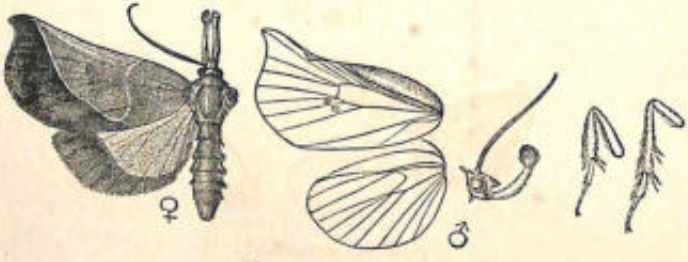
Type. *NEOPHRIDA AUROLIMBALIS, Möschl. Lep. Surinam, p. 27.
British Guiana; Surinam.

Genus TAMYRA.

Tamyra, Herr.-Schäff. Samml. aussereur. Schmett. p. 76 (1855).
Lametia, Wlk. xvi. 77 (1858).
Tamyrodes, Rag. Ann. Soc. Ent. Fr. 1890, p. 476.

Palpi upturned, four or five times the length of head and reaching far above it, thickly scaled, the 3rd joint clothed with

Fig. 9.



Tamyra ignitalis. ½.

hair, forming a rounded brush; frons with a sharp tuft; antennæ thickened and flattened; mid and hind tibiæ and 1st joint of hind

tarsus above fringed with hair. Fore wing broad, the costa nearly straight in female, excised beyond middle in male and with a small triangular fold; two postmedial tufts of raised scales between veins 2 and 4 and a glandular swelling at base of costa below; the apex slightly produced and acute; the outer margin very much excurved at middle; vein 3 from near angle of cell; 4, 5 from angle; 6 from upper angle; 7, 8, 9 stalked in female, in male 7 from angle and 8, 9, 10 free from before the angle; 11 anastomosing with 12, in female free. Hind wing with the cell short; veins 3, 4, 5 from angle; the discocellulars curved; 6, 7 from upper angle, 7 anastomosing slightly with 8.

Type. (1)*TAMYRA PENICILLANA, Herr.-Schäff. Samml. aussereur. Schmett. p. 76, f. 453. Brazil.

(2)†TAMYRA CUPRINA, n. sp.

♀. Differs from *penicillana* in the fore wing having a diffused red patch below the cell before the antemedial pale line; no discocellular spot: the postmedial oblique line straighter, arising from the costa before the apex and with the whole area beyond it bright chestnut-red. Hind wing with the marginal area reddish.

Hab. Guadaloupe. *Exp.* 54 mm.

(3)†TAMYRA IGNITALIS, Wlk. xvi. 77. Brazil.

Auctorum.

Tamyrodes papulalis, Rag. Ann. Soc. Ent. Fr. 1890, p. 475, pl. 7. f. 4. Cayenne.

Genus CASUARIA.

Casuaria, Wlk. xxxv. 1807 (1866).

Palpi upturned, 4 or 5 times the length of head and reaching far above it, the 2nd and 3rd joints roughly scaled and fringed with long hair below; antennæ of male almost simple; tibiæ and 1st joint of hind tarsi fringed with hair above. Fore wing with

Fig. 10.



Casuaria armata, ♂. ½.

tympanic vesicle at base of costa above with ridged membrane across it; the costa highly arched at middle, excised beyond middle; the apex produced upwards and acute; the outer margin

rounded; a glandular swelling fringed with hair at base of costa below; the retinaculum annular; the frenulum flattened and twisted near base and with a short lower fork; vein 3 from near angle of cell; 4, 5 from angle; 6 from upper angle; 7, 8, 9 stalked; 10, 11 free. Hind wing with veins 3, 4, 5 from angle of cell; 6, 7 from upper angle, 7 anastomosing slightly with 8.

Type. (1)†Casuaria armata, Wlk. xxxv. 1807. New Granada.
Tamyra physophora, Feld. Reis. Nov. pl. 137. f. 10.

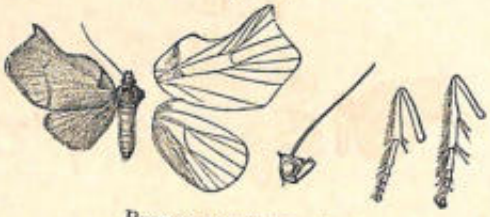
(2)*Casuaria crumena, Feld. Reis. Nov. pl. 137. f. 16. Bogotá.

Genus Rucuma.

Rucuma, Wlk. xxviii. 441 (1863).
Erioptycha, Rag. Ann. Soc. Ent. Fr. 1890, p. 496.

Palpi upturned and reaching vertex of head, the 3rd joint minute; frons with a sharp tuft; antennæ of male simple; mid and hind tibiæ and tarsi fringed with long hair above; the tympanic vesicle, retinaculum, and frenulum as in *Casuaria*. Fore wing with the costa very much arched at middle and excised beyond it; the apex produced upwards and falcate; the outer margin much excurved at middle, then excised to anal angle; neuration as in *Casuaria*. Hind wing of male with glandular swelling on basal half of inner margin below, clothed with rough hair.

Fig. 11.



Rucuma recurvana, ♂. ½.

Type. †Rucuma recurvana, Wlk. xxviii. 441. Brazil.

Auctorum.

Erioptycha umbrivittalis, Rag. Ann. Soc. Ent. Fr. 1890, p. 497, pl. 7. f. 9. Brazil.

Genus Oryctopleura.

Oryctopleura, Rag. Ann. Soc. Ent. Fr. 1890, p. 495.

Palpi upturned and reaching vertex of head, the 3rd joint minute; frons with a sharp tuft of scales; mid and hind legs thickly clothed with scales. Fore wing with the costa strongly arched at base, then deeply excised; the apex produced to a sharp point; the outer margin excurved at middle; male with a large

tympanic vesicle; a glandular swelling at base of costa below, fringed with hair; the retinaculum annular; the frenulum thickened and flattened; veins 2, 3 from well before angle of cell; 4, 5 from angle; 6 from below upper angle; 7, 8, 9, 10 stalked. Hind wing with the outer margin angled at middle; the costa arched; the cell short; vein 3 from before angle of cell; 4, 5 from angle; 6, 7 from upper angle.

Type. *Oryctopleura arcuatalis, Rag. Ann. Soc. Ent. Fr. 1890, p. 496. Brazil.

Genus Salobrena.

Salobrena, Wlk. xxviii. 446 (1863).
Œctoperia, Zell. Verh. zool.-bot. Ges. Wien, 1875, p. 331.
Clydonopteron, Riley, Ent. Am. iii. p. 287.

Palpi upturned, about twice the length of head and reaching well above the vertex, fringed with long hair above; frons rounded; antennæ somewhat annulate; mid legs with large tufts of scales at middle and end of tibiæ. Fore wing of male with a tympanic vesicle at base of costa, usually with two excisions beyond it; the retinaculum annular; the frenulum much thickened and with a short lower fork; vein 3 from before angle of cell; 4, 5 from angle; 6 from upper angle; 7, 8, 9 stalked; 10, 11 free. Hind wing with veins 3, 4, 5 from angle of cell; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 12.



Salobrena excisana, ♂. ⅔.

Sect. I. (*Salobrena*). Mid tarsus of male with a large tuft of scales on 1st joint; fore wing with two deep excisions in costa.

Type. (1)†Salobrena excisana, Wlk. xxviii. 446. Brazil.
„ *genualis*, Feld. Reis. Nov. pl. 137. f. 35.

(2)*Salobrena cyrisalis, Druce, Biol. Centr.-Am., Het. ii. p. 192, pl. 59. f. 20. Mexico.

(3)*Salobrena propylea, Druce, Biol. Centr.-Am., Het. ii. p. 193, pl. 59. ff. 21, 22. Mexico.

(4) Salobrena tecomæ, Riley, Ent. Am. iii. p. 288, ff. 132, 133. U.S.A.; W. Indies; Brazil; Buenos Ayres.

(5)*Salobrena gibbosa, Feld. Reis. Nov. pl. 137. f. 36. Bogotá.

Sect. II. (*Œctoperia*). Mid tarsus of male without the tuft of scales; fore wing with the excisions in costa slight.

(6) Salobrena sincera, Zell. Verh. zool.-bot. Ges. Wien, 1873, p. 331, pl. x. f. 45. U.S.A.

Sect. III. Male with no excisions on costa of fore wing; the glandular swelling on underside very large, with a thick tuft of hair from its extremity in end of cell.

(7)†Salobrena vacuana, Wlk. xxviii. 441. W. Indies; Brazil.

Genus Idnea.

Idnea, Herr.-Schäff. Samml. aussereur. Schmett. p. 75 (1855).
Uzeda, Wlk. xxviii. 442 (1863).
Corybissa, Wlk. xxviii. 445.
Auchoteles, Zell. Hor. Soc. Ent. Ross. 1877, p. 83.

Palpi upturned, reaching vertex of head, the 3rd joint minute; frons with a tuft of hair; antennæ minutely ciliated; mid and hind tibiæ and the 1st joint of tarsi fringed with rough hair. Fore wing with the costa arched at base, excised beyond middle; the apex produced and falcate; the outer margin very much excurved at middle; a glandular swelling in male at base of costa below, with an oblique tuft of hair from it met by a fringe on median nervure continued for a short way along vein 2; a hyaline patch beyond the cell; vein 3 from near angle of cell; 4, 5 from angle; 6, 7 from upper angle in male, 8, 9 stalked, 10 free, 11 anastomosing with 12; in female 7, 8, 9 stalked, 10, 11 free. Hind wing with the outer margin excurved at middle; veins 3, 4, 5 from lower angle of cell (or abnormally 4, 5 on a long stalk); the discocellulars obliquely curved; veins 6, 7 stalked, 7 anastomosing with 8.

Fig. 13.



Idnea speculans, ♂. ½.

Sect. I. (*Idnea*). Fore wing of male with two excisions in the costa beyond middle, the lobe between them curled over and with a tuft of hair; hind wing with short ridges of scales beyond lower angle of cell on veins 3, 4, 5.

Type. (1) Idnea speculans, Herr.-Schäff. Samml. aussereur. Schmett. ff. 399, 400. Brazil.
†*Uzeda olivaceana*, Wlk. xxviii. 443.

Sect. II. Fore wing of male with one excision in the costa beyond middle and no fringed lobe; hind wing without ridges of scales beyond lower angle of cell.

A. (*Corybissa*). Fore wing of male with a rounded lobe at base of costa.

(2)†Idnea concolorana, Wlk. xxviii. 439. Brazil.
†*Uzeda torquetana*, Wlk. xxviii. 443.
†*Auchoteles perforatana*, Zell. Hor. Soc. Ent. Ross. xiii. p. 84.
† „ *sobriana*, Zell. Hor. Soc. Ent. Ross. xiii. p. 84.

(3)†Idnea altana, Wlk. xxviii. 438. Brazil.
†*Corybissa congruana*, Wlk. xxviii. 416.

B. (*Uzeda*). Fore wing of male with an angled lobe at base of costa; a flap of scales on inner side of the hyaline patch.

a. Fore wing of male with the costal lobe ending before middle, with no tuft of scales on it or ridge on the postmedial line.

(4)†Idnea propriana, Wlk. xxviii. 438. Brazil.
†*Uzeda vitriferana*, Wlk. xxviii. 442.

b. Fore wing of male with the costal lobe extending to middle and with a tuft of scales on it; a ridge of scales on the postmedial line.

(5)†Idnea gibbosana, Wlk. xxviii. 444. Brazil.

Genus Samcova.

Samcova, Wlk. xxviii. 435 (1863).
Epidelia, Rag. Ann. Soc. Ent. Fr. 1891, p. 100.

Palpi obliquely upturned, about twice the length of head and reaching well above it, the 3rd joint long and naked; frons with a tuft of hair; mid tibiæ very thickly fringed with long scales; the 1st tarsal joint with a large tuft; hind tibiæ fringed with long scales at extremity and with a tuft on 1st tarsal joint. Fore wing

Fig. 14.



Samcova incensana, ♂. ½.

of male with a tympanic vesicle at base of costa; a glandular swelling below, with a fringe of long hair at extremity; a tuft of long hair from median nervure; the costa arched at base; the apex slightly produced and acute; the outer margin excurved at middle; vein 3 from near angle of cell; 4, 5 from angle; 6 from

upper angle; 7, 8, 9 stalked; 10, 11 free. Hind wing with a slight glandular patch of scales beyond cell, which is extremely short; veins 3, 4, 5 from angle; 6, 7 stalked, 7 anastomosing with 8.

Type. (1)†Samcova incensana, Wlk. xxviii. 436. Brazil.

(2)*Samcova damia, Druce, Biol. Centr.-Am., Het. i. p. 308, pl. 28. f. 4 (♀). Centr. Am.
Epidelia viridalis, Rag. Ann. Soc. Ent. Fr. 1891, p. 101, pl. 16. f. 8.

Genus Tosale.

Tosale, Wlk. xxviii. 447 (1863).
Fabatana, Wlk. xxxiv. 1265 (1865).
Siparocera, Grote, Ann. N.Y. Lyc. 1876, p. 129.

Palpi upturned, reaching vertex of head, the 3rd joint short; frons with a slight tuft; antennæ of male ciliated; mid tibiæ with large tufts of scales at base and extremity, the first joints of tarsi with large tufts. Fore wing of male with a tympanic vesicle and the costa arched at base; a costal fold below; the retinaculum annulate and fringed with hair; the frenulum thickened and flattened, and with a short lower fork; the apex rounded; the outer angle hooked; vein 3 from near angle of cell; 4, 5 from angle; 6, 7 from upper angle; 8, 9, 10 stalked in male, in female 7, 8, 9, 10 stalked; 11 free. Hind wing with vein 3 from before angle of cell; 4, 5 from angle; the discocellulars highly angled; 6, 7 stalked, 7 anastomosing slightly with 8.

Fig. 15.



Tosale pyralidoides, ♂. ½.

Sect. I. Fore and hind wings of male without patches of velvety black scales on disk.

(1)†Tosale aucta, n. sp.

♂. Head, thorax, and abdomen brown with a slight red tinge; palpi and legs deeper red-brown; the extremities of tarsi white. Fore wing red-brown, suffused in parts with grey; a semicircular chocolate band with slightly waved grey outer edge beyond the tympanic vesicle; diffused medial and submarginal olive-brown shades; a grey postmedial line with black specks on its inner edge, excurved from vein 6 to 2, where it is bent inwards; the cilia blackish. Hind wing black-brown, with a pale sinuous line from

vein 2 to anal angle. Underside redder, with a dark patch on disk of fore wing; hind wing with pale curved postmedial line.
Hab. St. Martha, Brazil. *Exp.* 20 mm.

(2)*Tosale decipiens, Feld. Reis. Nov. pl. 137. f. 37. Brazil.

Sect. II. Male with velvety patches of black scales on disk of fore wing below and on disk of hind wing above.

(3)†Tosale oviplagalis, Wlk. xxxiv. 1265. U.S.A.; Colombia;
Siparocera nobilis, Grote, Ann. N.Y. Lyc. 1876, p. 129. Peru.
Asopia anthracioides, Grote, Tr. E. S. Phil. xv. pl. 2. f. 9.

Type. (4)†Tosale pyralidoides, Wlk. xxviii. 447. Brazil.
Pyralis crassipes, Wlk. xxxiv. 1232.
Torda metamelana, Wlk. xxxv. 1800.

(5)*Tosale flattalis, Feld. Reis. Nov. pl. 137. f. 28. Brazil.

Genus Carcha.

Carcha, Wlk. xvii. 281 (1859).
Cœloma, Möschl. Lep. Porto Rico, p. 276 (1890).

Palpi upturned and reaching vertex of head, the 3rd joint minute; frons with a tuft of hair; antennæ minutely ciliated; mid tibiæ with thick tufts of scales at middle and extremity; hind tibiæ and tarsal joints slightly fringed with hair; abdomen with medial and paired lateral anal tufts. Fore wing of male with the costa highly arched at base and bearing a tympanic vesicle; a glandular swelling below; the retinaculum annulate, the frenulum greatly thickened and flattened, with a strong lower fork; the disk with a patch of black scales; the apex rounded; the outer angle hooked; veins 2 and 3 from a point before angle of cell; 4, 5 from angle; 6 from upper angle; 7, 8, 9, 10 stalked; 11 free. Hind wing with vein 3 from before angle of cell; 4, 5 from angle; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 16.



Carcha hersilialis, ♂. ¾.

Sect. I. Hind wing without ridges of scales on inner area.

Type. (1)†Carcha hersilialis, Wlk. xvii. 282. W. Indies; Honduras.
†*Pyralis dispansalis*, Wlk. xxxiv. 1228.
† „ *curtalis*, Wlk. xxxiv. 1230.
Cœloma tortricalis, Möschl. Lep. Porto Rico, p. 277.
Tosale moritzi, Rag. Ann. Soc. Ent. Fr. 1890, p. 500.

Sect. II. Hind wing with ridge of large erect scales from below middle of cell to outer margin, thickest towards base.

(2)†Carcha violalis, n. sp.

♀. Chocolate-brown with a purple tinge. Fore wing with the costal and apical areas suffused with pink; a marginal series of silvery blue spots. Hind wing with the outer margin and base of cilia silvery blue; a marginal series of black striæ; the scales in the ridge with a metallic tinge. Underside of both wings with indistinct curved postmedial line.

Hab. Espiritu Santo (*Jones*). *Exp.* 24 mm.

Genus Sanguesa.

Sanguesa, Wlk. xxviii. 440 (1863).

Palpi upturned, slender, and reaching just above vertex of head, the 3rd joint minute; frons with a tuft of hair; antennæ of male minutely ciliated; mid and hind tibiæ fringed with long hair, the 1st joint of hind tarsus with a large tuft of hair. Fore wing with a tympanic vesicle at base of costa; the basal half of costa highly arched, then almost straight; the apex rectangular; the outer margin rounded; male with a large tuft of hair from the glandular swelling at base of costa below covering the annular retinaculum; the frenulum very much thickened and flattened, with a short lower fork; a thick tuft of hair below median nervure; vein 3 from before angle of cell; 4, 5 well separated at origin; 6 from upper angle; 7, 8, 9 stalked; 10, 11 free. Hind wing with the costa lobed near base; the outer margin rounded from apex to vein 2, then excised to anal angle; vein 3 from before angle of cell; 4, 5 well separated at origin; the discocellulars highly angled; 6, 7 shortly stalked, 7 anastomosing slightly with 8.

Fig. 17.



Sanguesa cosmiana, ♂. ½.

Type. (1)†Sanguesa cosmiana, Wlk. xxviii. 440. Brazil.

(2)†Sanguesa dilatatana, Wlk. xxviii. 437. Brazil.

Genus Azamora.

Azamora, Wlk. xv. 1757 (1858).
Torda, Wlk. xxviii. 436 (1863).

Amblyura, Led. Wien. ent. Mon. 1863, p. 357.
Thylacophora, Rag. Ann. Soc. Ent. Fr. 1890, p. 490.

Palpi upturned and reaching vertex of head; frons with a sharp tuft; antennæ of male ciliated; hind tibiæ very thickly fringed with long scales, the 1st tarsal joint with a very large tuft; abdomen of male with medial and paired lateral anal tufts. Fore wing of male with a tympanic vesicle at base of costa, which is arched; a glandular swelling below, with a tuft of long hair at extremity met by a fringe from below median nervure; the retinaculum annulate, the frenulum thickened; the apex rectangular or slightly produced; vein 3 from close to angle of cell; 4, 5 from angle; 6 from upper angle; 7, 8, 9 stalked; 10, 11 free. Hind wing with veins 3, 4, 5 from angle of cell; 6, 7 from upper angle; 7 anastomosing slightly with 8.

Fig. 18.



Azamora tortriciformis, ♂. ½.

Sect. I. Hind tibiæ of male with a tuft of long hair from base; fore wing with a patch of velvety black scales on underside above middle of vein 1, with a tuft of long hair lying over it; hind wing with a patch of velvety black scales in end of cell above.

(1)†Azamora melanospila, Wlk. xxxv. 1799. Brazil.

Sect. II. Hind tibiæ of male without tuft of hair from base; fore and hind wings without velvety black patches.

A. Fore wing of male with a tuft of pale hair below median nervure on underside.

Type. (2)†Azamora tortriciformis, Wlk. xv. 1757. Brazil.
„ *basiplaga*, Wlk. Trans. Ent. Soc. (3) i. p. 91.
Thylacophora hepaticalis, Rag. Ann. Soc. Ent. Fr. 1890, p. 492.

(3) Azamora corusca, Led. Wien. ent. Mon. 1863, p. 357, pl. 6. f. 14. Brazil.

B. Fore wing of male with a tuft of black hair below median nervure on underside.

(4)†Azamora penicillana, Wlk. xxviii. 437. Brazil.
Thylacophora tortricoidalis, Rag. Ann. Soc. Ent. Fr. 1890, p. 491.

Genus ANISOTHRIX.

Anisothrix, Rag. Ann. Soc. Ent. Fr. 1890, p. 478.

Palpi upturned and reaching vertex of head, the 2nd joint with a hollow tuft at extremity enclosing the 3rd joint; frons smooth; antennæ of male with cilia and bristles. Fore wing with the apex rectangular; vein 3 from near angle of cell; 4, 5 from angle; 6 from upper angle; 7, 8, 9 stalked; 10 free; 11 slightly anastomosing with 12; male with a glandular swelling at base of costa fringed with hair, which is met by a fringe of hair from median nervure. Hind wing with veins 3, 4, 5 from angle of cell; the discocellulars obliquely curved; 6, 7 stalked, 7 anastomosing with 8.

Fig. 19.



Anisothrix adustalis, ♂. ½.

Type. *ANISOTHRIX ADUSTALIS, Rag. Ann. Soc. Ent. Fr. 1890, p. 479, pl. 7. f. 5.

Centr. Amer.

Genus HYALOSTICTA, nov.

Palpi upturned, thickly scaled, and reaching vertex of head; frons smooth; antennæ of male ciliated; mid and hind tibiæ thickly fringed with long scales, the tarsal joints with large tufts of scales. Fore wing with the costa slightly arched at base, then nearly straight; the apex rectangular; male with a slight tuft of hair at base of costa below; a hyaline fovea in cell; veins 2 and 3 from close to angle of cell; 4, 5 from angle and closely approximated at origin; 6 from near upper angle; 7, 8, 9 stalked; 10, 11 free. Hind wing with veins 3, 4, 5 from angle of cell; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 20.



Hyalosticta obliqualis, ♂. ½.

Type. †HYALOSTICTA OBLIQUALIS, n. sp.

Head and thorax ochreous brown and purplish fuscous; abdomen fuscous irrorated with ochreous; legs clothed with reddish,

purplish-black, and ochreous scales. Fore wing purplish fuscous irrorated with greyish ochreous; a very oblique diffused greyish line with ridge on its inner side from costa near base to inner margin beyond middle, the costal area beyond it suffused with grey; an ill-defined submarginal grey line excurved below costa; a reddish patch above outer angle. Hind wing dark fuscous brown. Underside greyer, with dark ante- and postmedial marks on costa of each wing.

Hab. São Paulo (*Jones*). *Exp.* ♂ 26, ♀ 30 mm.

Genus STHENOBÆA.

Sthenobœa, Rag. Ann. Soc. Ent. Fr. 1890, p. 541.

Palpi upturned, short, smoothly scaled, and not reaching vertex of head; frons smooth; antennæ ciliated; tibiæ smoothly scaled. Fore wing short and broad; the costa slightly arched; the apex rectangular; the outer margin obliquely rounded; vein 2 much curved at origin; lower angle of cell greatly produced by vein 5 running along median nervure; 3, 4, 5 from angle, 4, 5 approximated for some distance; upper angle of cell produced; 6 from well below upper angle; 7 from upper angle; 8, 9 very shortly stalked; 10 from cell; 11 anastomosing with 12. Hind wing with vein 2 from well before angle of cell; 3 and 5 from angle; 4 absent; 6, 7 stalked, 7 anastomosing with 8.

Fig. 21.



Sthenobœa abnormalis, ♂. ½.

Type. *STHENOBÆA ABNORMALIS, Rag. Ann. Soc. Ent. Fr. 1890, p. 641. Ecuador.

Genus HYPOCOSMIA.

Hypocosmia, Rag. Ann. Soc. Ent. Fr. 1890, p. 70.

Palpi upturned, slender, and hardly reaching vertex of head, the 3rd joint minute; frons smooth; antennæ of male thickened; mid tibiæ fringed with long hair, a large tuft on 1st joint of tarsus; hind tibiæ fringed with long hair, the tarsal joints with tufts diminishing distally. Fore wing with the costa nearly straight; the apex rectangular; male with a small tympanic vesicle at base above; the costal thickening slightly fringed with hair below; a fringe of hair from above base of inner margin; the frenulum rather thickened; vein 3 from near angle of cell; 4, 5 from angle; 7, 8, 9, 10 stalked; 11 free. Hind wing with vein 3 from angle of cell; 4, 5 stalked; the discocellulars obliquely curved; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 22.



Hypocosmia definitalis, ♂. ½.

Type. *Hypocosmia definitalis, Rag. Ann. Soc. Ent. Fr. 1891, p. 505, pl. 7. f. 11. Venezuela [1].

Genus Xantippe.

Xantippe, Rag. Ann. Soc. Ent. Fr. 1890, p. 532.

Palpi upturned, thickly scaled, and hardly reaching vertex of head; frons roughly scaled; antennæ somewhat annulate; mid tibiæ and 1st tarsal joint fringed with hair above; hind tibiæ long, fringed with hair above, the tarsal joints with tufts of scales diminishing distally. Fore wing with the costa straight; the apex rectangular; the outer margin oblique; veins 4, 5 stalked; 6 from upper angle; 7, 8, 9 stalked; 10 from angle; 11 becoming coincident with 12. Hind wing with vein 2 from close to angle of cell; 3, 4, 5 stalked; 6, 7 stalked, 7 anastomosing strongly with 8.

Fig. 23.



Xantippe auropurpuralis, ♂. ½.

Sect. I. Fore wing with vein 3 stalked with 4, 5.

Type. (1) Xantippe auropurpuralis, Rag. Ann. Soc. Ent. Fr. 1890, p. 533, pl. 5. f. 7. Brazil.

Sect. II. Fore wing with vein 3 from cell.

(2)†Xantippe chromalis, n. sp.

♂. Greenish yellow. Fore wing with the costa fuscous, with pale specks at the origin of the very indistinct pale medial and postmedial lines; a marginal blackish line; the cilia yellowish white, dark at apex. Abdomen and hind wing pale fuscous. Underside fuscous; the costa of fore wing irrorated ochreous and black, of hind wing reddish irrorated with black.

♀ with the hind wing whiter.

Hab. São Paulo (*Jones*). *Exp.* ♂ 18, ♀ 20 mm.

[1] Not Ceylon.

(3) XANTIPPE BICHORDALIS, Rag. Ann. Soc. Ent. Fr. 1890, p. 537. Brazil.

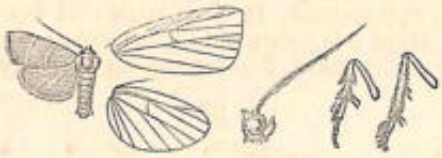
†*Arta rubricalis*, Warr. A. M. N. H. (6) vii. p. 498.

Genus PARACHMA.

Parachma, Wlk. xxxiv. 1263 (1865).
Zazaca, Wlk. xxxiv. 1269.
Perseis, Rag. Ann. Soc. Ent. Fr. 1890, p. 538.

Palpi upturned, thickly scaled, and hardly reaching vertex of head; frons rounded; antennæ of male ciliated; mid tibiæ with large tufts of scales at middle and extremity and a large tuft on the 1st tarsal joint; hind tibiæ very long in male and roughly scaled, the tarsal joints with tufts of scales diminishing distally; the spurs short. Fore wing with the apex rectangular; veins 4, 5 stalked; 6 from upper angle; 7 absent; 8, 9, 10 stalked; 11 free. Hind wing with vein 2 from near angle of cell; 3 absent; 4, 5 stalked; 6, 7 from upper angle, 7 anastomosing strongly with 8.

Fig. 24.



Parachma ochracealis, ♂. ½.

SECT. I. Fore wing with vein 3 stalked with 4, 5.

Type. (1)†PARACHMA OCHRACEALIS, Wlk. xxxiv. 1263. U.S.A.
†*Zazaca auratalis*, Wlk. xxxiv. 1269.
Asopia culiculalis, Hulst, Tr. Am. Ent. Soc. xiii. 167.

(2)†PARACHMA LUTEALIS, n. sp.

Head and thorax yellow marked with fuscous; abdomen yellow suffused with rufous above; the tufts on hind tarsi rufous. Fore wing yellow irrorated with fuscous and red scales; a broad medial purplish-grey band with red edges indented in cell and toothed just below it; the area near outer angle suffused with purplish grey; a marginal red line. Hind wing pale, with some reddish suffusion near lower angle of cell and on outer margin; traces of a postmedial line.

Hab. São Paulo (*Jones*). *Exp.* ♂ 16, ♀ 16–20 mm.

SECT. II. Fore wing with vein 3 absent.

(3)†PARACHMA METERYTHRA, n. sp.

Purplish grey; head and patagia marked with yellowish white; palpi and tarsi ringed with yellowish white. Fore wing with

yellowish spot at base of costa and larger triangular medial and postmedial spots, with series of specks arising from them. Hind wing orange-red; the cilia of both wings pale at tips.

Hab. Espiritu Santo. *Exp.* ♂ 20, ♀ 22 mm.

Genus Dasycnemia.

Dasycnemia, Rag. Ann. Soc. Ent. Fr. 1890, p. 489.

Palpi upturned, slender, and not reaching vertex of head, the 3rd joint short; frons smooth; antennæ of male finely ciliated; mid tibiæ with large tufts of scales at middle and extremity, the tarsal joints with tufts of scales diminishing distally; hind tibiæ long and roughly scaled, the tarsal joints with tufts of scales diminishing distally; the spurs short. Fore wing with the apex rounded; vein 3 from angle of cell; 4, 5 on a long stalk; 6 from below upper angle; 7, 8, 9 stalked; 10, 11 free. Hind wing with vein 3 from angle of cell and closely approximated to 4, 5, which are shortly stalked; 6, 7 stalked, 7 slightly anastomosing with 8.

Fig. 25.



Dasycnemia depressalis, ♂. ½.

Type. *Dasycnemia depressalis, Rag. Ann. Soc. Ent. Fr. 1890, p. 490, pl. 7. f. 7. Peru.

Genus Catadupa.

Catadupa, Wlk. xxviii. 444 (1863).

[1] Palpi with the 2nd joint upturned and reaching vertex of head, the 3rd short and porrect; antennæ of male ciliated; hind tibiæ with a fringe of very long scales at extremity; hind tibiæ long, fringed with rough scales at extremity, the 1st joint of tarsus with a large tuft of scales. Fore wing of male with a large lobe near base of costa, roughly scaled on the costa; a large ridge of scales on median nervure above, with a hollow between it and the costal lobe; tufts of hair from base of costa and median nervure below and a large fovea in the cell; the apex rectangular; the cell very short; vein 2 from near angle; 3, 4, 5 from angle; 6 from upper angle; 7, 8, 9 stalked; 10, 11 free. Hind wing with the cell short; veins 3, 4, 5 from angle; 6, 7 from upper angle, 7 anastomosing with 8.

[1] In the unique type the head is wanting, and the characters are taken from Walker's description.

Fig. 26.



Catadupa integrana, ♂. ⅔.

Type. †CATADUPA INTEGRANA, Wlk. xxviii. 445. Brazil.

Genus DASTIRA.

Dastira, Wlk. xix. 917 (1859).

Palpi upturned, minute and not reaching vertex of head; frons with a sharp tuft; antennæ of male with long curved cilia; mid and hind tibiæ and tarsi nearly smooth. Fore wing with the costa arched at base, the apex rounded; male with a glandular swelling at base of costa below fringed with long hair; vein 3 from near angle of cell; 4, 5 from angle; 6 from upper angle; 7, 8, 9 stalked; 10, 11 free. Hind wing with vein 3 from near angle of cell; 4, 5 from angle; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 27.



Dastira hippialis, ♂. ⅔.

Type. †DASTIRA HIPPIALIS, Wlk. xix. 917. Brazil.

Genus PROTRICHIA, nov.

Palpi upturned and reaching vertex of head, the 3rd joint minute; frons with a sharp tuft; antennæ of male somewhat thickened; mid and hind tibiæ roughly scaled. Fore wing with the costa slightly excised and with a fringe of hair below it beyond middle; a tuft of hair from base of costa below; veins 3, 4, 5 from close to angle of cell; 6, 7 from upper angle and 8, 9 stalked in male, in female 7, 8, 9 stalked; 10, 11 free. Hind wing with the lower angle of cell produced and the discocellulars obliquely curved; veins 3, 4, 5 from angle; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 28.



Protrichia vinacea, ♂. ½.

Type. †PROTRICHIA VINACEA, n. sp.

♂. Head purplish red; thorax and abdomen pale grey-brown. Fore wing with the base of costa purplish red; the basal area grey-brown bounded by an oblique whitish line; the costal area grey-brown; the rest of the wing purplish red, with a slightly sinuous whitish postmedial line. Hind wing pale; the outer area suffused with purplish red; a pale submarginal line angled outwards to the margin at vein 2.

♀ with only a slight vinous tinge on medial area of fore wing; the submarginal line more curved and the area beyond it dark purplish red.

Hab. São Paulo (*Jones*). *Exp.* 24 mm.

Genus SCHISTONEURA.

Schistoneura, Rag. Ann. Soc. Ent. Fr. 1890, p. 527.

Palpi upturned, slender, and reaching vertex of head; frons with a tuft of hair; antennæ of male minutely ciliated; tibiæ thickly scaled. Fore wing of male with the membrane contorted beyond middle below the costa and with tufts of scales on upperside; a large costal fold below, with oblique tuft of hair at its extremity met by a fringe from median nervure; vein 3 from near angle of cell; 4, 5 from angle; 7, 8, 9 stalked in female, 10 free and 11 anastomosing with 12; in male 7 and 8 from upper angle of cell, 9, 10, 11 free and bent up to the costa. Hind wing with the outer margin angled at vein 2; veins 3, 4, 5 from angle of cell; the discocellulars obliquely curved; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 29.



Schistoneura helicalis, ♂. ½.

Type. †SCHISTONEURA HELLICALIS, Wlk. xviii. 630; Rag. Ann. Soc. Ent. Fr. 1891, pl. 16. f. 2. Brazil.

" *flavitinctalis*, Rag. Ann. Soc. Ent. Fr. 1890, p. 527.

Genus Acropteryx.

Acropteryx, Rag. Ann. Soc. Ent. Fr. 1890, p. 469.

Palpi upturned, the second joint reaching vertex of head, the 3rd short in male, long and oblique in female; frons with a tuft of hair; antennæ of male minutely ciliated; tibiæ roughly scaled. Fore wing of male with the costa arched near base, excised beyond middle, the apex slightly produced upwards and falcate; a glandular swelling at base of costa below, with a large oblique tuft of hair at end of it met by a fringe from below median nervure; the costa nearly straight in female; vein 3 from near angle of cell; 4, 5 from angle; 6, 7 from upper angle; 8, 9 absent in male, stalked with 7 in female; 10, 11 free. Hind wing in male with small tufts of scales on veins 5, 6, 7 beyond the cell on underside; vein 3 from near angle of cell; 4, 5 from angle; 6, 7 from upper angle, 7 anastomosing slightly with 8.

Fig. 30.



Acropteryx herbacealis, ♂. ½.

Sect. I. Fore wing with the costa excised beyond middle, the apex slightly produced upwards and acute.

(1) Acropteryx arnea, Cram. Pap. Exot. i. pl. 36, G. Surinam; Amazons.
Botys linalis, Feld. Reis. Nov. pl. 137. f. 9.

Type. (2) Acropteryx herbacealis, Rag. Ann. Soc. Ent. Fr. 1890, p. 470, pl. 7. f. 1. Chiriqui; St. Martha.

Sect. II. Fore wing with the costa evenly arched; the apex rounded.

(3)* Acropteryx nattereri, Feld. Reis. Nov. pl. 136. f. 29. Brazil.

Genus Teratomorpha.

Teratomorpha, De Nicéville, Journ. Bom. Nat. Hist. Soc. x. p. 192 (1896).

Palpi upturned, the 2nd joint reaching vertex of head and moderately scaled in front, the 3rd short and naked; frons rounded; antennæ almost simple; tibiæ with the outer spurs about two-thirds length of inner. Fore wing with the costa arched at base and excised beyond middle, the apex bent upwards,

arched, and falcate; the outer margin excised below apex, produced and hooked at middle, then excised to outer angle; the inner margin lobed; male with a glandular swelling at base of costa below fringed with tufts of long hair; vein 3 from before angle of cell; 4, 5 from angle; 6 from upper angle; 7, 8, 9 curved and stalked; 10, 11 free. Hind wing with the outer margin somewhat excised below apex and angled at vein 2; vein 3 from near angle of cell; 4, 5 from angle; 6, 7 from upper angle, 7 anastomosing slightly with 8.

Type. †Teratomorpha hampsoni, De Nicéville, Journ. Bom. Nat. Hist. Soc. x. p. 192, pl. 1. f. 52. Tenasserim.

Fig. 31.



Teratomorpha hampsoni, ♂. ½. (From Moths Ind. vol. iv.)

Auctorum.

Goossensia darabitalis, Snell. Tijd. v. Ent. xxxviii. p. 107, pl. 5. f. 1. Java.

Genus Pionidia, nov.

Palpi upturned, slender, reaching vertex of head and held well in front of frons, which is smooth; antennæ of male almost simple; mid tibiæ thickly fringed with scales; hind tibiæ with a slight tuft of hair from base. Fore wing with the costa arched at base, then straight, the apex rectangular; male with some rough scales in cell below; the cell short and narrow; veins 2, 3 from near angle; 5 from above angle; 6 from below upper angle; 7, 8, 9 stalked; 10, 11 absent. Hind wing with the cell short; vein 2 absent; 3, 4, 5 from angle; the discocellulars highly angled; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 32.



Pionidia albicilia, ♂. ½.

Type. †Pionidia albicilia, n. sp.

♂. Yellowish brown. Fore wing slightly suffused with pink; a

small tuft of scales on discocellulars; a dark marginal line; the cilia pure white. Hind wing pale ochreous; the apical area suffused with pink. Underside of fore wing with pink suffusion in and beyond cell to outer margin.

Hab. Rio Janeiro. *Exp.* 28 mm.

Genus Paridnea.

Paridnea, Rag. Ann. Soc. Ent. Fr. 1891, p. 602.

Palpi upturned, extending far in front of frons and reaching vertex of head, roughly scaled on outer side, 3rd joint with the scales directed downwards; frons nearly smooth; antennæ strongly ciliated; tibiæ nearly smooth. Fore wing with the costa nearly straight, the apex rectangular; male with a large tuft of scales on costa beyond middle; a glandular swelling at base of costa below fringed with long hair, met by a fringe from median nervure; veins 3, 4, 5 from angle of cell; male with veins 6, 7, 8 free from close to upper angle; 9, 10 stalked; 11 free. Hind wing with veins 3, 4, 5 from angle of cell; the discocellulars highly angled; 6, 7 shortly stalked, 7 anastomosing with 8.

Fig. 33.



Paridnea holophœalis, ♂. ½.

Type. Paridnea holophæalis, Rag. Ann. Soc. Ent. Fr. 1891, p. 603. Centr. & S. Am.

Stemmatophora demonica, Druce, Biol. Centr.-Am., Het. ii. p. 200, pl. 60. f. 9.

Genus Derbeta.

Derbeta, Wlk. xxxiv. 1147 (1865).

Palpi upturned and reaching halfway to vertex of head, thickly scaled, and the 3rd joint minute; frons with a tuft of hair; antennæ of male bipectinate (mid and hind legs wanting). Fore wing long and narrow; the costa evenly arched; the apex rectangular; the outer margin obliquely curved; the inner margin evenly arched; a small glandular swelling at base of costa below; the retinaculum tufted with hair; veins 3, 4, 5 from angle of cell; 6 from upper angle; 7, 8 stalked; 9, 10 absent; 11 free. Hind wing with vein 3 from near angle of cell; 4, 5 approximated for a short distance; the discocellulars highly angled; 6, 7 from upper angle, 7 anastomosing slightly with 8.

Fig. 34.



Derbeta nigrifimbria, ♂. ♭.

Type. †Derbeta nigrifimbria, Wlk. xxxiv. 1148. Brazil.

Genus Pyraustodes.

Pyraustodes, Rag. Ann. Soc. Ent. Fr. 1890, p. 484.

Palpi upturned, slender, very short and hardly reaching halfway to vertex of head; frons rounded; antennæ almost simple; mid and hind tibiæ slightly fringed with hair. Fore wing of male with a large flap of scales in the cell; the basal half of costal arched; the apex slightly produced; the outer margin obliquely rounded; veins 3, 4, 5 from angle of cell; 6 from below upper angle; 7 absent; 8, 9 stalked; 10 free; 11 curved. Hind wing with the discocellulars very highly angled; the lower angle of cell greatly produced; veins 3, 4, 5 from angle; 6, 7 shortly stalked, 7 anastomosing slightly with 8.

Fig. 35.



Pyraustodes flavicostalis, ♂. ♭.

Type. *Pyraustodes flavicostalis, Rag. Ann. Soc. Ent. Fr. 1890, p. 485. Brazil.

Genus Arica.

Arica, Wlk. xxviii. 439 (1863).

Palpi with the 2nd joint upturned and reaching vertex of head, the 3rd porrect and thickly scaled; frons with a sharp tuft; antennæ of male nearly simple; mid tibiæ somewhat thickly clothed with hair; hind tibiæ long. Fore wing very broad; male with tympanic vesicle at base of costa, which is very highly arched, the outer half somewhat excised; the apex rectangular; the outer and inner margins forming an almost continuous curve; the retinaculum annulate; the frenulum thickened and flattened, with a short lower fork; vein 3 from near angle of cell; 4, 5 from

angle; 6 from upper angle; 7, 8, 9 stalked; 10, 11 free. Hind wing with veins 3 and 5 well separated from 4; the discocellulars very highly angled; 6, 7 from upper angle, 7 anastomosing slightly with 8.

Fig. 36.



Arica pelopsana, ♂. ½.

Type. (1)†Arica pelopsana, Wlk. xxviii. 439. Brazil.

(2) Arica splendens, Druce, Biol. Centr.-Am., Het. ii. p. 194, pl. 59. f. 25. Panama; Brazil.

Genus Itambe.

Itambe, Rag. Ann. Soc. Ent. Fr. 1891, p. 607.

Palpi minute, porrect, and not reaching nearly to end of frons, which is rounded and smooth; antennæ of male minutely ciliated; tibiæ nearly smoothly scaled. Fore wing with the basal half of costa extremely highly arched; the outer half deeply excised; the apex produced upwards and falcate; the outer margin excised below apex, then excurved; vein 2 from near angle of cell; 3, 4, 5 from angle; 6 from below upper angle; 7, 8 stalked; 9 absent; 10 free; 11 given off from 12. Hind wing of male with a large rounded patch of thick scales on upperside occupying the greater part of inner area; vein 2 from near angle of cell; 3 from angle; 4, 5 stalked; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 37.



Itambe fenestalis, ♂. ½.

Type. Itambe fenestalis, Rag. Ann. Soc. Ent. Fr. 1891, p. 608. Brazil.

Genus Microzancla, nov.

Differs from *Zanclodes* in the fore wing having the costa slightly arched at base and much less produced upwards at apex; male with a very small glandular swelling at base of costa; veins 4, 5

with vein 2 from near angle of cell; 3 absent; 4, 5 stalked; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 41.



Sarcistis medialis, ♂. ½.

Type. †Sarcistis medialis, n. sp.

♀. Flesh-colour. Fore wing thickly irrorated with pink; the costa tinged with yellow; ante- and postmedial very slightly curved fuscous lines, the area between them slightly darker. Hind wing pale with fuscous irroration; a slightly dark marginal line. Underside with pink irroration on fore wing and costal area of hind wing.

Hab. São Paulo (*Jones*). *Exp.* 18 mm.

Genus Monoloxis, nov.

Palpi rostriform, downcurved, roughly scaled, and extending about the length of head; frons with a sharp tuft; antennæ of male minutely ciliated; legs smoothly scaled. Fore wing with the costa evenly arched; the apex rectangular; male with a small tuft of hair on costa beyond middle; a glandular swelling at base of costa below fringed with hair, met by a fringe of hair from median nervure; vein 3 from near angle of cell; 4, 5 from angle; 6, 7 stalked; 9 absent; 10, 11 free. Hind wing with vein 3 from near angle of cell; 4, 5 from angle; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 42.



Monoloxis cinerascens, ♂. ½.

Type. †Monoloxis cinerascens, Warr. A. M. N. H. (6) vii. p. 424.

Brazil.

Genus Diloxis, nov.

Palpi rostriform, downcurved, thickly scaled, and extending about the length of head; frons smooth; antennæ of male

minutely ciliated; legs smoothly scaled. Fore wing with the basal half of costa arched, the outer half excised; apex somewhat produced; the outer margin obliquely curved; male with a large tuft of scales on median nervure above, and a smaller tuft from costa beyond middle; veins 3, 4, 5 from angle of cell; 6 from upper angle; 7, 8 stalked; 9 absent; 10, 11 free. Hind wing with veins 3, 4, 5 from angle of cell, which is produced; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 43.



Diloxis ochriplaga, ♂. ½.

Type. †DILOXIS OCHRIPLAGA, n. sp.

♂. Head and collar red-brown; thorax and abdomen dark brown. Fore wing with the costal half red-brown; the tufts purplish; a large ochreous patch on costa before apex; the inner half dark brown. Hind wing dark brown.

Hab. Rio Janeiro. *Exp.* 20 mm.

Genus AREA.

Area, Rag. Ann. Soc. Ent. Fr. 1890, p. 483.

Palpi rostriform, downcurved, nearly smoothly scaled, and extending about the length of head; frons smooth; antennæ of male somewhat thickened; mid and hind tibiæ somewhat hairy. Fore wing with the costa straight; the apex rectangular; male with a hyaline fovea in end of cell; vein 3 from near angle of cell; 4, 5 from angle; 6 from upper angle; 7, 8 stalked; 9 absent; 10, 11 free in female, 10 absent in male. Hind with vein 3 from near angle of cell; 4, 5 from angle, which is extremely produced; 6, 7 stalked, 7 anastomosing with 8.

Fig. 44.



Area diaphanalis, ♂. ½.

Type. AREA DIAPHANALIS, Rag. Ann. Soc. Ent. Fr. 1890, p. 484.

Brazil; Argentina.

stalked; 7, 8, 9 stalked; 11 free. Hind wing with veins 4, 5 stalked.

Fig. 38.



Macrozancla ignitalis, ♂. ½.

Type. †Microzancla ignitalis, n. sp.

♂. Head, thorax, and abdomen brick-red. Fore wing with the basal area brick-red; the outer area dark red-brown with a purplish tinge; the costa from before middle to near apex golden yellow, with a fiery red fascia below it; the inner area broadly fiery red. Hind wing fiery red; the apical area fuscous. Underside of fore wing brown, with the costa deep red.

♀ with no brick-red at base of fore wing, the red-brown and fiery red extending to base.

Hab. São Paulo (*Jones*); Rio Janeiro. *Exp.* ♂ 18, ♀ 20 mm.

Genus Zanclodes.

Zanclodes, Rag. Ann. Soc. Ent. Fr. 1890, p. 475, pl. 7. f. 3.

Palpi porrect, straight, thickly scaled, and not reaching beyond the large frontal tuft; antennæ of male minutely ciliated; tibiæ roughly scaled on outer side. Fore wing with the basal half of costa highly arched, the apical half excised; the apex very much produced upwards; the outer and inner margins evenly curved; male with a large glandular swelling at base of costa, below fringed with a very thick tuft of hair at extremity; the retinaculum hairy; vein 3 from before angle of cell; 4, 5 from angle; 6, 7 stalked; 8, 9 stalked; 10 free; 11 anastomosing with 12. Hind wing with vein 3 from before angle of cell; 4, 5 from angle; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 39.



Zanclodes falculalis, ♂. ½.

Type. Zanclodes falculalis, Rag. Ann. Soc. Ent. Fr. 1890, p. 475, pl. 7. f. 3. Brazil.

Genus Arta.

Arta, Grote, Bull. Buff. Soc. ii. p. 229 (1875).
Heliades, Rag. Ann. Soc. Ent. Fr. 1890, p. 534.

Palpi porrect, straight, and hardly extending beyond the frons, which is rounded; antennæ of male annulate and ciliated; mid and hind tibiæ slightly fringed with hair on outer side, the tarsal joints smooth. Fore wing with the costa nearly straight, the apex rectangular; vein 3 from angle of cell; 4, 5 stalked; 6 from upper angle; 7, 8, 9 stalked; 10 absent; 11 free. Hind wing with vein 2 from angle of cell, which is short; 3, 4, 5 stalked; 6, 7 stalked, 7 anastomosing with 8.

Fig. 40.



Arta statalis, ♂. ½.

(1)†Arta serialis, n. sp.

Brownish flesh-colour; abdomen yellower, the anal tuft bright ochreous. Fore wing with the inner and medial areas slightly suffused with pink; an oblique medial fuscous line very slightly angled on median nervure; a nearly erect postmedial line; a prominent marginal series of black striæ; the tips of cilia blackish; Hind wing whitish; the apical area tinged with brown; an indistinct postmedial line from costa to vein 5; a series of black marginal striæ. Underside with the costal area of both wings suffused with pink; hind wing with prominent black discocellular spot and postmedial line.

Hab. São Paulo (*Jones*). *Exp.* 20 mm.

Type. (2)†Arta statalis, Grote, Bull. Buff. Soc. ii. p. 230. U.S.A.
" *epicænalis*, Rag. Ann. Soc. Ent. Fr. 1890, p. 536.
" *mulleolella*, Hulst, Entom. Am. 1887, p. 133.

(3)†Arta olivalis, Grote, Can. Ent. x. p. 23. U.S.A.

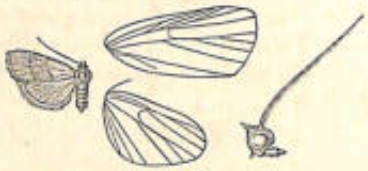
(4)*Arta encaustalis, Rag. Ann. Soc. Ent. Fr. 1890, p. 537, pl. 5. f. 8. Brazil.

Genus Sarcistis, nov.

Palpi porrect, thickly scaled, straight and extending rather beyond the frons, which is smoothly scaled; antennæ of female ciliated; tibiæ and tarsi smoothly scaled. Fore wing with the costa almost straight; the apex rounded; vein 2 from near angle of cell; 3, 4, 5 stalked; 6 from near upper angle; 7, 8 stalked; 9 absent: 10 free; 11 becoming coincident with 12. Hind wing

with vein 2 from near angle of cell; 3 absent; 4, 5 stalked; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 41.



Sarcistis medialis, ♂. ½.

Type. †Sarcistis medialis, n. sp.

♀. Flesh-colour. Fore wing thickly irrorated with pink; the costa tinged with yellow; ante- and postmedial very slightly curved fuscous lines, the area between them slightly darker. Hind wing pale with fuscous irroration; a slightly dark marginal line. Underside with pink irroration on fore wing and costal area of hind wing.

Hab. São Paulo (*Jones*). *Exp.* 18 mm.

Genus Monoloxis, nov.

Palpi rostriform, downcurved, roughly scaled, and extending about the length of head; frons with a sharp tuft; antennæ of male minutely ciliated; legs smoothly scaled. Fore wing with the costa evenly arched; the apex rectangular; male with a small tuft of hair on costa beyond middle; a glandular swelling at base of costa below fringed with hair, met by a fringe of hair from median nervure; vein 3 from near angle of cell; 4, 5 from angle; 6, 7 stalked; 9 absent; 10, 11 free. Hind wing with vein 3 from near angle of cell; 4, 5 from angle; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 42.



Monoloxis cinerascens, ♂. ½.

Type. †Monoloxis cinerascens, Warr. A. M. N. H. (6) vii. p. 424. Brazil.

Genus Diloxis, nov.

Palpi rostriform, downcurved, thickly scaled, and extending about the length of head; frons smooth; antennæ of male

minutely ciliated; legs smoothly scaled. Fore wing with the basal half of costa arched, the outer half excised; apex somewhat produced; the outer margin obliquely curved; male with a large tuft of scales on median nervure above, and a smaller tuft from costa beyond middle; veins 3, 4, 5 from angle of cell; 6 from upper angle; 7, 8 stalked; 9 absent; 10, 11 free. Hind wing with veins 3, 4, 5 from angle of cell, which is produced; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 43.



Diloxis ochriplaga, ♂. ½.

Type. †DILOXIS OCHRIPLAGA, n. sp.

♂. Head and collar red-brown; thorax and abdomen dark brown. Fore wing with the costal half red-brown; the tufts purplish; a large ochreous patch on costa before apex; the inner half dark brown. Hind wing dark brown.

Hab. Rio Janeiro. *Exp.* 20 mm.

Genus AREA.

Area, Rag. Ann. Soc. Ent. Fr. 1890, p. 483.

Palpi rostriform, downcurved, nearly smoothly scaled, and extending about the length of head; frons smooth; antennæ of male somewhat thickened; mid and hind tibiæ somewhat hairy. Fore wing with the costa straight; the apex rectangular; male with a hyaline fovea in end of cell; vein 3 from near angle of cell; 4, 5 from angle; 6 from upper angle; 7, 8 stalked; 9 absent; 10, 11 free in female, 10 absent in male. Hind with vein 3 from near angle of cell; 4, 5 from angle, which is extremely produced; 6, 7 stalked, 7 anastomosing with 8.

Fig. 44.



Area diaphanalis, ♂. ½.

Type. AREA DIAPHANALIS, Rag. Ann. Soc. Ent. Fr. 1890, p. 484.

Brazil; Argentina.

Genus ADENOPTERYX.

Adenopteryx, Rag. Ann. Soc. Ent. Fr. 1890, p. 507.

Palpi porrect, downcurved, and extending about twice the length of head; frons with a tuft of scales; antennæ of male ciliated, the basal joint long; hind tibiæ long and slightly hairy. Fore wing with the costa arched; the apex rounded; male with a large glandular swelling at base of costa; vein 3 from angle of cell, 4, 5 shortly stalked; 6 and 7 from below angle of cell; 9, 10 from angle, 10 running almost at right angles to costa; 8 and 11 absent. Hind wing with the cell short, and produced at lower angle; 3 from before angle of cell; 4, 5 from angle; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 45.



Adenopteryx conchyliatalis, ♂. ½.

Type. *ADENOPTERYX CONCHYLIATALIS, Rag. Ann. Soc. Ent. Fr. 1890, p. 508, pl. 5. f. 4. Algeria [1].

Genus HYPERPARACHMA.

Hyperparachma, Warr. A. M. N. H. (6) viii. p. 62 (1891).

Palpi porrect, straight, and hardly extending beyond the frons, the end of 2nd joint thickly scaled; frons roughly scaled; antennæ of male somewhat annulated and ciliated; tibiæ nearly smooth.

Fig. 46.



Hyperparachma bursarialis, ♂. ¾.

Fore wing of male with a glandular swelling at base of costa below fringed with long hair, beyond which on upperside is a deep groove with a flap of scales on its outer edge on costa, and a ridge of

[1] The species is of a typical Neotropical form; the unique type has been kindly lent to me by M. de Joannis, who assures me that it was undoubtedly taken in Philippeville, Algeria. It seems probable that it must in some way have been imported there.

scales below it; the apex rounded; the cell very short; vein 2 absent; 3, 4, 5 from angle; 6, 7, and 10 from upper angle; 8, 9, and 11 absent. Hind wing of male with a fringe of long hair in cell below; vein 2 absent; 3 from angle; 4, 5 stalked; 6, 7 from upper angle, 7 anastomosing with 8.

Type. †Hyperparachma bursarialis, Wlk. xxxiv. 1231. Honduras; W. Indies; Brazil.
† „ *rubrifusca*, Warr. A. M. N. H. (6) viii. p. 62.

Genus Condylolomia.

Condylolomia, Grote, Bull. Buff. S. N. S. i. p. 176 (1873).

Palpi rostriform, downcurved, thickly scaled, and extending about the length of head; frons with a sharp tuft; antennæ of male ciliated; hind tibæ thickly tufted with scales. Fore wing with the costa evenly curved; the apex rounded; male with a tuft of hair on costa before middle; the cell extremely short; veins 2, 3, 4 stalked; 6 from below upper angle; 9, 10 absent; 11 free; female with the cell longer, vein 3 from angle. Hind wing with vein 2 absent; 3 from angle; 4, 5 stalked; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 47.



Condylolomia participalis, ♂. ¾.

Sect. I. Fore wing of male with vein 5 from angle of cell.

Type. (1)†Condylolomia participalis, Grote, Bull. Buff. S. N. S. i. p. 177, pl. 5. ff. 4 & 5. U.S.A.

Sect. II. Fore wing of male with vein 5 stalked with 3, 4; a fovea fringed with scales on upperside below the costa before the tuft; the cell clothed with rough scales; hind wing with a fringe of very long hair in cell above: a fringe below the cell and vein 3; the inner area thickly clothed with hair, and the anal angle lobed.

(2)†Condylolomia metapachys, n. sp.

♂. Head, thorax, and abdomen pale, variegated with red and ochreous. Fore wing pale, suffused with ochreous and red and irrorated with fuscous; the costal tuft and apex fuscous; traces of a minutely dentate postmedial white line; a marginal series of fuscous striæ. Hind wing pale fuscous, the fringes of hair in and below the cell blackish; the hair on anal lobe rufous.

Hab. São Paulo (*Jones*). *Exp.* 18 mm.

Genus HOLOPERAS.

Holoperas, Warr. A. M. N. H. (6) vii. p. 500 (1891).

Palpi rostriform, downcurved, and extending about the length of head; frons smooth; antennæ of male annulated; mid femora and tibiæ with large tufts of scales; hind legs with tufts of scales at extremity of tibiæ and on 1st tarsal joint. Fore wing narrow; the costa very highly arched; the apex rounded; veins 2, 3 on a very long stalk from near angle of cell; 4, 5 shortly stalked; 6 from close to upper angle; 7, 8, 9 stalked; 10, 11 absent; male with a costal fold below. Hind wing with vein 2 from near angle of cell; 3 from angle, which is very much produced; 4, 5 stalked; 6, 7 from upper angle, 7 anastomosing slightly with 8.

Fig. 48.



Holoperas innotata, ♂. ½.

Type. †HOLOPERAS INNOTATA, Warr. A. M. N. H. (6) vii. p. 500.
Colombia.

Auctorum.

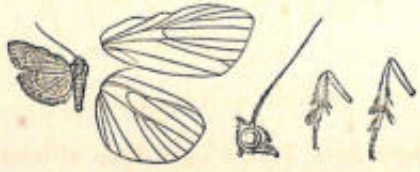
Holoperas œnochroalis, Rag. Ann. Soc. Ent. Fr. 1890, p. 509.
Centr. Am.

Genus GALASA.

Galasa, Wlk. xxxv. 1801 (1866).
Cordylopeza, Zell. Verh. z.-b. Ges. Wien, 1873, p. 306.

Palpi rostriform, downcurved, and extending about the length

Fig. 49.



Galasa rubidana, ♂. ½.

of head; frons with a sharp tuft; antennæ of male somewhat annulate; mid tibiæ thickly tufted with hair, the 1st tarsal joint

with a large tuft; hind tibiæ tufted with hair at extremity, the 1st tarsal joint with a large tuft. Fore wing with the costa excised at middle; the apex rounded; veins 2 and 3 on a long stalk; 4, 5 from angle; 6 from upper angle; 7, 8 stalked; 9 absent; 10, 11 free. Hind wing with veins 3, 4, 5 from angle of cell, which is very much produced; 6, 7 stalked, 7 anastomosing with 8.

Type. GALASA RUBIDANA, Wlk. XXXV. 1802. U.S.A.; Jamaica.
Cordylopeza nigrinodis, Zell. Verh. z.-b. Ges. Wien, 1873, p. 306, pl. 3. f. 3.
Galasa rubrana, Fitch, Smith List Lep. Bor.-Am. p. 80.
„ *palmipes*, Grote & Rob. Smith List Lep. Bor.-Am. p. 80.

Auctorum.

Galasa daulisalis, Druce, Biol. Centr.-Am., Het. ii. p. 195, pl. 60. f. 4. Panama.

Genus BLEPHAROCERUS.

Blepharocerus, Blanch. Gay's Chili, vii. p. 102 (1852).
Œdematodes, Rag. Ann. Soc. Ent. Fr. 1891, p. 623.

Palpi rostriform, thickly scaled, and extending about the length of head; frons smooth; antennæ of male annulated and fasciculate; mid and hind tibiæ fringed with long hair. Fore wing with the costa nearly straight, the apex rounded; vein 2 from close to angle of cell, which is very short; 3, 4 shortly stalked; 5 from angle; 6 from upper angle; 7, 8 stalked; 9, 10 absent; 11 becoming coincident with 12, which is very short; female with vein 3 from near angle of cell; 4, 5 stalked; 7, 8, 9 stalked. Hind wing with vein 2 from near angle of cell, which is very short, the lower angle much produced; 3 from angle; 4, 5 stalked; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 50.



Blepharocerus chilensis, ♂. ½.

SECT. I. (*Blepharocerus*). Fore wing of male with no tuft on costa.

Type. (1) BLEPHAROCERUS ROSELLUS, Blanch. Gay's Chili, vii. p. 102, pl. 7. f. 12. Chili.
†*Asopia rufulalis*, Led. Wien. ent. Mon. 1863, p. 343, pl. 7. f. 3.

Sect. II. (*Œlematodes*). Fore wing of male with a small tuft of hair on upperside of costa before middle.

(2)†Blepharocerus chilensis, Zell. Verh. z.-b. Ges. Wien, xxiv. p. 426. Chili.

†*Actenia rubescens*, Butl. Tr. Ent. Soc. 1883, p. 51.
†*Blepharocerus cinerosus*, Warr. A. M. N. H. (6) vii. p. 494.
† „ *sabulosus*, Warr. A. M. N. H. (6) vii. p. 495.

Genus Alpheias.

Alpheias, Rag. Ann. Soc. Ent. Fr. 1890, p. 543.

Palpi rostriform, downcurved, slender, and extending about three times length of head, the 3rd joint minute; frons smooth; antennæ of female almost simple; tibiæ smoothly scaled. Fore wing elongate; the costa arched towards apex, which is rounded; vein 3 from angle of cell; 4, 5 stalked; 6 from below upper angle; 7, 8, 9 stalked; 10, 11 free. Hind wing with the cell long; vein 3 absent; 4, 5 from angle; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 51.



Alpheias baccalis, ♂. ½.

Type. (1)*Alpheias baccalis, Rag. Ann. Soc. Ent. Fr. 1890, p. 544, pl. 5. f. 11. Mexico.

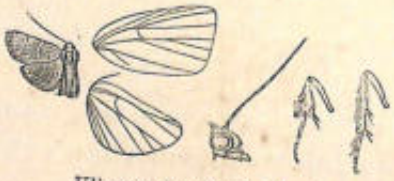
(2)*Alpheias gitonalis, Rag. Ann. Soc. Ent. Fr. 1890, p. 544. Mexico.

Genus Uliosoma.

Uliosoma, Warr. A. M. N. H. (6) vii. p. 105 (1891).

Palpi rostriform, downcurved, thickly clothed with hair, and

Fig. 52.



Uliosoma discoloralis, ♂. ½.

reaching just beyond the large frontal tuft; antennæ of male

almost simple; mid tibiæ with a large tuft of scales on outer side; hind tibiæ and 1st tarsal joint fringed with long hair; abdomen with a pair of very large lateral tufts from base. Fore wing with the costa evenly arched; the apex rounded; vein 2 absent; 3 from near angle of cell; 4, 5 stalked; 6, 7 from upper angle; 8, 9 stalked; 10, 11 absent. Hind wing with vein 2 absent; 3 from near angle of cell; 4, 5 stalked; 6 absent; 7 anastomosing with 8.

Type. †Uliosoma discoloralis, Wlk. xxxiv. 1315. Brazil.

Genus Acutia.

Acutia, Rag. Ann. Soc. Ent. Fr. 1890, p. 539.

Palpi rostriform, downcurved, thickly scaled, and extending about twice the length of head; frons roughly scaled; antennæ of male strongly ciliated; hind tibiæ with a slight tuft of hair on outer side from base. Fore wing narrow; the apex produced and falcate; the outer margin very oblique; vein 2 from close to angle of cell; 3 from angle; 4, 5 on a long stalk; 6 from near upper angle; 7, 8, 9 stalked; 10 absent; 11 free. Hind wing with vein 2 absent; 3 from angle; 4, 5 on a long stalk; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 53.



Acutia falciferalis, ♂. ½.

Type. Acutia falciferalis, Rag. Ann. Soc. Ent. Fr. 1890, p. 540. Brazil.

Genus Acallis.

Acallis, Rag. Ann. Soc. Ent. Fr. 1890, p. 540.

Palpi rostriform, downcurved, thickly scaled, and extending about the length of head; frons roughly scaled; antennæ of male ciliated;

Fig. 54.



Acallis fernaldi, ♂. ½.

tibiæ smoothly scaled. Fore wing long and narrow; the outer margin oblique; vein 2 from close to angle of cell; 3 from angle;

4, 5 stalked; 6 from upper angle; 7, 8, 9 stalked; 10 absent; 11 free. Hind wing with vein 2 absent; 3 from near angle of cell, which is produced; 4, 5 from angle; 6, 7 stalked, 7 anastomosing with 8.

Type. Acallis fernaldi, Rag. Ann. Soc. Ent. Fr. 1890, p. 540. Colorado.
†*Ugra angustipennis*, Warr. A. M. N. H. (6) vii. p. 494.

Genus Caphys.

Caphys, Wlk. xxvii. 13 (1863).
Ugra, Wlk. xxvii. 188.
Euexippe, Rag. Ann. Soc. Ent. Fr. 1890, p. 538.

Palpi rostriform, downcurved, thickly scaled, and extending about the length of head; frons smooth; antennæ of male ciliated; mid tibiæ strongly fringed with scales; hind tibiæ slightly fringed. Fore wing with the costa straight; the apex rectangular; vein 3 from near angle of cell; 4, 5 stalked; 6 from upper angle; 7, 8, 9, 10 stalked; 11 free. Hind wing with vein 2 absent; 3 from angle of cell; 4, 5 stalked; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 55.



Caphys bilinea, ♂. ½.

Sect. I. Fore wing of male with the costa not indented.

Type. (1)†Caphys bilinea, Wlk. xxvii. 13. Honduras; W. Indies; Brazil, Venezuela.
†*Ugra parallela*, Wlk. xxvii. 188.
Scopula parallelalis, Wlk. xxxiv. 1462.
Euexippe bistrialis, Rag. Ann. Soc. Ent. Fr. 1890, p. 539.

(2)†Caphys subrosealis, Wlk. xxxiv. 1462. Honduras.

(3)†Caphys dubia, Warr. A. M. N. H. (6) vii. p. 495. W. Indies; Brazil.

(4)†Caphys pallida, n. sp.

♂. Pale greyish ochreous. Fore wing with a slight purplish tinge; the basal half of costa blackish; traces of sinuous ante- and postmedial dark lines; a marginal series of black specks; the cilia fuscous at tips. Hind wing darker and with a reddish tinge; a marginal series of black specks; the cilia fuscous. Underside of fore wing suffused with rufous; the basal half suffused with fuscous; hind wing paler, with rufous and fuscous suffusion on costal and outer areas and with a curved dark postmedial line.
Hab. São Paulo (*Jones*). *Exp.* 14 mm.

Sect. II. Fore wing of male with a slight indentation and tuft of scales at middle of costa and a fovea in cell below.

(5)†Caphys fovealis, n. sp.

♂. Head ochreous white; thorax purplish pink; abdomen pale brown. Fore wing bright purplish pink, with a pale speck in cell and traces of a pale postmedial line excurved below costa; cilia blackish at tips. Hind wing fuscous. Underside with the costal area of each wing purplish irrorated with black.

Hab. São Paulo (*Jones*). *Exp.* 12 mm.

Sect. III. Fore wing of male with two slight indentations in costa.

(6) Caphys palmipes, Feld. Reis. Nov. pl. 127. f. 23. Brazil.

Auctorum.

Aglossa gryphalis, Hulst, Tr. Ent. Soc. 1876, p. 146. U.S.A.

Genus Tetraschistis, nov.

Palpi downcurved, projecting about twice the length of head, and thickly scaled; frons with a sharp tuft; antennæ of female simple; mid tibiæ and tarsi fringed with long hair. Fore wing with the costa nearly straight; the apex rectangular; vein 2 from near angle of cell; 3 from angle; 4, 5 on a long stalk; 6 from upper angle; 7 given off from 8 after 9; 10 absent. Hind wing with vein 2 from near angle of cell, which is produced; 3 from angle; 4, 5 stalked; 6, 7 stalked, 7 anastomosing with 8.

Fig. 56.



Tetraschistis tinctalis, ♀. ½.

Type. (1)†Tetraschistis tinctalis, n. sp.

♀. Head and thorax rufous; palpi fuscous; abdomen brownish. Fore wing rufous irrorated with fuscous; traces of a sinuous medial dark line arising from a black speck on costa; a discocellular black speck; a postmedial slightly waved fuscous line arising from a black speck on costa and excurved from costa to vein 3; a dark marginal line; cilia fuscous with a pinkish tinge. Hind wing pale, with traces of a curved dark postmedial line more prominent on underside; cilia darkish towards apex.

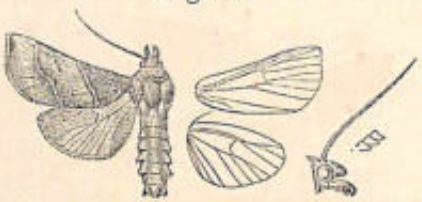
Hab. São Paulo (*Jones*). *Exp.* 26–30 mm.

(2)†Tetraschistis major, Warr. A. M. N. H. (6) vii. p. 500. Colombia.

Genus Cyclopalpia, nov.

Palpi thickly scaled, in male curved inwards and downwards and extending just beyond the large frontal tuft, in female curved downwards and extending about twice the length of head; antennæ of male serrated; mid and hind tibiæ moderately fringed with hair. Fore wing with the costa nearly straight; the apex acute; the outer margin excurved at middle; vein 3 from near angle of cell; 4, 5 stalked; 6 from below upper angle; 7, 8, 9, 10 stalked; 11 free. Hind wing with vein 3 from near angle of cell; 4, 5 stalked; 6, 7 shortly stalked, 7 anastomosing with 8.

Fig. 57.



Cyclopalpia violescens, ♂. ½.

Type. †Cyclopalpia violescens, n. sp.

♂. Head and thorax purple suffused with grey; abdomen purplish. Fore wing purple thickly suffused with grey, leaving the basal area and the area on each side of lower part of postmedial line most purple; an oblique dark-edged pale antemedial line; a dark discocellular spot; a dark-edged pale postmedial line slightly bent inwards at vein 4. Hind wing pale suffused with red, especially on apical area. Underside purplish, the inner half of hind wing white; both wings with discocellular lunule; the apical area bright chestnut-red, with a white line on its inner edge.

Hab. São Paulo (*Jones*). *Exp.* 40 mm.

Genus Œctoperodes.

Œctoperodes, Rag. Ann. Soc. Ent. Fr. 1891, p. 612.

Palpi rostriform, downcurved, extending about the length of head, the extremity with a tuft of long scales dilated at tips: frons smooth; antennæ of male minutely ciliated; mid and hind tibiæ and first tarsal joints with tufts of scales. Fore wing with the costa strongly arched at base, then excised; the apex acute; the outer margin oblique towards outer angle; male with a tympanic vesicle at base of costa; a glandular swelling below fringed with long hair, met by a fringe of hair from median nervure; vein 3 from near angle of cell; 4, 5 from angle; 6, 7 shortly stalked; 8, 9 stalked; 10, 11 free. Hind wing with the outer margin angled at middle; the lower angle of cell produced; veins 3 and 5 well separated from 4; 6, 7 shortly stalked.

Type. *Œctoperodes rufitinctalis, Rag. Ann. Soc. Ent. Fr. 1891, p. 613. Brazil.

Genus Pelasgis.

Pelasgis, Rag. Ann. Soc. Ent. Fr. 1890, p. 487.

Palpi rostriform, downcurved, roughly scaled, and extending three or four times length of head; frons smooth; antennæ of female slightly ciliated; legs smoothly scaled. Fore wing with the costa slightly arched; the apex retangular; vein 3 from near angle of cell; 4, 5 from angle; 6 from below upper angle; 7, 8, 9, 10 stalked, 7 being given off after 9; 11 free. Hind wing with vein 3 from near angle of cell; 4, 5 very shortly stalked; 6, 7 shortly stalked, 7 anastomosing with 8.

Fig. 58.



Pelasgis hypogryphalis, ♀. ½.

Type. *Pelasgis hypogryphalis, Rag. Ann. Soc. Ent. Fr. 1890, p. 487. Brazil.

Genus Bonchis.

Bonchis, Wlk. Tr. Ent. Soc. (3) i. p. 128 (1862).
Ethnistis, Led. Wien. ent. Mon. 1863, p. 345.
Vurna, Wlk. xxxiv. 1189 (1865).
Zarania, Wlk. xxxiv. 1262.
Gazaca, Wlk. xxxiv. 1273.

Palpi rostriform, strongly downcurved, thickly scaled, and extending about three times length of head; frons smooth; antennæ of male with fascicles of cilia; mid and hind tibiæ with strong tufts of scales. Fore wing of male with the costa produced to a

Fig. 59.



Bonchis scoparioides, ♂. ½.

lobe at base; a thick ridge of scales on basal area and medial and postmedial tufts on inner margin; the retinaculum formed by a tuft of hair from a costal fold; the costa nearly straight; the apex rectangular; vein 3 from near angle of cell; 4, 5 from angle; 6 from near upper angle; 7, 8, 9 stalked; 10, 11 free. Hind wing

with the median nervure pectinated above; the cell long; vein 3 from near angle; 4, 5 from angle; 6, 7 from upper angle, 7 anastomosing with 8.

(1) BONCHIS MUNITALIS, Led. Wien. ent. Mon. 1863, p. 55, pl. 6. f. 13. W. Indies; Honduras.
†*Vurna instructalis*, Wlk. xxxiv. 1189.
Zarania cossalis, Wlk. xxxiv. 1262.
†*Gazaca dirutalis*, Wlk. xxxiv. 1274.

Type. (2) BONCHIS SCOPARIOIDES, Wlk. Trans. Ent. Soc. (3) i. p. 128. Trinidad; Brazil.

Genus ANEMOSA.

Anemosa, Wlk. xix. 849 (1859).

Palpi rostriform, downcurved at extremity, thickly scaled, and extending about three times length of head, frons with a sharp tuft of hair. Antennæ of male bipectinate, with short branches; tibiæ thickly scaled. Fore wing with the apex rounded; vein 3 from near angle of cell; 4, 5 from angle; the discocellulars highly angled; 6, 7, 8, 9 stalked and curved; 10, 11 free. Hind wing with vein 3 from before angle of cell; 4, 5 from angle; the discocellulars highly angled; 6, 7 stalked, 7 anastomosing with 8.

Fig. 60.



Anemosa isadasalis, ♂. ½.

Type. †ANEMOSA ISADASALIS, Wlk. xix. 849. Australia.

Genus CURICTA.

Curicta, Wlk. xxxiv. 1129 (1865).

Palpi of male upturned to vertex of head, the 3rd joint fringed with long downcurved hair in front, of female extending about three times length of head, the 2nd joint obliquely porrect and fringed with hair above, the 3rd long, naked, and downcurved; frons smooth; antennæ simple; tibiæ naked. Fore wing with the costa arched at base; the apex acute and falcate; the outer margin excised from apex to vein 5, where it is strongly excurved; vein 3 from before angle of cell; 4, 5 from angle; 6 from upper angle; 7, 8, 9 stalked; 10, 11 free; male with a glandular swelling at base of costa below fringed with long hair and enclosing masses of flocculent scales. Hind wing with vein 3 from near angle of cell; 4, 5 from angle; 6, 7 from upper angle; 8 free.

Fig. 61.



Curicta oppositalis, ♂. ½.

Type. (1)†CURICTA OPPOSITALIS, Wlk. xxxiv. 1130. *Goossensia cinnamomealis*, Snell. Tijd. v. Ent. xxxvii. p. 74, pl. 3. ff. 5, 6. Salawati; Waigiou; N. Guinea.

(2)*CURICTA LUTEALIS, Snell. Tijd. v. Ent. xxxvii. p. 75, pl. 3. ff. 7, 8. Obi.

Genus MURGISCA.

Murgisca, Wlk. xxvii. 11 (1863).

Palpi rostriform, downcurved, thickly scaled, and extending about three times the length of head; frons smooth; antennæ of female almost simple; tibiæ smooth. Fore wing with the costa nearly straight; the apex acute; vein 3 from near angle of cell; 4, 5 from angle; 6 from near upper angle; 7 given off from 8 before 9; 10, 11 free, or 10 stalked with 7, 8, 9. Hind wing with vein 3 from before angle of cell; 4, 5 from angle; 6, 7 stalked, 7 anastomosing with 8.

Fig. 62.



Murgisca cervinalis, ♀. ½.

Type. †MURGISCA CERVINALIS, Wlk. xxvii. 12. St. Domingo.

Genus STREPTOPALPIA.

Streptopalpia, Hmpsn. A. M. N. H. (6) xvi. p. 345.

Palpi rostriform, downcurved, somewhat roughly scaled, and extending about twice the length of head; frons with a slight tuft; antennæ of male minutely serrate and ciliated; mid and hind tibiæ with tufts of hair at middle and extremity, the tarsal joints tufted. Fore wing with the apex produced, acute, and depressed; two tufts of scales on inner margin; vein 3 from near angle of cell; 4, 5 from angle; 7, 8, 9, 10 stalked, 7 being given off close to the margin. Hind wing with vein 3 from near angle of cell; 4 absent; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 63.



Streptopalpia deera, ♂. ⅔.

Type. STREPTOPALPIA DEERA, Druce, Biol. Centr.-Am., Het. ii. p. 195, pl. 60. f. 1. Mexico; W. Indies.

† „ *ustalis*, Hmpsn. A. M. N. H. (6) xvi. p. 346.

Genus CHALINITIS.

Chalinitis, Rag. Ann. Soc. Ent. Fr. 1890, p. 528.

Palpi rostriform, downcurved, thickly scaled, and extending about twice the length of head; frons with a tuft of scales; antennæ of female minutely ciliated; legs somewhat hairy. Fore wing with the costa straight; the apex rectangular; vein 3 from near angle of cell; 4, 5 from angle; 6 from below upper angle; 7, 8, 9, 10 stalked, 7 being given off before 9. Male with a tympanic vesicle at base of costa of fore wing above, and glandular swelling fringed with long hair below. Hind wing with vein 3 from before angle of cell; 4, 5 from angle; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 64.



Chalinitis proclea, ♂. ½.

Type. (1)*CHALINITIS OLEALIS, Rag. Ann. Soc. Ent. Fr. 1890, p. 529, pl. 5. f. 6 (♀). U.S.A.

(2) CHALINITIS PROCLEA, Druce, Biol. Centr.-Am., Het. ii. p. 191, pl. 59. f. 15. Mexico; W. Indies.

†*Torda leucospilalis*, Hmpsn. A. M. N. H. (6) xvi. p. 345.

(3)*CHALINITIS CECROPIA, Druce, Biol. Centr.-Am., Het. ii. p. 191, pl. 59. f. 16. Mexico; Guatemala.

Genus OCRESIA.

Ocresia, Rag. Ann. Soc. Ent. Fr. 1890, p. 485.

Palpi rostriform, downcurved, slightly fringed with hair above,

and extending about four times length of head; frons smooth; antennæ of female almost simple; legs smoothly scaled. Fore wing with the costa nearly evenly arched; the apex produced and acute; the outer margin strongly angled at middle; vein 3 from near angle of cell; 4, 5 from angle; 6 from upper angle; 7, 8, 9 stalked; 10, 11 free. Hind wing with vein 3 from before angle of cell; 4, 5 from angle; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 65.



Ocresia bisinualis, ♀. ½.

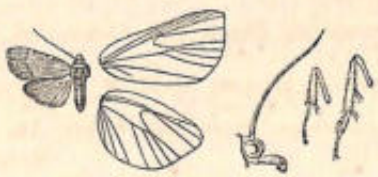
Type. *Ocresia bisinualis, Rag. Ann. Soc. Ent. Fr. 1890, p. 486.
Brazil.

Genus Pachypalpia.

Pachypalpia, Hmpsn. A. M. N. H. (6) xvi. p. 345.

Palpi rostriform, downcurved, with curled hair at end of 2nd joint, and extending about the length of head; frons with a slight tuft; antennæ of male thickened and flattened; mid and hind tibiæ slightly fringed with hair, the 1st joint of tarsus with a large tuft of hair. Fore wing with the apex somewhat produced and acute; the outer margin slightly angled at vein 4; veins 3, 4, 5 from close to angle of cell; the discocellulars highly angled; 7, 8 stalked from 9; 10 absent. Hind wing with the outer margin slightly angled at vein 3; vein 3 from near angle of cell; 4, 5 from angle; 6, 7 from upper angle, 7 anastomosing slightly with 8.

Fig. 66.



Pachypalpia dispilalis, ♂. ½.

Type. †Pachypalpia dispilalis, Hmpsn. A. M. N. H. (6) xvi. p. 345.
W. Indies.

Genus Epitamyra.

Epitamyra, Rag. Ann. Soc. Ent. Fr. 1890, p. 503.
Proropera, Warr. A. M. N. H. (6) xvii. p. 453 (1896).

Palpi rostriform, downcurved, smoothly scaled, and extending about twice the length of head; antennæ of female ciliated; tibiæ smooth. Fore wing with the outer margin angled at middle; vein 3 from before angle of cell; 4, 5 from angle; 6 from upper angle; 7, 8, 9 stalked; 11 free. Hind wing with vein 3 from before angle of cell; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 67.



Epitamyra vinosalis, ♂. ½.

Sect. I. Fore wing with vein 10 stalked with 7, 8, 9.

Type. (1)*Epitamyra albomaculalis, Möschl. Lep. Porto Rico, p. 278. W. Indies.

(2)*Epitamyra minusculalis, Möschl. Lep. Porto Rico, p. 278. W. Indies.

Sect. II. Fore wing with vein 10 stalked with 11 and anastomosing with 8, 9.

(3)†Epitamyra birectalis, n. sp.

♀. Head and thorax rufous; abdomen ochreous brown. Fore wing rufous, with nearly straight, pale fuscous-edged ante- and post-medial lines; a pale speck on costa before apex; cilia ochreous from apex to the angle at vein 4. Hind wing fuscous, with some red suffusion on outer area at vein 3; cilia from apex to vein 3 red at bases, ochreous at tips.

Hab. Santa Lucia. *Exp.* 20 mm.

Sect. III. (*Proropera*). Fore wing with vein 10 free.

(4) Epitamyra vinosalis, Warr. A. M. N. H. (6) xvii. p. 454. Assam.

Genus Nachaba.

Nachaba, Wlk. xix. 834 (1857).
Aischa, Wlk. xxx. 1015 (1864).

Palpi rostriform, downcurved, extending about twice the length of head, and smoothly scaled, the 2nd joint fringed with scales above; frons with a large tuft; antennæ of male with long bristles; mid and hind tibiæ moderately fringed with hair. Fore

wing of male with a tuft of hair on middle of costa above; underside with a circular flap of scales at base of costa; vein 2 from near angle of cell; 3 from angle; 4, 5 stalked; 6 from below upper angle; 7, 8 from angle; 9, 10 absent; 11 free. Hind wing with vein 3 from angle of cell; 4, 5 stalked (sometimes shortly); 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 68.



Nachaba flavisparsalis, ♂. ½.

Type. (1)*NACHABA CONGRUALIS, Wlk. xix. 835. Brazil.

(2)†NACHABA AURITALIS, Wlk. xix. 834 (*nec* Hübn.). Brazil.

(3)*NACHABA OPPOSITALIS, Wlk. xix. 835. Brazil.

(4)†NACHABA FLAVISPARSALIS, Wärr. A. M. N. H. (6) vii. p. 424. Brazil.

(5)†NACHABA RECONDITANA, Wlk. xxx. 1016. Brazil.

(6) NACHABA TRYPHŒNALIS, Feld. Reis. Nov. pl. 132. f. 17. Brazil.
† „ *carbonalis*, Warr. A. M. N. H. (6) vii. p. 423.

(7)*NACHABA FUNEREA, Feld. Reis. Nov. pl. 134. f. 23 (♀). Brazil.

Genus SEMNIA.

Semnia, Hübn. Verz. p. 353 (1827).
Acronolepia, Westw. Zool. Journ. v. p. 451 (1834).
Episemnia, Rag. Ann. Soc. Ent. Fr. 1890, p. 481.

Palpi downcurved, slender, extending about twice the length of head, the 2nd joint fringed with hair above, the 3rd long; frons with

Fig. 69.



Semnia auritalis, ♂. ½.

a sharp tuft; antennæ of male with a thick brush of scales near extremity; hind tibiæ slightly fringed with hair. Fore wing with the costa nearly straight; the apex rectangular; male with a

costal fold fringed with hair below; veins 3, 4, 5 from angle of cell; male with 6, 7, 8, and 10 from upper angle; 9 absent; female with 7, 8, 9 stalked. Hind wing with veins 3, 4, 5 from angle of cell; 6, 7 from upper angle, 7 anastomosing with 8.

Type. (1) SEMNIA AURITALIS, Hübn. Zutr. ii. 28, ff. 361, 362. Brazil.
Acronolepia quadricolor, Westw. Zool. Journ. 1834, v. p. 451.
" *biguttalis*, Feld. Reis. Nov. pl. 134. f. 18.
†*Virbia notata*, Wlk. ii. 472.
Noctua elongata, Sepp, Surinam, p. 93, pl. 43.
Episemnia subauritalis, Rag. Ann. Soc. Ent. Fr. 1890, p. 482; 1891, pl. 16. f. 10.

(2)*SEMNIA AURIVITTA, Feld. Reis. Nov. pl. 134. f. 20 (♀). Brazil.

(3) SEMNIA JOSIALIS, Feld. Reis. Nov. pl. 134. f. 24. Brazil.

Auctorum.

Episemnia ligatalis, Druce, Biol. Centr.-Am., Het. ii. p. 189, pl. 29. f. 11. Mexico.

Genus EURYPTA.

Eurypta, Led. Wien. ent. Mon. 1863, p. 334.
Chrysophila, Hübn. Zutr. iii. 20 (1825), non descr.

Palpi downcurved, slender, projecting about twice the length of head, smoothly scaled and fringed with hair below; frons with a sharp tuft; antennæ of male bipectinated; tibiæ smoothly scaled. Fore wing with the costa arched at base and towards apex; male with a slight fold at middle of costa fringed with hair; a glandular swelling at base of costa below; vein 3 from before angle of cell; 4, 5 from angle; 6, 7, 8, and 10 from upper angle; 9 absent; in female 7, 8, 9 stalked. Hind wing with veins 3, 4, 5 from angle of cell; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 70.



Eurypta basilinealis, ♂. ½.

Type. (1) EURYPTA AURISCUTALIS, Hübn. Zutr. ff. 465, 466. Brazil.
" *atridorsalis*, Rag. Ann. Soc. Ent. Fr. 1890, p. 481.

(2)†EURYPTA BASILINEALIS, Warr. A. M. N. H. (6) vii. p. 423. Brazil.

Auctorum.

Eurypta rectibasalis, Rag. Ann. Soc. Ent. Fr. 1891, p. 610. Brazil.
= *auriscutalis*, Led. Wien. ent. Mon. 1863, pl. 6. f. 5. (*nec* Hübn.).

Genus Arouva.

Arouva, Wlk. xxx. 963 (1864).

Palpi downcurved, slender, extending once to twice the length of head, and almost smoothly scaled; frons with a sharp tuft; mid and hind tibiæ slightly fringed with hair. Fore wing with the costa straight; the apex rectangular; male with a flap of scales on median nervure; a costal fold below fringed with scales covering a fovea in cell; veins 3, 4, 5 from angle of cell; 6, 7, 8, 10 from upper angle, 9 absent; in female 7, 8, 9 stalked. Hind wing with veins 3, 4, 5 from angle of cell; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 71.



Arouva mirificana, ♂. ½.

Type. (1)†Arouva mirificana, Wlk. xxx. 963. Brazil.
Semnia axialis, Feld. Reis. Nov. pl. 134. f. 19.

(2)*Arouva albivitta, Feld. Reis. Nov. pl. 134. ff. 21, 22. Brazil.

Genus Penthesilea.

Penthesilea, Rag. Ann. Soc. Ent. Fr. 1890, p. 493.

Palpi rostriform, downcurved, thickly scaled, and extending about twice the length of head; frons smooth; antennæ of male

Fig. 72.



Penthesilea sacculalis, ♂. ½.

ciliated; abdomen with terminal and paired lateral anal tufts. Fore wing with the costa arched at base, then straight, the apex rectangular; male with a tympanic vesicle at base of costa; veins

3, 4, 5 well separated at origin; 6 from well below upper angle; 7, 8, 9 stalked; 10, 11 free. Hind wing with veins 3, 4, 5 widely separated at origin; 6, 7 from upper angle, 7 anastomosing with 8.

Type. *Penthesilea sacculalis, Rag. Ann. Soc. Ent. Fr. 1890, p. 493. ? U.S.A.

Genus Lophopleura.

Lophopleura, Rag. Ann. Soc. Ent. Fr. 1890, p. 506.

Palpi porrect, straight, thickly scaled, and extending slightly beyond the frons, which has a large tuft of hair; antennæ of male ciliated; tibiæ slightly fringed with hair on outer side. Fore wing of male with a glandular swelling at base of costa below fringed with long hair; a fringe of hair on median nervure; the apex rounded; veins 3, 4, 5 stalked; 6 from upper angle; 9 absent; 10 from angle; 11 absent. Hind wing with vein 3 from near angle of cell; 4, 5 from angle; 7 anastomosing strongly with 8.

Fig. 73.



Lophopleura xanthotænialis, ♂. ½.

Sect. I. Fore wing of male with vein 7 stalked with 8; hind wing with veins 6, 7 stalked.

Type. (1) Lophopleura xanthotænialis, Rag. Ann. Soc. Ent. Fr. 1890, p. 506. Brazil.
†*Dastira imitatrix*, Warr. A. M. N. H. (6) vii. p. 425.

Sect. II. Fore wing of male with vein 7 stalked with 6; hind wing with veins 6, 7 from angle of cell.

A. Fore wing of male with no postmedial tuft of scales on costa.

(2)†Lophopleura sublituralis, Warr. A. M. N. H. (6) vii. p. 424. Brazil.

B. Fore wing of male with a postmedial tuft of scales on costa.

(3)†Lophopleura eurzonalis, n. sp.

♂. Dark purplish red-brown. Fore wing with broad antemedial bright yellow band with metallic blue scales on its edges; an indistinct postmedial line angled on vein 6; the margin of both wings suffused with purple and with a series of dark striæ; hind wing fuscous brown, with dark submarginal mark on vein 2.

Hab. Amazons (*Trail*). *Exp.* 18 mm.

Genus CHRYSAUGE.

Chrysauge, Hübn. Samml. exot. Schmett. ii., Lep. iv. Noct. iii. (1806).
Xanthiris, Feld. Wien. ent. Mon. 1863, p. 230.
Candisa, Wlk. xxxiv. 1493 (1865).

Palpi porrect, straight, and hardly reaching beyond the frons, which has a large tuft of hair; antennæ of male almost simple; tibiæ smoothly scaled. Fore wing with the costa evenly arched; the apex rounded; male with a tuft of hair from costa beyond middle, recurved over the wing; female with veins 7, 8, 9 stalked. Hind wing with vein 3 from near angle of cell; 4, 5 from angle; 6, 7 from upper angle, 7 anastomosing with 8.

Fig. 74.



Chrysauge bifasciata, ♂. ½.

SECT. I. Fore wing with veins 4, 5 from cell in both sexes; male with a large fovea covered with hair in cell below; veins 6, 7 stalked, 8, 9, 10 stalked.

(1)†CHRYSAUGE BIFASCIATA, Wlk. ii. 368; Led. Wien. ent. Mon. 1863, pl. 6. f. 1. Brazil.

(2)†CHRYSAUGE CATENULATA, Warr. A. M. N. H. (6) vii. p. 423. British Guiana; Brazil.

(3) CHRYSAUGE KADENII, Led. Wien. ent. Mon. 1863, p. 163, pl. 6. f. 2. Brazil.

(4)†CHRYSAUGE LATIFASCIATA, Warr. A. M. N. H. (6) vii. p. 423. Brazil.

SECT. II. Fore wing with veins 4, 5 stalked in both sexes; male with no fovea in cell; veins 8, 9 absent; 10 free.

Type. (5) CHRYSAUGE FLAVELATA, Cram. Pap. Exot. iv. p. 112, pl. 348. f. B. Surinam; Venezuela; Brazil.
" *divida*, Hübn. Samml. exot. Schmett. ii. Lep. iv. Noct. iii.
† " *chrysomelas*, Wlk. ii. p. 369.
†*Candisa auriflavalis*, Wlk. xxxiv. 1494.

Auctorum.

Chrysauge unicolor, Berg, Ann. Soc. Arg. xix. p. 274. Argentina.
Flavinia gopala, Doguin, Le Nat. 1891, p. 109. Venezuela.

Genera auctorum.

Cryptocosma perlalis, Led. Wien. ent. Mon. 1863, p. 56, pl. 7. f. 11. Brazil.

Fenaria severa, Grote, Pap. ii. p. 132. U.S.A.

Species omitted.

Ethnistis eucarta, Feld. Reis. Nov. pl. 136. f. 28, belongs to the *Pyraustinæ*.

Idneodes tretopteralis, Rag. Ann. Soc. Ent. Fr. 1890, p. 605, probably belongs to the *Schœnobiinæ*.

3. On a Collection of Lepidoptera obtained in the Arusa Galla Country in 1894 by Mr. F. Gillett. By Arthur G. Butler, Ph.D., F.L.S., F.Z.S., &c., Senior Assistant-Keeper, Zoological Department, British Museum.

[Received May 10, 1897.]

So little has been published respecting the Lepidopterous fauna of the country south of Shoa, that the present collection, although unhappily in very poor condition, is of considerable interest [1].

The following is a list of the species :—

Rhopalocera.

1. Limnas chrysippus, *L.*, var. klugii. Between 25th September & 1st October.
2. Ypthima asterope, *Klug.* " "
3. Charaxes neanthes ♂, *Hewits.* " "
4. Hypolimnas misippus, *L.*, var. inaria. " "
5. Junonia sesamus, *Trimen.* Between 1st October & 19th November.
6. " octavia, *Cram.* " "
7. " cloantha, *Cram.* " "
8. " terea, *Drury.* Between 25th September & 19th November.
9. " cebrene, *Trimen.* Between 25th September & 21st November.
10. " clelia, *Cram.* Between 25th September & 1st October.
11. " boöpis, *Trimen.* Between 1st October & 19th November.
12. " orthosia, *Godt.* Between 25th September & 19th November.
13. " taveta, *Rogenh.* Between 1st October & 19th November.
14. Pyrameis cardui, *L.* Between 25th September & 1st October.
15. Eurytela dryope, *Fabr.* " "
16. Byblia ilithyia, *Drury.* Between 25th September & 19th November.
17. " acheloia, *Wallgr.* " "
18. Hamanumida dædalus, *Fabr.* Between 25th September & 1st October.
19. Neptis agatha, *Cram.* Between 1st October & 19th November.
20. Atella phalantha, *Drury.* " "
21. Acræa lycia, *Fabr.*, var. usagaræ. " "
22. " seis, *Feisth.* Between 25th September & 19th November.
23. Pardopsis punctatissima, *Boisd.* Between 25th September & 1st October.
24. Polyommatus bæticus, *L.* Between 1st October & 19th November.
25. Catochrysops asopus, *Hopff.* 21st November.
26. " osiris, *Hopff.* "

[1] Mr. Gillett says that the collection was made at a place called Sheik Husein, long. about 40° 45' E., lat. 7° 44' S., which accounts for the butterflies being partly Abyssinian and partly Somalian.

27. Azanus uranus, *Butl.* Between 25th September & 1st October.
28. Tarucus plinius, *Fabr.* Between 25th September & 21st November.
29. „ theophrastus, *Fabr.*, var. sybaris. Between 25th September & 1st October.
30. Lycænid too bad for identification. Between 1st October & 19th November.
31. Colias edusa, *L.*, var. electra. „ „
32. Terias zoe, *Hopff.* „ „
33. „ candace, *Feld.* Between 25th September & 19th November.
34. Teracolus eris, *Klug.* 21st November.
35. „ ludoviciæ, *E. M. Sharpe.* Between 25th September & 1st October.
36. „ evarne, *Klug*, var. syrtinus. Between 25th September & 19th November.
37. „ heuglini, *Feld.*, var. thruppi. Between 25th September & 21st November.
38. „ xanthus, *Swinh.*, var. comptus. Between 1st October & 21st November.
39. „ casta, *Gerst.*, & var. sipylus ♀. Between 25th September & 21st November.
40. „ isaura, *Lucas.* Between 1st October and 19th November.
41. „ pseudacaste, *Butler.* Between 25th September & 21st November.
42. „ celimene, *Lucas.* 21st November.
43. „ heliocaustus ♀, *Butler.* Between 25th September & 1st October.
44. „ ansorgei, var. ?, *Marsh.*[1] Between 1st October & 19th November.
45. „ vesta, *Reiche* (int. form). „ „
46. „ protomedia, *Klug.* „ „
47. Catopsilia florella, *Fabr.* Between 25th September & 1st October.
48. Belenois boguensis, *Feld.*, vars. Between 25th September & 19th November.
49. „ gidica, *Godt.*, ♂. Between 1st October & 19th November.
50. Herpænia melanarge, *Butl.* Between 1st October & 21st November.
51. Papilio demoleus, *L.* Between 25th September & 19th November.
52. „ bromius, *Doubl.* Between 1st October & 19th November.
53. Papilio erinus, *Gray*, var. „ „
54. „ antinorii, *Oberth.*, ♀. „ „
55. Eretis djæleæ, *Wllgr.* Between 25th September & 1st October.

Heterocera.

Only five small species were obtained, and of these only two are in sufficiently good condition to be recognized:—

56. Syntomis tomasina, *Butl.* Between 1st October & 19th November.
57. Mentaxya albifrons, *Hübn.* „ „

All that can be said of the three others is that one is a *Hypenid*, a second a *Macaria*, and the third probably the remains of some form of *Pyralid*.

In this series, although it includes no new species, there are several forms of interest:—The example of *Catochrysops osiris* measuring only ten millimetres in expanse of wings; whilst it is satisfactory to receive typical males of *Teracolus eris*; a female form of *Teracolus heuglini* var. *thruppi* approaching the female of *T. daira*, respecting which it will be worth while to make a few

[1] This form has the ashy-whitish basal area of *T. aurigineus* in the males; the discal black band of the primaries varies as in that species, and that of the secondaries is represented by black dashes on a grey ground, as is often the case in *T. aurigineus*, but the under surface is ochraceous with all the markings weakly defined: it may be the dry phase of *T. ansorgei*.

observations. *Teracolus heuglini* of Felder was based upon dry-season examples of a species of which the wet and intermediate phases were not recognized. In his recent paper on the synonymy of *Teracolus* Mr. Guy A. K. Marshall reduced *T. heuglini*, *T. nouna*, and the whole of the *T. antigone* group of *Teracolus* to synonyms of *T. evagore*, totally misunderstanding their seasonal relationships.

In a recent paper on Lepidoptera from Arabia and Somali-land (P. Z. S. 1896, p. 247), Capt. Nurse speaking of *T. yerburyi* observes :—"From all the pupæ emerged typical *T. yerburyi*, except from one which produced *T. nouna*, much to my surprise. I did not notice that one of the larvæ was different from the others, so that the larva of *T. nouna* must closely resemble that described above."

In dry countries like Aden and Karachi the seasonal phases of *Teracolus* are undoubtedly produced simultaneously as mere variations, if produced at all: in the case of *Teracolus phisadia* the male is always a wet-season phase and the female always dry-season; in the nearly allied *T. puellaris* both dry and wet phases of the male occur, but only dry of the female; whereas in the species nearest to the latter (*T. vestalis*) dry and wet forms of both sexes are abundant, but all flying together. Indeed one of Col. Swinhoe's chief objections to Capt. Watson's decision as to the dry and wet forms of *Teracolus* was based upon the fact that at Karachi he took all the so-called 'seasonal forms' flying together throughout the year. That this is not the case where the seasons are well defined has been amply proved, but it appears to be unquestionably true of very hot and dry countries where there is next to no rainfall.

A careful examination of the *T. daira* group of *Teracolus* has convinced me that the following are the seasonal forms or phases of the three most nearly allied species:—

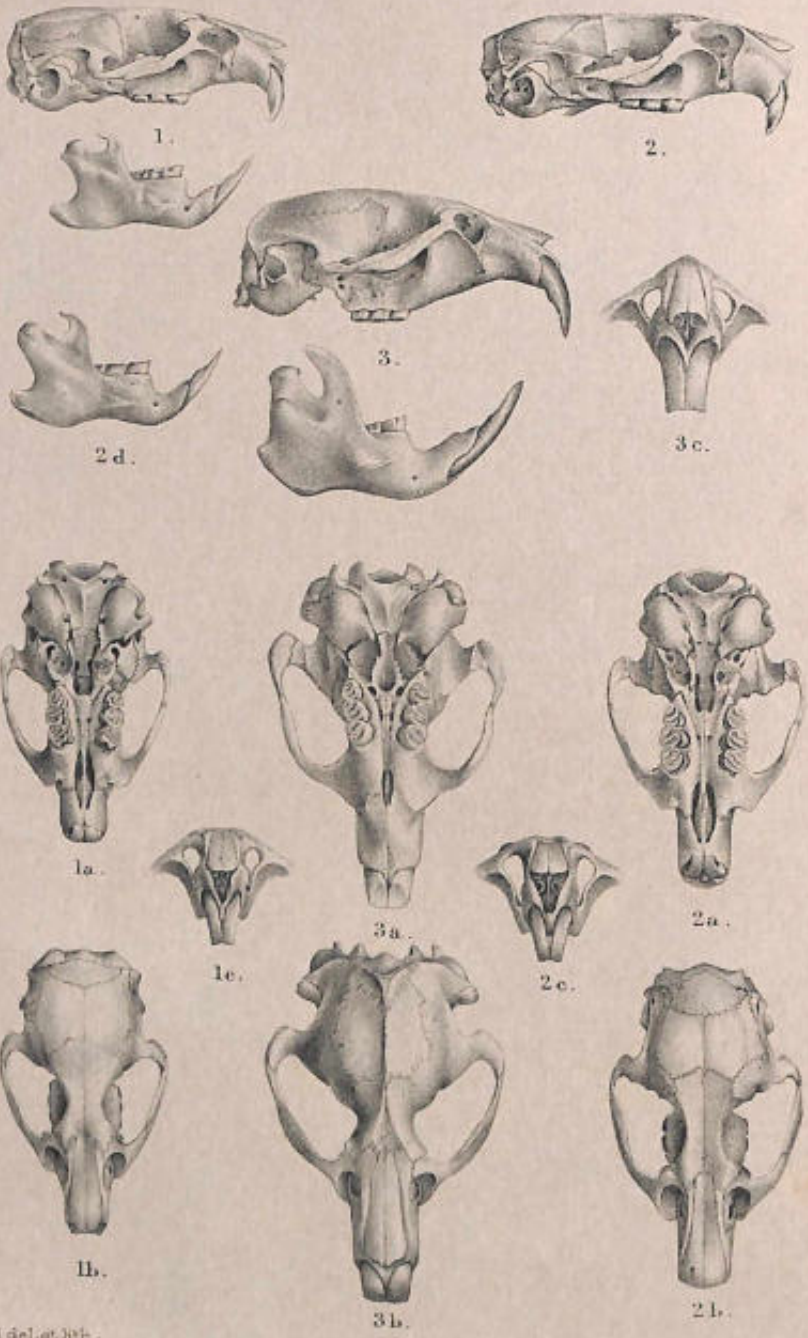
Wet-season.	Intermediate.	Dry-season.
1. *T. daira.*	*T. odysseus.*	*T. nouna.*
2. *T. jacksoni.*	*T. thruppi.*	*T. heuglini.*
3. *T. yerburyi.*	*T. swinhoei?*	*T. evagore.*

It will, however, be necessary to note that the dry-season forms, being much alike in these three species, owing to the simple character of their markings, have hitherto been confounded in papers upon the Lepidoptera of Aden and Somali-land. Also *T. swinhoei* is practically a wet-season form with yellow ground-tint, this alone entitling it to be called intermediate; it does not nearly approach *T. evagore* (=*saxeus*), which is the form bred from a larva of *T. yerburyi* by Capt. Nurse.

Other species of interest in Mr. Gillett's collection are:—

A somewhat rubbed male of *Teracolus ludoviciæ*, a very distinct species related to *T. puniceus* and *T. hetæra* (of both of which species I have examined series of both dry- and wet-season forms, and which therefore are certainly not synonymous).

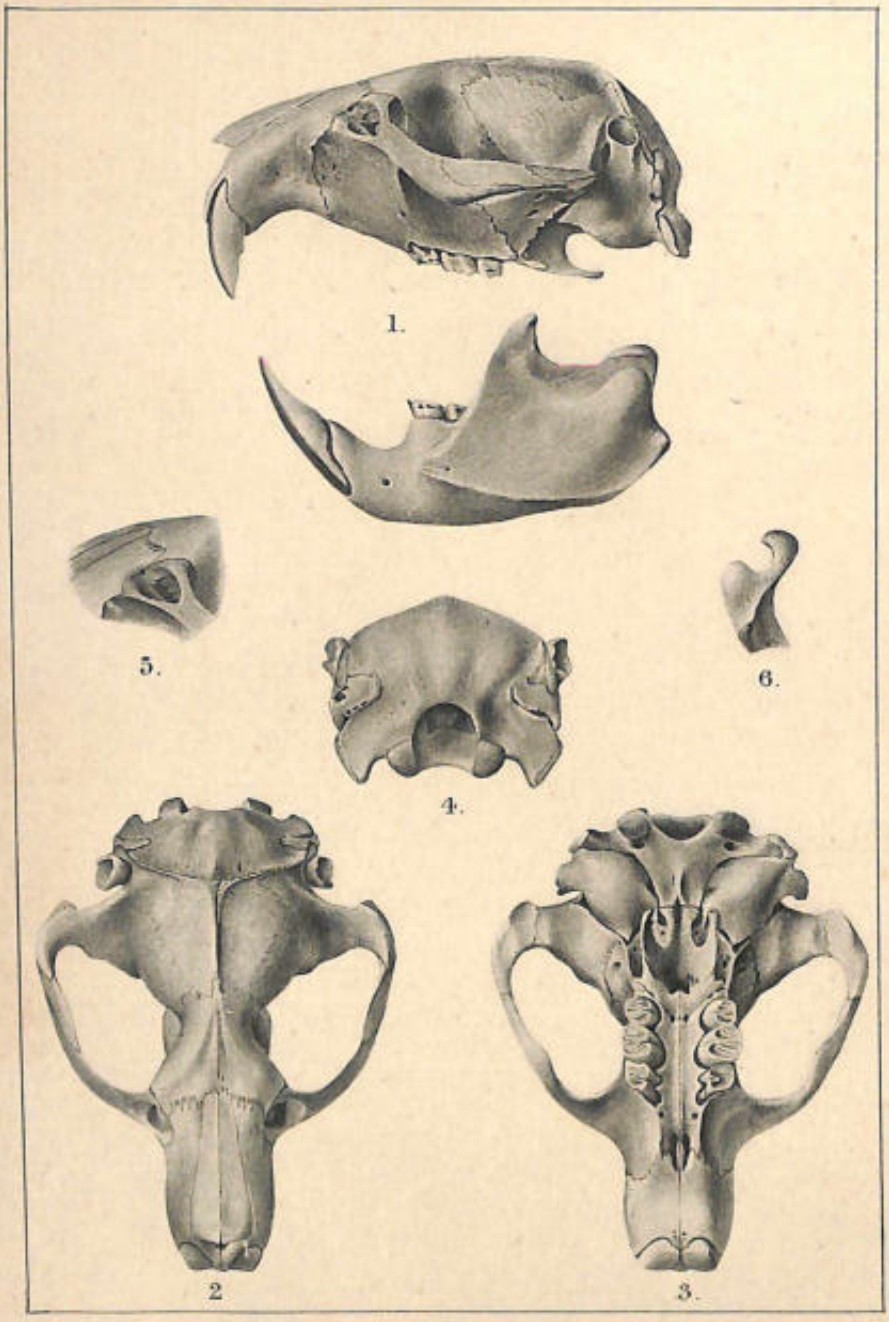
Both sexes of *Teracolus casta* and the female of its wet-season



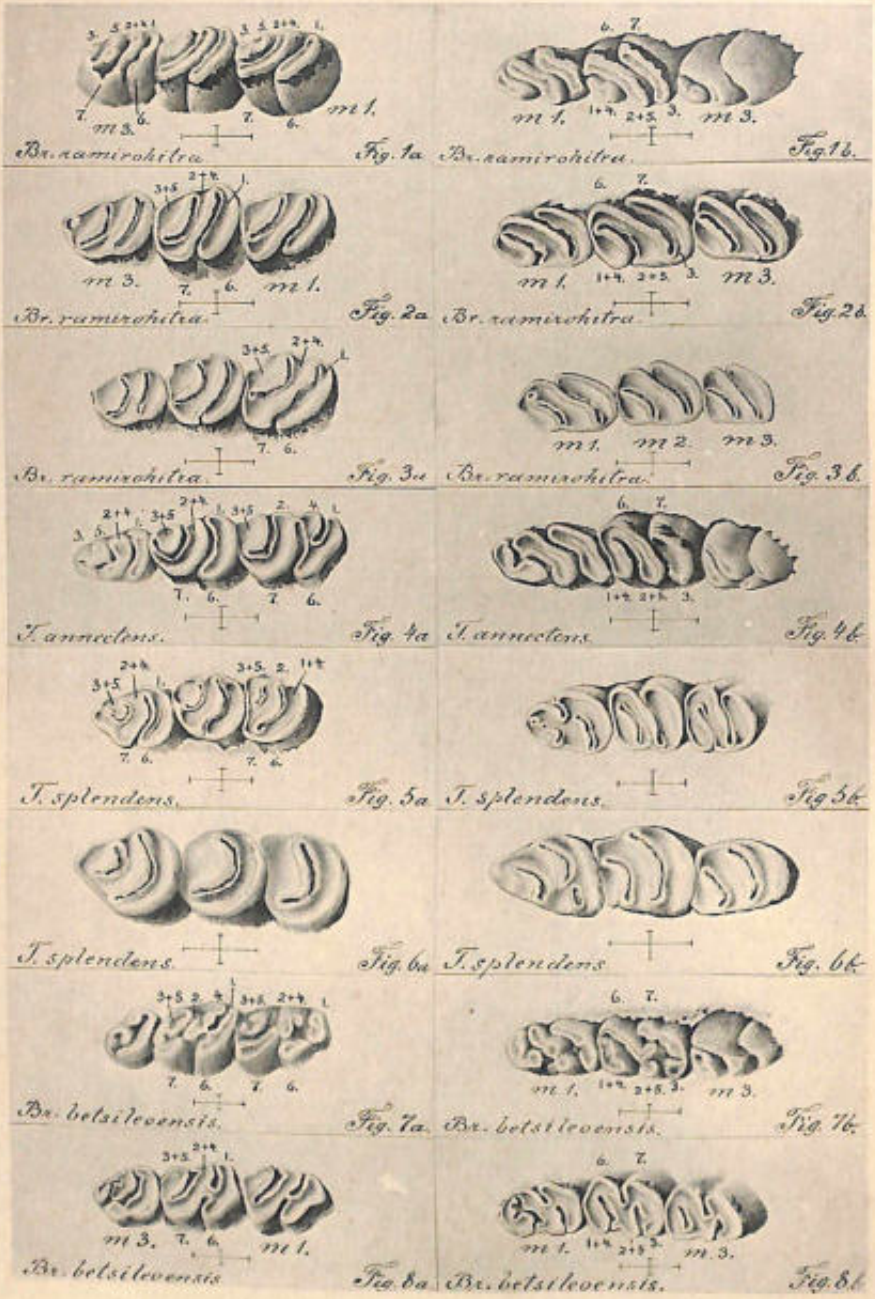
H.Grönvold del. et lith.

Mintern Bros. imp.

1.BRACHYUROMYS BETSILEOENSIS. 2.B.RAMIROHITRA.
3.TACHYORYCTES SPLENDENS.



SKULL OF RHIZOMYS SINENSIS.



Enlarged upper and lower molar teeth of BRACHYUROMYS and TACHYORYCTES.



Enlarged upper and lower molar teeth of recent and fossil
SPECIES OF RHIZOMYS.

form *T. sipylus*, clearly proving this to be a well-marked geographical race distinct from *T. evenina*.

An example of what seems to be an intermediate phase of *T. vesta*, differing from the wet-season form of *T. mutans* in its small discocellular black spot, smaller discal salmon-buff spots, larger marginal spots, and strongly defined brown bands on the under surface of the secondaries.

A form which I take to be a dry-season phase of *T. ansorgei*, already referred to in footnote.

Specimens of *Herpænia melanarge* showing considerable variation in size, proving that *H. iterata* (which differs constantly in the red coloration of the markings below) is a nearly allied but distinct geographical race.

Lastly, examples of *Papilio erinus* with unusually narrow blue banding on the upper surface of the primaries.

4. On the Malagasy Rodent Genus *Brachyuromys*; and on the Mutual Relations of some Groups of the *Muridæ* (*Hesperomyinæ*, *Microtinæ*, *Murinæ*, and "*Spalacidæ*") with each other and with the Malagasy *Nesomyinæ*.

By Dr. C. I. Forsyth Major, C.M.Z.S.

[Received June 1, 1897.]

(Plates XXXVII.–XL.)

It has been stated not long ago (1893), in a valuable Manual, that the Rodents are amongst the few exceptions to the rule, according to which the Malagasy Mammals belong to peculiar specifically Malagasy genera[1]. This statement, made originally by Rütimeyer in 1867[2], was true at that date. In the intervening 28 years five genera, containing six species, of Malagasy Rodents have been brought to notice; several of them, however, were so scantily characterized as to explain the undue neglect to which they have been subjected.

The genus *Brachyuromys* was characterized by me last year[3], upon specimens collected in Madagascar, the species *B. ramirohitra*, of which a short description was given, being taken as type. In the same place it was pointed out that Bartlett's "*Nesomys betsileoensis*"[4] is a second species of *Brachyuromys*.

At this Society's Meeting of Dec. 1, 1896[5], some considerations on the Malagasy Rodents as a whole were presented; the great majority of them I considered to "belong to the so-called Cricetine

[1] K. A. Zittel, 'Handbuch d. Paläontologie. IV. Vertebrata (Mammalia),' 1891-93, p. 767.

[2] L. Rütimeyer, 'Ueber die Herkunft unserer Thierwelt. Eine zoogeographische Skizze.' Basel & Genf, 1867, p. 14.

[3] Ann. & Mag. Nat. Hist. ser. 6, vol. xviii. Oct. 1896, p. 322.

[4] P. Z. S. 1879, p. 770.

[5] P. Z. S. 1896, pp. 978-980.

group of muriform Rodents (*Muridæ*, auct.), of which they are the lowest of existing forms, having affinities with some of the least specialized of the family Dipodidæ, as defined by Winge, viz. with *Sminthus* and *Zapus*." It was further pointed out that the African and Asiatic *Rhizomyes* (*Tachyoryctes* and *Rhizomys*) present relations with the Malagasy Rodents, and that the affinity is especially close between *Tachyoryctes* and *Brachyuromys ramirohitra*.

In the present paper I propose to give a fuller description of the skull and dentition of the two species of *Brachyuromys*, and to compare them with those Rodents outside Madagascar with which, in my opinion, they have affinities. The description of the other Malagasy Muridæ must be postponed to a future paper; but I shall have to refer to them repeatedly in the following pages.

Genus Brachyuromys, Maj.

Skull broad and massive. Upper profile of cerebral cranium flattened. Supraorbital crests rounded off. Incisors and rooted semihypselodont molars $(\frac{3-3}{3-3})$ large as compared to the size of the skull. Infraorbital foramen large, but on the whole with the shape characteristic of Muridæ. Jugal large and approaching the lachrymal. Transverse diameter of incisors exceeding the longitudinal[1]. Crowns of molars flattened, not tuberculate; unworn molars of species 2 half-tuberculate. In young specimens the crowns of the molars show three lobes of enamel, united by cement and obliquely disposed (inclining forwards with their outer portion), the posterior lobe in the upper, the anterior one in the lower molars being the smallest. These lobes soon unite together, producing various patterns, by which the different species may be easily distinguished. Tail shorter than usual in Muridæ.

By their broad, moderately flattened, roundish heads and comparatively short tails these Rodents recall somewhat the Voles in outer appearance.

1. Brachyuromys ramirohitra, Maj. (Plate XXXVII. fig. 2 and Plate XXXIX. figs. 1–3.)

Ears large, oval. Coloration of upper parts brown, abundantly mixed with black, on the sides less dark, the black hairs gradually diminishing. Lower parts fawn. Bases of hairs slate-coloured. Tail furnished above with black, beneath with grey hairs.

Parietal crests diverging anteriorly. Interparietal short in transverse, but longer in antero-posterior diameter than in *B. betsileoensis*. Molars very large, all about of equal size and pattern, the third in both jaws generally slightly smaller than the other

[1] (1) Where the incisors are wider than thick, the gnawing habit is feebly developed.—(2) Where the incisors are thicker than wide, the gnawing habit is greatly developed (Ryder, "The Significance of the Diameters of the Incisors in Rodents," Proc. Acad. Nat. Sci. Philadelphia, 1877, pp. 314–18).

two; the third upper one slightly triangular. The pattern presented by the uniting of the three enamel-lobes is as follows in moderately worn teeth. In the two anterior upper molars:—(1) an anterior enamel loop, open on the inner side and running obliquely across the crown, close up to the outer enamel margin of the tooth; (2) a posterior enamel islet, smaller in transverse extent than the anterior loop and almost parallel to it. In the last upper molar the anterior loop is shut out very soon from the inner side, so that this tooth presents two obliquely transverse enamel islets, with sometimes a third, smaller one, behind. In moderately worn lower molars the shorter anterior loop opens on the inner, the longer posterior loop on the outer side, the latter remaining open for a longer time than the former.

Dimensions in millimetres, those of the first two taken in the flesh:—

	Skin (M. 429), ♂. Type.	Skin (M. 509), ♂.	Spirit-specimen (M. 181), jun.
Length of head and body	165	162	*c.* 110
„ tail	99	89	73
„ manus	15	16	16
„ pes	34	52	27
„ ear	24	24	17

Dimensions, in millimetres, of the skull (M. 719, ♂):—basal length 32·5; length of nasals in middle line 13·5; length of frontals in m. l. 13·5; length of parietals in m. l. 6·3; interorbital breadth at narrowest 4·7; length of upper molar series 8·5; length of lower series 8·5; length of interparietal in middle line 5·2; breadth of skull between zygomatic arches 23·5.

Loc. Ampitambè Forest, Betsimisaraka country (on the border of N.E. Betsileo), 6 hours S.E. of Fandriana.—Ambohimitombo Forest, Tanala country.

Native names *voalavoanala* (*i. e.* forest rat); *ramirohitra* (meaning probably: who goes in company, gregarious). Fossil in the lower deposits of the Children's Cave (Sirabè).

2. Brachyuromys betsileoensis. (Plate XXXVII. fig. 1 and Plate XXXIX. figs. 7, 8.)

Nesomys betsileoensis, Bartlett (P. Z. S. London, 1879, p. 770).

Resembling *B. ramirohitra* in outer appearance, but smaller. The brown of the upper parts of the previous species gives place here to fawn, which, together with the black hairs, gives to the upper part of the fur almost an olivaceous colour.

Skull resembling that of *B. ramirohitra*, but parietal crests nearly parallel; interparietal longer in transverse, shorter in longitudinal diameter. Molar teeth absolutely, as well as comparatively, smaller than in *B. ramirohitra*, though large as compared to Muridæ in general. Third upper molar small. Enamel loops of all the molars slightly less oblique than in the

preceding species. The anterior one in upper, the posterior one in lower molars being divided in the middle of the crown at an early stage of wear, the pattern presented in middle-aged specimens is the following:—a single enamel loop opening on the inner side of upper and on the outer side of lower molars; two on the outer side of upper and the inner side of lower molars. The single loops on the inner side of upper and on the outer side of lower molars remain open for a longer time than the others.

Dimensions in millimetres, taken in the flesh:—

	Skin (M. 516), ♀. Type.	Skin (M. 625), ♀.	Skin (M. 628), ♂.
Length of head and body	142	145	125
„ tail	89	94·5	68
„ manus	12	13	11
„ pes	28	27·5	25·5
„ ear	17·5	20	17
Breadth of ear	—	18	15·5

Loc. Ampitambè, outside the forest. Vinanitelo, close to the forest of the Independent Tanala of Ikongo, thirty miles south of Fianarantsoa. The specimens measured are from the former locality. Fossil in the Children's Cave near Sirabè; abundant in the superficial, very rare in the lower deposits.

The Affinities of the Genus Brachyuromys *with* Tachyoryctes, Rhizomys, Spalax, *and* Siphneus.

1. *Tachyoryctes* and *Rhizomys*.—With regard to the affinities of *Brachyuromys*, I made on a former occasion[1] the following statement:—"The African and Asiatic *Rhizomyes*, usually classed in the *Spalacidæ*, but which Winge places amongst the lowest *Muridæ*, alongside with the Tertiary *Cricetodon* and *Eomys*, are nearly related to the Malagasy group of Rodents by means of the Abyssinian *Tachyoryctes* (*Rhizomys*) and the Malagasy *Brachyuromys*, the former being but a very specialized fossorial form of the more generalized *Brachyuromys ramirohitra*. The molars are almost identical in both, only slightly more hypsodont in *Tachyoryctes*." (They are much more so in the latter than in the former.) "If we divest the *Tachyoryctes* skull of its [excessive] fossorial characters and of the consequences of the more hypselodont molars, we obtain a *Brachyuromys* skull. Likewise the skulls of the young *Tachyoryctes* bear much greater resemblance to *Brachyuromys* than the adult. There is further a great correspondence in external characters if we disregard the smaller ears and eyes of *Tachyoryctes* and its fossorial claws."

In the following I give the reasons for the above statements.

In spite of all the differences of the skulls at first sight, a closer

[1] P. Z. S. 1896, p. 979.

examination shows that the *Rhizomyes* (*Tachyoryctes*, *Rhizomys*) and *Brachyuromys* are nearly related to each other—the same holds good, in a somewhat minor degree, with regard to *Spalax* and *Siphneus*. The *Rhizomyes* are highly adapted to fossorial habits; *Brachyuromys* much less. The molars of both will be considered below.

The skull of the two (*Rhizomyes* and *Brachyuromys*) presents the following agreements, *B. ramirohitra* being somewhat intermediate between *Tachyoryctes* and *B. betsileoensis*, although standing of course closer to the latter:—

(1) The zygomata diverge outwards posteriorly, more in *Rhizomyes* than in *Brachyuromys*; the malar process of the squamosal parts at right angles from the skull and is strongly developed.

(2) The jugal is very strong and approaches closer to the lachrymal than in other Muridæ.

(3) The infraorbital foramen in *Brachyuromys* is situated higher above the molar series and reaches higher up than in other Muridæ; the narrowed lower portion being lower and wider in *B. ramirohitra*. In *Tachyoryctes* it is located higher still, and there is almost no narrowed passage below. In *Rhizomys* the foramen is situated higher still, and much shortened as well as broadened.

(4) The skulls of both *Rhizomyes* and *Brachyuromys* are depressed and massive.

(5) Mandibulæ short, massive and high. Anterior margin of coronoid process almost vertical.

(6) The lower maxillary border, between premaxillary suture and first molar, viewed in profile, appears higher anteriorly, sloping down backwards towards the anterior alveolar border.

(7) The molar series diverge backwards.

(8) The glenoid fossa is, outside and inside, delimited by longitudinal parallel crests.

(9) The anterior margin of the nasals does not reach as much forwards as that of the premaxillaries.

The skull of *Rhizomyes* differs from *Brachyuromys* in the following characters, which are all of them the expression of the higher fossorial adaptation and the more hypselodont molars:—

Eyes and ears very small; tail very short.

A sagittal crest. Increase in vertical extent of the maxilla, upwards as well as downwards.—Anterior narial aperture depressed and broad.—Foramina incisiva small and situated backwards, being overgrown by the premaxillaries. The upper posterior processes of the premaxillaries extend also far backwards.—The distance between m.1 and anterior extremity of the premaxillaries, depending on the increased length of the incisor alveoli, is much increased as well.—Viewed in profile, the sloping backwards of the inferior border of premaxillary and maxillary, between the incisors and first molar, is much steeper than in *Brachyuromys*.—The great horizontal extension of the lower incisors and the great vertical extension of the lower molars

produce the well-known changes in the shape of the mandibula.—The angular process is less curved inwards than in the Malagasy genus.—Occiput inclined forwards.

Basis cranii.—In *Brachyuromys* we have the conditions normal in Muridæ; the tympanic bones are remarkable for their small size. *Rhizomyes*: Auditory meatus tubular. The space behind the choanæ, whose base is formed by the basisphenoid, is much compressed laterally. Brandt, in his description of the skull of the genus *Rhizomys*[1], comprehending both *Tachyoryctes* and *Rhizomyes*[2], makes a statement apt to be misleading. Referring apparently to the figure of "*Nyctocleptes dekan*" (= *Rhizomys sumatrensis*) by Temminck,[3] he says:—"Die innern Flügelfortsätze des Keilbeins divergiren so stark nach aussen, dass hinten, wie bei keiner andern der bekannten Spalacoiden-Gattungen, eine sehr breite Gaumenrinne entsteht." All depends what extension is given to the term '*Gaumenrinne*' (palatal groove). The internal pterygoid processes in fact diverge much with their inferior borders, so that, as is shown in Temminck's figure, and in Pl. XXXVIII. fig. 3 of the present paper, they almost completely cover the pterygoid fossæ. Upwards, however, they converge very much; and lastly, in the upper third of their height, they run parallel with each other, so as to delimit a groove—whose bottom (or roof) is occupied by the basisphenoid—which is very deep anteriorly and whose upper portion is exceedingly *narrow* (*Rh. sinensis*). In *Rh. sumatrensis* the groove is slightly shallower and less narrow; and the same, although in a minor degree, holds good with regard to *Rh. pruinosus*. In *Tachyoryctes* the groove in question is less deep; backwards, where it is no more bordered by the internal pterygoid processes, it appears as a very narrow longitudinal groove in the middle line of the basisphenoid, which is thus partitioned in two lateral portions; whereas in *Rhizomys* it has only somewhat raised borders. Anteriorly, the "palatal groove" appears somewhat deepened and enlarged, as shown in Rüppell's plate[4] and in Pl. XXXVIII. fig. 3 of the present paper.

In consequence of the vertical extent of the maxillary in *Rhizomys*, the bony palate comes to be situated at a very deep level. As a consequence, the external pterygoid processes also acquire a considerable vertical extension, since they serve as a "support for the maxillary."[5] But this is not the only explanation of the great depth of the pterygoid fossæ; otherwise their roof—or rather their bottom, as we are speaking of them as 'fossæ'—would remain on a level with the inferior basis of the intervening basisphenoid. In *Rhizomys* and *Tachyoryctes* the anterior portion of the basisphenoid becomes increased in vertical size, forming a septum

[1] J. F. Brandt, "Untersuchungen üb. d. craniolog. Entwicklungsstufen d. Nager d. Jetztzeit," Mém. Acad. St. Pétersbourg, [6] ix. vii. 1855, p. 817.
[2] *Ib.* p. 306.
[3] 'Monographies de Mammalogie,' ii. Leiden, 1835, p. 40, pl. xxxiii. fig. 5.
[4] Mus. Senckenberg. iii. Taf. x. fig. 2 *c* (*Rhizomys* [*Tachyoryctes*] *macrocephalus*).
[5] Winge, Meddel. Naturh. Foren. 1881, p. 40.

between the two pterygoid fossæ, which is reduced to a thin transparent plate.

In this way is brought about the great depth and spaciousness of the pterygoid fossæ. Their roof is covered by an irregular network of raised ridges, apparently for the pterygoid internus, greatly developed as a masticatory muscle.

A beginning of these conditions we meet with in the *Microtinæ*: in *Fiber* there is in the bony septum a spacious fenestra, situated farther backwards than the small fontanelle which is seen in *Tachyoryctes*. The *Microtinæ* are somewhat intermediate in this respect between the *Rhizomyes* and typical brachyodont Muridæ, including *Brachyuromys*. In the latter, the height of the basisphenoid is not increased; it slopes considerably downwards from before backwards, so that the shallow pterygoid fossæ are situated slightly below the level of the inferior surface of the basisphenoid, which broadly separates them. In *Microtinæ* they are situated somewhat *above* the level of the basisphenoid.

Winge, speaking of the *Bathyergini*, remarks that the strongly developed m. pterygoideus which is inserted alongside the centra of the sphenoidea has transformed the presphenoid into a thin vertical plate[1]. I find that both the presphenoid and basisphenoid are thus transformed, at least in the genera *Bathyergus* and *Georychus*.

2. *Spalax*.—Winge places *Spalax* amongst the Dipodidæ[2] on account of the form of the infraorbital canal, and for having m.1 of the same size as m.2. He states though, that besides the complete absence of premolars, this genus is in other respects as well on a somewhat higher level than the rest of the Dipodidæ. The outer wall of the infraorbital canal is certainly not greatly developed; and in adult specimens it is besides pushed considerably forwards, whilst at the same time starting almost horizontally from the cranium. The upper maxillary radix of the zygoma, which in Muridæ usually forms the roof of the infraorbital canal, is more obliquely extended downwards in *Spalax* (not much differing from what obtains in *Zapus*), so that it helps to form the outer wall of the canal. The direction and extension of the walls, of course, shape the form of the canal itself. But with all that, the agreement with the Dipodidæ is not so considerable, and besides seems to be a secondarily acquired character in *Spalax*; and this for the following reasons:—

(1) In younger specimens of *Spalax* (B.M.), and in some adult, the outer wall of the canal is by no means pushed considerably forwards and neither is it horizontal, but more upright; as a consequence these specimens approach *Siphneus* in the form of the canal.

[1] 'Gnavere fra Lagoa Santa,' p. 127, and footnote 62, p. 169: "Den Del af *M. pterygoideus internus*, der voxer op paa Siderne af Kilebenskroppene, er meget stærk, naar langt frem under *Foramen opticum* og har omformet det forreste Kilebenskrop til en tynd lodret Plade." Footnote (p. 169): "De paagjældende Muskler ere gjennemgaaede hos *Georychus capensis*; Mærkerne paa Hovedskallen ere de samme hos de andre Slægter."

[2] 'Gnavere fra Lagoa Santa,' pp. 109, 121, 166.

(2) In *Rhizomys*, placed amongst the Muridæ by Winge himself, the outer wall parts from the skull almost horizontally and is not only pushed forwards but upwards as well; this last Winge considers to be a secondarily acquired character [1]. And I think rightly; for in the closely related *Tachyoryctes* we meet with almost the normal Muridæ-type of the outer wall and the canal itself.

(3) In the powerful development of the maxillary process of the zygoma and corresponding reduction of the malar bone, *Spalax* appears to be on a higher level than the Dipodidæ; a circumstance which has not been overlooked by Winge [2].

Whilst placing *Spalax* with some hesitation in the Dipodidæ, Winge does not in the least insist upon a sharp separation of *Spalax*, *Rhizomys* (and *Siphneus*), for he states expressly [3]: "*Spalax*, *Rhizomys*, and *Siphneus* are not widely separated animals; they take their origin from nearly related forms; there is no very great difference between a primitive Dipodide and little more or less primitive Murides."

The inevitable conclusion is, that if the *Rhizomyes* (*Rhizomys* and *Tachyoryctes*) [4] are to be considered as low Muridæ, and herewith I agree completely, *Spalax* has the same claims. In the comparatively powerful development of the malar bone, and in the form of the zygoma (considerable height of the anterior part), the *Rhizomyes*, *Tachyoryctes* more than *Rhizomys*, occupy an even lower rank than *Spalax*. The outer wall of the infraorbital canal in *Spalax* is scarcely less developed than in *Cricetus*.

The pattern of the molars in *Spalax*, to judge from the youngest available stages, is the same as in *Tachyoryctes* and *Brachyuromys*, whilst it agrees somewhat less with *Dipus*, with which it is compared by Winge. The relative dimensions between m. 1 and m. 2 are as in *Tachyoryctes*; m. 1 is slightly larger. Brandt assigns two roots to the molars of *Spalax* [5]; but the upper molars have three roots as in *Rhizomys* and *Tachyoryctes*, two outer ones and a much larger inner one. They are far from being as hypselodont as in *Tachyoryctes*, being shorter even than in *Rhizomys*. Moreover, they are somewhat atrophied, very small, and of roundish contours; the enamel-folds are rather superficial, so that the pattern becomes sooner simplified than in the two genera named. Some compensation is given by the thickness of the enamel bordering each molar. In correspondence with the much shorter molars, the maxillary bone, too, has not acquired such a great vertical extent as it has in *Rhizomys*, and still more so in *Tachyoryctes*; but the presphenoid has followed the general elevation of the middle part of the cranium; whilst remaining compact superiorly and inferiorly, its intermediate region has been transformed into a thin plate. The basisphenoid has been transformed in a similar manner, as we have seen to be likewise the case in *Rhizomys* and *Tachyoryctes*.

[1] 'Gnavere fra Lagoa Santa,' p. 124.
[2] *L. c.* p. 121.
[3] *L. c.* p. 167.
[4] For *Siphneus* see below.
[5] 'Craniologische Entwicklungsstufen,' p. 215: "alle besitzen zwei kurze Wurzeln, eine hintere und eine vordere."

3. *Siphneus*.—Gerrit Miller has recently expressed the opinion that it may eventually prove necessary to unite the "*Siphneinæ*," i. e. *Siphneus* and *Ellobius*, with the *Microtinæ*[1]. This corresponds fairly with Alphonse Milne-Edwards's views, who has considered the "*Siphnés*" to be "des Arvicoles anormaux."[2] O. Thomas maintains the subfamily for *Siphneus* alone, since according to his view its "differences, both external, cranial, and dental, are clearly sufficient to demand separate subfamily rank."[3]

It is to be remarked that Winge has treated the question of the relationship of *Siphneus* exhaustively many years ago. Whilst uniting *Ellobius* with the *Microtinæ*, he considers *Siphneus* to be a lower type, and accordingly places it with the *Cricetinæ*; its resemblance with the Voles resting solely on their having open roots to the molars, which otherwise are not different from the "*Hesperomys*-type." He points out that no Vole has such a small m. 1 inf., with not more than the usual five loops. Winge shows besides, that *Siphneus* lacks the powerful crest in the wall of the temporal fossa, which gives the characteristic feature to the Microtine skull, whereas the temporal muscles are inserted on the surface of the skull in the same manner as in the *Criceti*; and that the basioccipital region and the centrum of the basisphenoid are broader, the tympanic bones smaller, than in the Voles[4]. In the more simple structure of the molars he sees an indication of closer relationship with "*Cricetulus*." The shape of the outer wall of the infraorbital canal is said to be about as in the Hamsters; likewise the zygoma and the crests on the cranium, only slightly stronger; and equally the flattening and forward inclination of the occiput, the only difference being that these characters too are more strongly developed than in the Hamsters[5].

It seems to me that there is little to object to Winge's view of the question; I would even go a little farther still. In his arrangement of the Muridæ[6], Winge opposes his *Rhizomyini* (i. e. *Cricetodon*, *Eumys*, *Rhizomys*) to the rest of the Muridæ, m. 1 in the former being only slightly larger, in the latter considerably larger than m. 2.

As regards this character, *Siphneus* certainly belongs to the former group, with more right than *Cricetodon* and *Eumys*, which both herein are scarcely different from the *Hesperomyes*. In pattern and size the two anterior molars of *Siphneus* agree as much with each other as they do in *Spalax*, *Tachyoryctes*, and

[1] Gerrit S. Miller, "Genera and Subgenera of Voles and Lemmings" (North-American Fauna, No. 12, p. 8, footnote 3). Washington, 1896.

[2] H. Milne-Edwards et Alph. Milne-Edwards, 'Recherch. p. servir à l'Hist. nat. des Mammifères etc.,' t. i. Texte, pp. 76–79. Paris, 1868–74.

[3] O. Thomas, "On the Genera of Rodents" (P. Z. S. p. 1021 footnote 1). London, 1896.

[4] This does not hold good, however, with regard to all the genera of *Microtinæ*, e. g. *Fiber* and *Ellobius*.

[5] H. Winge, "Om grønske Pattedyr" (Videnskab. Meddel. fra d. Naturh. Foren. Kjöbenhavn for Aaret 1881, pp. 47–49. Kjöbenhavn, 1882; see also H. Winge, 'Gnavere fra Lagoa Santa,' pp. 124, 125, 126).

[6] 'Gnavere fra Lagoa Santa,' p. 125.

Brachyuromys, and even less than in some of the *Rhizomys* (especially with regard to the lower molars). In the shape of the outer wall of the infraorbital canal, *Siphneus* shows closer agreement with *Tachyoryctes* (especially with *T. splendens*) than with *Cricetus*, the lower portion of the outer wall advancing more forward. There is likewise more similarity than with *Cricetus* in the form of the canal itself, which in *Tachyoryctes* and *Siphneus* is broader in its upper part than in the first-named genus, whereas (apparently as a consequence of the broadening of the skull) in both the inferior, narrower part appears considerably shortened vertically. In this respect *Tachyoryctes* is somewhat intermediate between *Cricetus* and *Siphneus*. The malar bone of *Siphneus* is stronger than in *Cricetus*; in *S. armandi* it is as strongly developed and reaches nearer to the lachrymal than in *Tachyoryctes*. As regards the flattening and inclination of the occiput, there are different gradations in this respect in the genera under consideration (*Spalax*, *Siphneus*, *Rhizomys*, *Tachyoryctes*); one end of the series is occupied by *Spalax*, the other by *Tachyoryctes*. In the latter the inclination is scarcely more than in *Cricetus frumentarius*; in old individuals scarcely less than in young *Spalax*.

For the rest the skull of *Siphneus* is transformed to be used as a shovel and drill in a similar way as in *Spalax*.

The Molars of Brachyuromys *as compared with those of other Muridæ and of Mammalia generally.*

A few introductory remarks are indispensable.

In Didelphyidæ and many Insectivora there are on the outer side of the upper and on the inner side of the lower molars three very conspicuous cusps. These are considered by Winge[1] to be the oldest, most primitive parts of the Mammalian molar. They are the same which Osborn in upper molars has called *parastyle*, *mesostyle*, *metastyle*[2]; in Winge's plates[3] they are designated from before backwards by 1, 2, 3. The middle one is supposed to be the oldest of the three, so that according to Winge's view the protocone is something *toto cœlo* different from Cope's and Osborn's protocone; this last, 6 in Winge's figures, is according to the latter author one of the latest additions to the tooth.

If we review the more primitive Ungulates and the Ancylopoda, we find equally three outer cusps in the superior molars; but it may be seen at once—and in this I think I am in agreement with Winge—that they are not homologous in the different groups.

[1] H. Winge, "Om Pattedyrenes Tandskifte, især med Hensyn til Tændernes Former." Vidensk. Meddel. Naturh. Foren. i. Kjöbenhavn, 1882, p. 15, pl. iii.

[2] See *e.g.* H. F. Osborn, "The Rise of the Mammalia in North America," Address, Boston, 1893. p. 35 (text-figure of *Anchitherium*). H. F. Osborn and C. Earle, "Fossil Mammals of the Puerco Beds," Ann. Mus. Nat. Hist. vol. vii. Art. i., New York, 1895, p. 44, fig. 14.

[3] *L. c.* pl. iii. H. Winge, "Jordfundne og nulevende Pungdyr (Marsupialia) fra Lagoa Santa, Minas Geraes, Brasilien. Med Udsigt over Pungdyrenes Slægtskab" ("E Museo Lundii"), Kjöbenhavn, 1893, pl. ii. figs. 2*a*, 2*b*, 8*b*, 10.

In the Anthracotherina, *e. g.* in *Ancodus* [1], and in the *Ancylopoda* [2], we find three widely bulging cusps in the upper molars. In *Hyracotheria* [3] it is easy to see that the two posterior of the three outer cusps have nothing whatever to do with the two posterior of *Ancodus* and the *Ancylopoda*; only their anterior one, which I consider as homologous with cusp 1 of Insectivora and *Didelphys*, is the homologue of the anterior cusp in *Hyracotheria*. The two posterior cusps of *Ancodus* and the *Ancylopoda* are 2 and 3; those of the *Hyracotheria* are the homologues of the two cusps more internally situated in the former, Winge's 4 and 5, Osborn's *paracone* and *metacone*; the comparison with other *Hyracotheria* [4], in which something more of these "-styles" is preserved, shows this at once to be the case. The posterior outer cusp in upper molars, Winge's 3, Osborn's *metastyle*, which is so well developed in *Didelphys* and in many Insectivora [5], is, when met with at all in other orders, generally the least developed of the three outer cusps, and there is sometimes a relation in its development with that of the antero-internal cusp in lower molars, Winge's 1, Osborn's *paraconid*.

The fact, pointed out by Winge, that these cusps of Insectivora and Didelphyinæ have their homologues in other orders, chiefly in the older members, is of the greatest importance and a notable progress in our knowledge of the homologies of the Mammalian molar. It is a very remarkable fact, that this outermost series of cusps is enormously developed in several upper molars from the Laramie Cretaceous [6]. Whether we have to consider them, with Winge, as being the most primitive parts of the molar, older than the cusps situated internally from them in upper, externally in lower molars, is quite another question, in which it is not proposed to enter particularly for the present.

As regards the Rodents, Winge points out the remnants of this

[1] *Cf.*, *e.g.*, Zittel, 'Handbuch d. Palæontologie,' iv. p. 329, fig. 266.

[2] Zittel, *l. c.* p. 314, fig. 255.

[3] J. L. Wortmann, "Species of *Hyracotherium* and allied Perissodactyles from the Wahsatch and Wind River Beds of North America," Am. Mus. Nat. Hist. vol. viii., vi. 1896, p. 89, fig. 3, p. 95, fig. 4; Zittel, *l. c.* p. 277, fig. 219.

[4] Zittel, *l. c.* p. 243, fig. 179, p. 242, fig. 171 (*Pachynolophus siderolithicus*); Wortmann, *l. c.* p. 108, fig. 18 (*Orohippus*).

[5] Winge, *l. c.* pl. iii. fig. 1 *b*, 2 *b*, 3 *b*.

[6] *Cf.* H. F. Osborn, "Fossil Mammals of the Upper Cretaceous Beds," Am. Mus. Nat. Hist. vol. v. Art. xvii. pl. viii., New York, 1893. Osborn calls the molars referred to "trituberculates," and expresses his belief that they lend "overwhelming proof, if any more were needed, of the unity of origin of the molar types of the higher Mammalia from a tritubercular stem instead of from a multitubercular, as Forsyth Major has suggested" (*l. c.* p. 320). For me these Laramie "*Trituberculates*," so-called, are polybunous, as well as those figured on pl. vii.; and I have only to repeat once more that "trituberculate" and "triangular" are not synonymous. Prof. Osborn assures us (*l. c.* p. 320) that these "Laramie Trituberculates" "include a variety of forms just emerging from the primitive tritubercular stage." That is precisely what has yet to be proved. But even if we were inclined to take Prof. Osborn's assertion for granted, it would have to be shown how it happens that several of these ancient forms (E, F, pl. viii.) have in their very process of "emerging" already acquired such a luxury of "-styles" and "-conules," as to constitute by themselves alone half of the molar's crown.

old row in some genera, viz., *Allomys*[1] and *Pseudosciurus*; the pattern of molars of the last named he considers to be the most primitive amongst known Rodentia[2]. He places *Pseudosciurus* in the Anomaluridæ, from which family he derives the Hystricidæ and Dipodidæ, and from the latter the Myoxidæ and Muridæ[3].

I have many years ago[4], and so had Hensel[5] before me, drawn attention to the great resemblance of the molars of *Pseudosciurus* to those of Ungulates; they were compared by me in the first line with the molars of "*Hyracotherium siderolithicum*." With regard to *Allomys* I refer to a more recent paper of mine[6]. Besides, I wish to draw attention to a fact, which will be more fully considered by me in another place, viz., that amongst the *Sciuropteri* we equally meet with traces of these ancient outer cusps, namely in *S. pearsoni*[7], and especially in *S. xanthipes*, Milne-Edw., of which a less worn dentition than that figured by Milne-Edwards[8] lies before me (B.M. no. 95. 7. 5. 1).

These ancient cusps are further met with in *Aplodontia*, in whose premolar and molars the middle outer cusp in upper, and the middle inner cusp in lower molars, Winge's 2, are the most conspicuous of the three. Coues considered *Aplodontia* to be a very primitive genus, adducing for one of his reasons that the molars are of the most simple type[9]. There is no doubt that this genus is a very low form of Rodentia[10], as shown by the skull—in spite of its highly fossorial specialization—and by the structure of the molars; but not for the reason adduced by Coues; for in an unworn condition, as figured by Schlosser[11], they are shown to be of a complicated type.

We have next to face the question, what becomes of these ancient outer cusps in the upper molars of Mammals generally? Years ago I tried to show that the vertical ridges on the outer side of the molars of modern Ungulates are not the unimportant parts which they are generally held to be[12]; and Winge has since identified them as the homologues of the outer series (1, 2, 3) of Insectivora and Polyprotodontia[13]. In proportion as the next following inner cusps, 4 and 5, increase in size and at the same time apparently move outwards, the outer cusps decrease and either become fused with 4 and 5, or persist between them in the

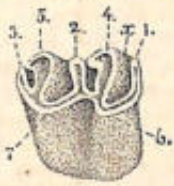
[1] 'Gnavere fra Lagoa Santa, etc.,' p. 114.
[2] *Ib.* p. 116. [3] *Ib.* p. 110 etc.
[4] Palæontographica, vol. xxii. 1873, p. 76.
[5] Zeitschr. d. deutsch. geol. Ges. viii. 1856, p. 664.
[6] "On some Miocene Squirrels etc.," P. Z. S. 1893, pp. 192, 193.
[7] *Ib.* pl. viii. fig. 20.
[8] 'Rech. p. servir à l'Hist. nat. des Mammifères,' Paris, 1868–74, p. 171, pl. 15 A. fig. 3.
[9] E. Coues and J. A. Allen, "Monographs of North American Rodentia," Report Un. St. Geol. Survey of the Territories, Washington, 1877, p. 555.
[10] See Winge, 'Gnavere fra Lagoa Santa,' pp. 108, 110, 115.
[11] M. Schlosser, "Die Nager des europäischen Tertiärs," Palæontographica, xxxi. 1884, p. 106 (124).
[12] "Nagerüberreste aus Bohnerzen Süddeutschlands und der Schweiz," Palæontographica, xxii., 1873.
[13] "Om Pattedyrenes Tandskifte etc.," *l. c.* pl. iii.

same longitudinal row. Winge has summed up in a few words his view of the fate of these outer cusps [1]. But in the figures of upper Rodent molars he ignores what I consider to be their homologues. For a clearer understanding of what is to follow, I append two sketches of the same upper molar from Winge's plates, the first with the numbering given by this author, the second with the numbering according to the manner in which I grasp the homologies. The tooth figured is one of the *Hesperomyinæ* with more complicated molars, being a copy of fig. 12 *a*, pl. iii. of Winge's paper [2], representing the second right upper molar of "*Nectomys squamipes*" (text-figs. 1 and 2). Winge assigns the homologies

Fig. 1.



Fig. 2.



Second right upper molar of *Nectomys squamipes*, after Winge.

thus: $\frac{5\ 4}{7\ 6}$, taking into consideration only what in these teeth appear to be the principal cusps; whereas I would write them as follows: $\frac{3\ 5\ 2\ 4\ 1}{7\ \ 6}$, taking into consideration as well those which in these teeth appear to be merely secondary cusps [3].

Now as to *Brachyuromys*. Here we have as principal feature of the molars three transverse and somewhat oblique rows. In *Brachyuromys ramirohitra* the separation of the three rows, their obliquity and their lophodontism are more pronounced than in *B. betsileoensis*, whose unworn teeth show a half-tuberculate conformation and are therefore more fit for the understanding of the homologies.

M. 2 *sup.* (Plate XXXIX. figs. 1 *a*, 2 *a*, 3 *a*, 7 *a*, 8 *a*).—The anterior transverse row apparently is composed of the outer cusp 1 and the inner cusp 6. The second one is a compound, on the outer side, of '4' anteriorly and '2' posteriorly, which in very early stages become fused with each other and with the inner cusp 7. The most prominent outer and inner cusps,

[1] "Kronen bliver ved sin Væxt saa bred, at Underkjæbe tænderne ere for smalle til endnu at røre ved dens ydre Rand, naar Munden lukkes; derfor vantrives de tre oprindelige yderste Spidser og indskrænkes til fremspringende Hjørner eller Lister, smelte sammen med de nærmeste indre Spidser eller forsvinde helt." (Om Pattedyrenes Tandskifte, etc., *l. c.* pp. 17, 18; see also footnote 4 on p. 41).

[2] 'Gnavere fra Lagoa Santa, etc.'

[3] On comparison of the lower molars figured in Plates XXXIX. and XL. of the present paper with those on pl. iii. of Winge's "Om Pattedyrenes Tandskifte, etc.," it will be seen that my mode of numbering the cusps to indicate their homologies disagrees with the one adopted by Winge; but I cannot in this paper enter into a discussion of my mode of viewing the homologies of lower molars.

viz. 4 and 6, 5 and 7, are opposed to each other in a similar way as in *Hesperomyinæ*; the oblique position of the rows is brought about by the different connections. The third, posterior, row, which remains essentially limited to the outer part of the posterior margin, shows on unworn teeth of both species, more distinctly in *B. betsileoensis*, its composition of two parts: an anterior somewhat stronger cusp, 5, and a posterior smaller one, 3; exactly as in the less reduced teeth of *Hesperomyinæ* [1].

The lower molars agree with the upper ones, if we take into account that they are, of course, reversed. The anterior transverse row, restricted to the inner part, consists, as seen in unworn teeth of *Brachyuromys betsileoensis* (Plate XXXIX. fig. 7 *b*), of Winge's 1 and 4. The middle row consists internally of 2 and 5, which very soon become fused with the outer cusp 6. The posterior ridge is composed of 3 and 7.

To sum up. The five transverse ridges of *Trechomys*, e. g.[2], or of the Dipodide *Zapus*, are in *Brachyuromys* reduced to three, by the atrophy of 2 and 3 and their fusion with 4 and 5.

Comparison of the Molars of the "Rhizomyes" (Tachyoryctes, Rhizomys) *with those of* Brachyuromys.

It has been formerly stated that the molars of *Brachyuromys ramirohitra* are almost identical with those of the African *Tachyoryctes* [3]. There is, however, a greater difference in vertical extension between the molars of the two genera than appears from my former statement; those of *B. ramirohitra* are semi-hypselodont, whereas the very hypselodont molars of *Tachyoryctes* are on their way to become rootless. In *Rhizomys* the molars are less hypselodont than those of *Tachyoryctes* and somewhat more complicated than in both *Tachyoryctes* and *Brachyuromys*.

This is particularly apparent in the molars of the upper jaw. While in the latter genus we have seen the upper molars to be composed essentially of three outer cusps (3+5; 2+4; 1), separated by two external folds, there are four cusps in *Rhizomys* and accordingly three folds, which later on become three enamel islets. In *Rh. badius* the teeth, although as complicated in an unworn condition as those of the other species, become when worn more similar to the unworn teeth of *Tachyoryctes* and *Brachyuromys*, a fusion taking place in the anterior part of the crown. Moreover, the gradual disappearance of the islets from the crown proceeds at a quicker rate than in the other species of *Rhizomys*.

In *Tachyoryctes*, m. 1 sup. of young specimens has a similar structure to that of all three molars of *Rhizomys*. But this complication too disappears very soon, so that somewhat worn anterior molars of

[1] R. Hensel, "Beiträge z. Kennt. Säugeth. Süd-Brasiliens," Phys. Abh. k. Akad. d. Wiss. Berlin, 1873, pl. i. figs. 24 *a*, 25 *a*; pl. ii. figs. 26 *a*, 28 *a*; pl. iii. fig. 30 *a*.—Winge, 'Gnavere fra Lagoa Santa, etc.,' pl. iii. figs. 1 *a*, 10 *a*, 12 *a*.—It is also apparent in several Muridæ, e. g. *Uromys*, *Conilurus* (young), *Chiruromys*.

[2] Winge, 'Gnavere fra Lagoa Santa,' p. 116.

[3] P. Z. S. 1896, p. 979.

the former are perfectly similar to the following tooth and to those of *B. ramirohitra*, even in the oblique direction of the transverse ridges; whereas in *Rhizomys* these are placed at right angles to the long axis of the skull. As in *B. ramirohitra*, m. 3 sup. of *Tachyoryctes* is longer than the two anterior, this being a consequence of a fuller development of its posterior portion; that is, 3 remains longer independent from 5.

The different proportional size between the molars of *Tachyoryctes* and those of *Rhizomys* is apparently to a great extent due to the influence exercised by the incisors. In old specimens of *Tachyoryctes* (Plate XXXIX. fig. 6 *a*) the upper molars increase in size from before backwards. The upper incisors in this genus form a smaller segment of a circle than in *Rhizomys*, so that their posterior end interferes with the development of m. 1. In the latter genus the segment is a larger one; as a consequence, the first molar is partly or totally (according to the different species) withdrawn from the influence exercised by the incisor, which interferes with the *posterior* molars.

In *Rh. badius* the hinder end of the incisor reaches farther backwards than in any other species; m. 1, which is from the beginning the largest of the three (Plate XL. figs. 1 *a*, 2 *a*), remains such to an advanced stage of wear (Plate XL. fig. 3 *a*); the two posterior molars soon diminish in size. This decrease in size, from m. 1 to m. 3, is more intensified with age.—In *Rh. sumatrensis*, the incisor does not seem to affect the molars, their proportional size remaining the same in youth and advanced age (Plate XL. figs. 5 *a*, 6 *a*); m. 3 sup. is very small from the beginning.—In *Rh. pruinosus* and *Rh. sinensis* (Plate XL. fig. 7 *a*) the incisor forms a smaller segment of a circle than in *sumatrensis*, and a much smaller one than in *badius*. I have not all the stages of wear of *Rh. sinensis*, but there seems to be no essential difference from *Rh. pruinosus*. In this latter the unworn m. 1 sup. is considerably elongate (Plate XL. fig. 4 *a*); very soon it becomes reduced to the size of m. 2, and in very old dentitions it is even smaller than the latter.

To recapitulate the foregoing with regard to the two extremes, *Rhizomys badius* and *Tachyoryctes*. In both, m. 1 sup. is, before wear, slightly larger and especially longer than m. 2. In old specimens of *Rh. badius* both teeth, unaffected by the incisor, maintain their relative proportions, whereas both become considerably reduced in *Tachyoryctes*. The latter's m. 1, which is the most interfered with by the incisor, is eventually reduced to the size of m. 2, and in old individuals becomes even somewhat smaller; m. 1 becomes equally much reduced in size. In *Tachyoryctes* the greater vertical extension of the molars is a further reason for their being very soon interfered with by the incisor. M. 3, which from the beginning is somewhat atrophied in *Rh. badius*, becomes more so with advance of wear; whilst in *Tachyoryctes*, where the posterior part of m. 3 is on the contrary somewhat produced, as compared with its anterior molars, and with m. 3 of *Rh. badius*, this tooth maintains its proportions even in old individuals.

As regards the pattern of the *Rhizomys* molars, it results from a comparison with those of *Brachyuromys* and *Tachyoryctes*, that in *Rhizomys* cusp 2 maintains its independence, whereas in the others, as shown by *B. betsileoensis*, this cusp is not even in young specimens strongly developed, and becomes soon fused with 4. The homologies of the four outer cusps of *Rhizomys* are therefore to be expressed by the following figures:—1; 4; 2; 5+3 (see Pl. XL. figs. 1 *a*–7 *a*).

Of the lower molars of *Rhizomys* (Pl. XL. figs. 1 *b*–8 *b*) m. 1 is constantly longer and more complicated than either of the two posterior molars, which last agree almost absolutely with each other in size and pattern. Internally some of the species show, when young, four cusps, the two anterior of which are not strongly separated, so that very soon the only remainder of the original separation is a small enamel islet, which too tends to disappear. In *Rh. badius*, 1 and 4 appear already fused from the beginning, *i. e.* in the youngest available stages. The homologies of the four cusps, as compared with *Brachyuromys*, are therefore as follows: 1: 4 (or 1+4); 2+5; 3. I feel justified in considering the third cusp to be, as in *Brachyuromys*, a compound of two (2+5), from what is visible in unworn posterior molars as compared with m. 1 (Pl. XL. fig. 1 *b*, 2 *b*, 4 *b*, 5 *b*, 6 *b*). M. 1 is besides distinguished by a *surplus* on the antero-internal side: not only is cusp 1 separated from 4, but, like m. 1 of *Rh. betsileoensis*, there is an antero-external cusp in addition to what obtains in m. 2 and m. 3.

The molars of *Rhizomys* therefore, besides being less hypselodont than those of *Tachyoryctes*, are also more complicated than the molars both of the latter genus and of *Brachyuromys*, and thus approach more to the brachyodont amongst Malagasy Rodents; and further on to some members (*Trechomys*, *Theridomys*) of a more primitive group, Winge's *Anomaluridæ*. The molars of *Tachyoryctes* and *Brachyuromys*, on their side, show a remarkable likeness in pattern to some other members of the same group, viz. *Protechimys*[1], *Archæomys*. The molars of the former genus, which are much more brachyodont than those of the latter, arrive at the more simplified pattern of *Archæomys*, only in a somewhat advanced stage of wear. In comparing the molars of these two genera with each other and with *Brachyuromys* and the *Rhizomyes*, it becomes evident, beyond doubt, that the simplified pattern of the molars is the outcome of a complicated one. This is further confirmed by the little we know of a Pliocene *Rhizomys*, viz.:—

Rhizomys sivalensis, Lydekker[2], less specialized still than the existing *Rhizomys*.—I have reproduced the enlarged molars (Pl. XL. fig. 9 *b*) from a right mandibular ramus in the British Museum, No. 15925, mentioned in the Catalogue. Lydekker says of the

[1] Cf. "*Theridomys blainvillei*, Gerv.," in Gervais, Zool. et Pal. franç. pl. 47. fig. 17.—M. Schlosser, "Die Nager des europäischen Tertiärs," Palæontographica, xxxi. 1884, pp. 63 (45)–68 (50), pl. ix. (v).

[2] Records Geol. Surv. India, xi. 1878, pp. 100, 101, xii. 1879, p. 41; id. Pal. Ind. x., iii. 1884, p. 107–108; id. Catalogue of the Fossil Mammalia in the British Museum (Natural History), i. London, 1885, p. 233.

Rh. sivalensis, speaking of specimens in the Indian Museum, Calcutta:—"The relatively wider molars and the larger size of the incisors of the existing forms as compared with those of the fossil seem to indicate that the specialization has tended to the production of these characters."[1] In a former paper[2] it had been stated that "the fossil molars are in one specimen slightly smaller, and in the other slightly larger than those of the recent species" (i. e. *Rh. sumatrensis*).

In the mandibulæ preserved in the British Museum, the molars are wider and longer than those of the largest living species (*Rh. sumatrensis*), although the mandibula is shorter and lower. The elements constituting each of the molars in the recent forms appear to be more crowded together antero-posteriorly than in the fossil. In this last the molars are more complicated and remain so even in a worn condition, cusp 1 not becoming fused with 4, an occurrence which we meet with only in very young stages of some of the species of living *Rhizomys*. Besides, as has been already pointed out by Lydekker, in the fossil molars the external fold has a greater depth than in recent species. To sum up. The molars of *Rh. sivalensis* preserve the main characters of the molars of young specimens in later age, whilst in all the recent species the molars are very soon simplified, in some a little earlier, in others a little later.

Comparison of the Molars of the Hesperomyinæ *with those of* Brachyuromys *and* Nesomys.

Amongst American Muridæ the simplification of the pattern of molars has been attained in two ways: (1) by a more or less complete suppression of 1, 2, 3, accompanied by a predominance of the four cusps 4, 5, 6, 7, notably the two former; so that the crown of m. 2 remains essentially composed of four cusps; (2) by a more or less complete suppression of 2 and 3, whilst 4, 5, 6, 7 are equally somewhat reduced in dimensions, whereas 1 is rather increased; at any rate it has obtained quite or almost the dimensions of 4 and 5. Of both molars Hensel and Winge have figured examples. To the latter belong such genera as *Sigmodon* (*hispidus*), *Holochilus* (*vulpinus*), and the *Neotominæ*. Whilst in the former there exists a notable difference in form and size between m. 1 and m. 2, as in the *Hesperomyinæ* with more complicated molars[3], in the latter m. 1 tends to become more similar to m. 2.

Of the first type, viz. brachyodont, bunodont molars, with essentially only four tubercles, I have found no parallel amongst living Malagasy Rodents; but I discovered in the lower deposits of the "Children's Cave," near Sirabé (Central Madagascar), some jaws belonging to this type; these will be dealt with on a future occasion. To the second type belongs, amongst Malagasy Rodents, *Brachyuromys*; and from other parts of the Old World,

[1] Pal. Ind. *l. c.* p. 108. [2] Rec. Geol. Surv. Ind. xi. 1878, p. 101.

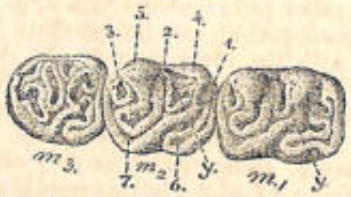
[3] Of course, as was shown so long ago as 1873 by Hensel, there are all possible transitions to be found between the simple and the more complicated molars.

Tachyoryctes (in a lesser degree *Rhizomys*), *Spalax*, and *Siphneus*. In the great agreement between m. 1 and m. 2, there is a decided approach of *Neotominæ* to all these Old World forms; there are species of *Neotoma*[1] in which scarcely any difference between m. 1 and m. 2 can be found. Of course this character, common to the two groups, may be partly the result of both having hypselodont molars.

One important character in the skull shows that the Old World Muridæ under consideration are on a lower level than the *Neotominæ*. With the exception of *Spalax* they all have the jugal greatly developed and approaching the lachrymal, whereas in *Neotominæ* the jugal is extremely reduced.

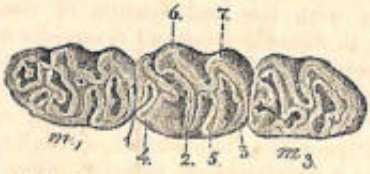
Of the *Hesperomyinæ* with a more complicated pattern there are likewise parallels in Madagascar, viz. *Hallomys*[2] and *Nesomys*. These two genera will be more fully described on a future occasion; but I append here a short characteristic of the dentition of the latter. I consider these complicated molars to be a more primitive condition than the simpler form, for reasons which will be fully discussed further on.

Fig. 3.



Right upper molars of *Nesomys rufus*.

Fig. 4.



Right lower molars of *Nesomys rufus*.

The molars of *Nesomys* figured in the text (text-figs. 3 & 4) represent the youngest stage I have been able to procure. In this stage of wear the teeth are half-tuberculate, the outer tubercles in upper, and the inner tubercles in lower molars being more cuspidate than the inner tubercles of upper and the outer ones of lower molars. In this as well as in other respects they approach nearer to such forms amongst *Hesperomyinæ* as "*Hesperomys squamipes*,"[3]

[1] C. Hart Merriam, "A new Subfamily of Murine Rodents—the *Neotominæ*," Proc. Acad. Nat. Sci. Philadelphia, 1894, p. 240, fig. 5 *a*, *b*.

[2] Since the above was written, I have seen in Leyden the type specimens of *Hallomys audeberti*, Jent., which proves to be a species of *Nesomys*.

[3] Hensel, *l. c.* pl. i. fig. 24, pl. ii. fig. 14.

"*Nectomys squamipes*,"[1] "*Hesperomys dorsalis*,"[2] "*Hesperomys tumidus*."[3] As in the *Hesperomyinæ* just mentioned, cusps 2 and 3 are well developed in *Nesomys*, and had younger stages been at hand, these cusps would have probably shown to be as independent from 4 and 5 as they are in Winge's fig. 12 *a*.

A feature common to the upper and lower molars of *Nesomys*, as compared with *Hesperomyinæ*, is a reduction in size of the cusps 4 and 5, and a corresponding increase in size and greater independence of the adjoining parts, of what I consider to be the homologue of the "intermediate" cusps of *Sciuroides*, *Pseudosciurus*, and of many, especially the older Placentals. Of this more will be said below, when m. 1 sup. of *Nesomys* will be discussed as compared with the same tooth of *Murinæ*.

Another distinguishing feature of the upper molars m. 1 and m. 2 of *Nesomys*—in which, by the way, they approach somewhat to the *Murinæ*, as well as in the greater development of the intermediate cusps—as compared with the *Hesperomyinæ*, is the lesser degree of symmetry between the anterior and the posterior part of the molars (see m. 1). In the *Hesperomyinæ* the enamel-fold, penetrating from the inner side (in upper molars), is separated from the anterior valley (*x* in text-figs. 1 & 2, p. 707) by a ridge—apparently the homologue of the intermediate cusp—connecting the outer cusp 4 with the inner cusp 6. In *Nesomys* the interspace formed by the enamel-fold mentioned is confluent with the anterior valley, thus separating cusp 6 from connection with the outer cusp 4, or rather with the intervening intermediate cusp (*y*, fig. 3)—a state of things which is only arrived at in much worn molars of *Nesomys*; whilst in this respect *Brachyuromys betsileoensis* agrees with the *Hesperomyinæ*.

Obviously, the formation of transverse ridges in molars by means of a fusion of the outer with the inner cusps (*lophodonty*) is brought about with the participation of the "intermediate" cusps, which, e. g. in *Pseudosciurus* and *Sciuroides* amongst Rodents, are as yet independent. This holds good with regard both to upper and lower molars.[4] These "intermediate" or "secondary" cusps, Osborn's "*protoconule*" and "*metaconule*," are generally considered to be of secondary importance, viz. later additions to the crown, because as a rule they are inferior in size to the outer and inner cusps. When this is *not* the case, they are liable not to be recognized, and such appears to have been the case with regard to the *Murinæ*, amongst others. Winge derives the Murine molar from the Hesperomyine type, by supposing that in the former the outer cusps (of upper molars) have increased in size as compared with the latter, and that by so doing they have pushed the inner

[1] Winge, 'Gnavere Lagoa Santa,' pl. iii. fig. 12 *a*.
[2] Hensel, *l. c.* pl. ii. figs. 16, 26.
[3] Hensel, *l. c.* pl. iii. figs. 20, 30.
[4] Besides, these intermediate cusps connect the two principal transverse ridges in the molars of *Brachyuromys betsileoensis* (not so in *B. ramirohitra*), as a result of which connection we obtain the interspace (fold) on the inner side of upper, and on the outer side of lower molars, a widespread feature in Mammalian molars.

cusps forwards [1]. The small cusps outside from the large "outer" cusps he supposes to be a new addition in *Murinæ* [2]. Now, it is possible to show with the help of the *Nesomyinæ* (1) that these supposed new additions of *Murinæ* are the homologues of the outer cusps 4 and 5 of *Hesperomyinæ* and *Nesomyinæ*, which in *Murinæ* atrophy to a certain extent as compared with the two former groups. And (2) that those cusps which in *Murinæ* Winge considers to be 4 and 5 are in reality the intermediate cusps, which in this subfamily have acquired a considerable size [3].

As regards the anterior upper molar (m. 1) in *Murinæ*, the anterior side of this tooth is tripartite, whereas it is bipartite in *Hesperomyinæ*, which last present three *internal* cusps against two in the former subfamily [4]. The clue for an understanding of the homologies is afforded by some of the *Nesomyinæ*, by young *Brachyuromys betsileoensis* (Pl. XXXIX. fig. 7 *a*), and more than all by *Nesomys* (text-figure 3). The comparison with *Nesomys* shows that the middle part of the tripartite anterior side of the Murine m. 1 is an intermediate cusp strongly developed; the outer part is cusp 1, more developed than in m. 2; the internal

[1] Vidensk. Meddel. fra d. Naturh. Foren. i Kjöbenhavn for Aaret 1881, Kjöbenhavn, 1882, p. 27.

[2] *L. c.* p. 27: "idet hver af dem" (*i. e.* ydre Knolde), "paa sin Yderside afsætter en lille Knold, der dog ikke er skilt fra Moderknolden."

[3] Some years ago Prof. Osborn arrived at the conclusion that these median cusps in the upper molars of *Mus* are homologous with the "intermediate" cusps in other Placentals (H. F. Osborn, "The Rise of the Mammalia in North America," *l. c.* p. 19). He considers this to be a victorious argument against my own views, being, according to what he states (*l. c.* p. 18), an "evidence that the multitubercular molar instead of being primitive was derived from the tritubercular"; and farther on (p. 19), that "the molars of the mouse (*Mus*), and of certain kangaroo-rats (*Dipodomys* and *Perognathus*), illustrate beautifully the recent stages between trituberculy and multituberculy, showing that the intermediate tubercles of *Mus* (also common in other Placentals) give rise to the intermediate or third multituberculate row." However, in such of the Muridæ in which these "intermediate" cusps are somewhat less developed (e. g. *Nesomys*), or more or less suppressed (e. g. several *Hesperomyinæ*, *Cricetus*, *Mystromys*), we do not for that reason find a nearer approach to tritubercular forms.

I am quite prepared to concede to Prof. Osborn that some of the features common to the molars of *Allotheria* and of *Murinæ* may have been independently acquired in each. One might even suggest that the whole of the outer series of cusps in the upper molars of *Allotheria* are the homologues of the outer series 1, 2, 3 of Winge, and, as a consequence, that the second range in the *Allotheria* corresponds to 4, 5 of Winge (paracone and metacone of Osborn); in that case the internal range of the former would be the homologue of the intermediate cusps of more modern Mammals. It would further follow that Cope's and Osborn's protocone (Winge's 6), absent in the *Allotheria*, is in reality a later addition, as has been suggested by Winge; so would also be the postero-internal cusp (Winge's 7), in which last assumption Winge agrees with Cope, Osborn, etc. With the materials at present available, such a supposition could be neither proved nor disproved for the moment.

More to the point is, that the "intermediate" cusps of *Mus* are "also common in other Placentals," and especially in (geologically speaking) older forms; and that they are present not only in the "Laramie Multituberculates," but as well in several of those molars which have been comprised by Osborn under the denomination of "Laramie Trituberculates." (*Cf.* pl. viii. of "Fossil Mammals of the Upper Cretaceous Beds," *l. s. cit*)

[4] In several *Murinæ* there is an additional small postero-internal cusp.

part is the antero-internal cusp 6, which, together with 7, appears always shifted forwards in *Murinæ*, as was assumed by Winge [1]. In *Hesperomyinæ* cusp 6 stands opposite the outer cusp 4; it is the median of the three internal cusps of m.1; the anterior one is the homologue of the intermediate cusp, above mentioned, of *Murinæ*, which in *Hesperomyinæ* occupies a more internal position. In *Nesomys* (text-fig. 3) this intermediate cusp occupies the same position as in *Murinæ*, but it is much less developed than either in *Murinæ* or in *Hesperomyinæ* [2]. Owing to the smaller size of this cusp and to its position on the anterior side of the tooth, the formation of an anterior fold, *i. e.* "interspace," between this intermediate cusp anteriorly and cusp 6 posteriorly, which we have in *Hesperomyinæ*, is not arrived at in *Nesomyinæ*. The antero-internal cusp, 6, occupies in the latter about the same position as in the former; it is much less shifted forwards than in *Murinæ*.

Lower Molars of Nesomys.—With regard to the lower molars in *Hesperomyinæ* and *Nesomys*, there can be no doubt as to which are the two principal internal cusps. The posterior internal cusp, 3, is sometimes rather strongly developed in *Hesperomyinæ*, just as in *Brachyuromys*; in other members of the group it is reduced as compared with 4 and 5, just as in *Nesomys*. In the *Hesperomyinæ* the median crest, corresponding to 2, either remains rather independent, reaching the inner side, but still with the tendency to cling to the antero-internal cusp; or it is more or less intimately connected with the postero-internal cusp, 5. In the latter case we find an enamel islet as remainder of the original separation [3]. In *Nesomys* the median crest becomes fused, near the inner side, with the posterior part of the antero-internal cusp, 4; a configuration to which there is an approach in those *Hesperomyinæ*, "*H. ratticeps*," [4] "*H. longicaudatus*," [5] "*H. nasutus*," [6] *H. subterraneus*," [7] in which the usually independent crest leans against the antero-internal cusp.

In both *Hesperomyinæ* and *Nesomys* the principal outer cusps, 6 and 7, are internally connected by a small longitudinal crest, from which the median transverse crest, 2, starts inwards at right angles. In *Brachyuromys betsileoensis* the aforesaid small longitudinal crest is likewise present, which explains the formation in this species of two creeks, an outer and an inner one, corresponding to the transverse valley in *B. ramirohitra*. In unworn teeth of *Br. betsileoensis* the median transverse ridge, 2, starting at right angles from the longitudinal crest, is equally to be seen; it

[1] Considering the backward inclination of the intermediate and external cusps of *Murinæ*, whilst the inner cusps remain upright, it might be questioned whether the latter have shifted their place forwards, or not rather the former backwards.

[2] This is one of the reasons for the great similarity between m.1 and m.2 in this as well as in the other *Murinæ*, as compared to what we find in the two subfamilies just mentioned.

[3] See the figures in Hensel, *l. c.*

[4] Hensel, *l. c.* pl. i. fig. 25 *b*.

[5] *Ib.* pl. ii. fig. 28 *b*.

[6] *Ib.* pl. iii. fig. 29 *b*.

[7] *Ib.* pl. iii. fig. 31 *b*.

connects itself, as often in *Hesperomyinæ*, with the postero-internal cusp 5, with which it becomes fused at an early date (in another Malagasy genus, *Gymnuromys*, it remains independent).

Nor is the antero-internal cusp, 1+4, simple, although it is undivided in *Brachyuromys*. In the *Hesperomyinæ* it presents itself frequently as a simple cusp, but in several forms, "*H. ratticeps*," [1] "*H. longicaudatus*," [2] "*H. tumidus*," [3] it appears as composed of two parts separated by an enamel islet—an anterior smaller cusp (Winge's 1, Osborn's *paraconid*), and a posterior larger cusp (the antero-internal cusp, 4). In *Nesomys* the original compound structure of this cusp (1+4) is likewise shown, in moderately worn molars, by an enamel islet; and in very young *B. betsileoensis* it is foreshadowed by a slight depression of the enamel.

From this comparison of the lower molars of *Nesomys* with those of *Brachyuromys betsileoensis* and *Hesperomyinæ*, it results that the molars of the former approach closer to certain forms of *Hesperomyinæ* in the conformation of their pattern, the latter to others. The internal enamel-folds remain for a longer time open on the inner side in the teeth of *Brachyuromys* and several *Hesperomyinæ* than in *Nesomys*. In the relative positions of outer and inner cusps *Brachyuromys* differs from some other *Hesperomyinæ*. In both *B. betsileoensis* and *B. ramirohitra* the postero-internal cusp, 5, stands directly opposite the interspace (inlet) dividing the two outer cusps (6 and 7), so that it comes to alternate with the latter, as in "*H. vulpinus*," [4] *H. squamipes*" [5]; in these same *Hesperomyinæ* and in *Brachyuromys* 3 is more developed, whilst 2 is atrophied. In other *Hesperomyinæ* the principal outer and inner cusps are almost opposite each other, as in *Nesomys*. *Brachyuromys* agrees more with "*H. vulpinus*" [6] and "*H. arenicola*?" [7] (the former is somewhat hypselodont; the fig. of the latter presents a much worn molar); *Nesomys* with "*H. ratticeps*," [8] "*H. longicaudatus*," [9] "*H. subterraneus*" [10]. The form of "*H. squamipes*" [11] agrees with both of them.

As was pointed out above, a still more advanced atrophy of 1, 2, and 3 leads us to such simple forms amongst Muridæ as *Cricetus*, *Mystromys*, "*Hesperomys expulsus*," [12] "*Habrothrix lasiurus*," [13] "*Hesp. nasutus*," [14] in which the pattern of the crown shows essentially only four cusps. Winge is doubtful whether the presence or the absence of the "transverse ridge" between the outer cusps, 4, 5, in upper, and the inner cusps in lower molars is the primitive condition in Muridæ; adding, "its presence in *Sminthus*, *Scirtetes*, and several other low Rodents leads to the assumption that this condition is the primitive one in Muridæ; whereas the absence of this 'transverse ridge' in the lowest

[1] Hensel, *l. c.* pl. i. fig. 25 *b*. [2] *Ib.* pl. ii. fig. 28 *b*. [3] *Ib.* pl. iii. fig. 30 *b*.
[4] Hensel, *l. c.* pl. i. fig. 23 *b*. [5] *Ib.* pl. i. fig. 24 *b*. [6] *Ib.* pl. i. fig. 23 *b*.
[7] *Ib.* pl. ii. fig. 27 *b*. [8] *Ib.* pl. i. fig. 25 *b*. [9] *Ib.* pl. ii. fig. 28 *b*.
[10] *Ib.* pl. iii, fig. 31 *b*. [11] *Ib.* pl. i, fig. 24 *b*.
[12] Winge, 'Gnavere fra Lagoa Santa,' pl. ii. fig. 4 *a*.
[13] *Ib.* pl. ii. fig. 11 *a*.
[14] Hensel, 'Beitr. Kenntn. d. Säugeth. Süd-Bras.' pl. iii. figs. 19, 29.

known of Muridæ, as *Cricetodon* and *Cricetus*, would point to the opposite assumption "[1].

These two genera are considered by Winge to be amongst the lowest of Muridæ, on account of the greater agreement in size of their m.1 and m.2; m.1 being more elongate in the *Murinæ*[2]. To these views of Winge I have to object:—(1) The molars of some of the species of *Cricetodon* show the transverse ridge in question. Winge refers[3] to the figures of *Cricetodon* given by Gervais[4], who figured worn teeth. With regard to the Tertiary Muridæ comprised under this generic denomination, the case stands thus:—In the older forms, e. g. *Cricetodon cadurcense*, Schloss.[5], from the Quercy, not only the middle transverse ridge, ending in 2, but also 1 and 3 are present, as they are likewise present in *Eumys*[6] (which does not seem to differ much from *Cricetodon*, both being very similar to the less simple molars of many *Hesperomyinæ*). Besides, we find in *Cricetodon cadurcense* a primitive feature of m. 1 which is almost identical with m. 2. In the more recent species of *Cricetodon*, from the Middle Miocene of Steinheim and La Grive Saint-Alban, I observe a greater approach to *Cricetus*; m. 1 is larger and more complicated as compared with m. 2, and the accessory crests of all the molars tend to disappear.

(2) In the Malagasy Muridæ the difference in size between m.1 and m.2 is even less, and their agreement in form greater than in *Cricetus*, *Cricetodon*, and the *Hesperomyinæ*, which is one of my reasons for regarding them as more primitive Muridæ than the above-named. And still we have found 1, 2, and 3 to be present in molars of young *Brachyuromys betsileoensis*. In other Malagasy Muridæ, to be described on a future occasion (*Nesomys*, *Gymnuromys*, *Brachytarsomys*), they are still more evident, and not in the least limited to young stages[7].

(3) In the Tertiary such simple forms of molars as exhibited by *Mystromys*, *Cricetus*, "*Hesper. expulsus*," and "*Habrothrix lasiurus*" are not known. The latter two, apart from the pattern of their molars, agree in all the rest with the other *Hesperomyinæ* (having more complicated molars) than with *Cricetus*. The latter genus is apparently derived from some such form as *Cricetodon* by a greater reduction of its molars, just as the *Hesperomyinæ*, with simpler constructed molars, appear to be derived from those with more complicated teeth. With reference to its teeth I have therefore recently called *Cricetus* a terminal form amongst Muridæ[8].

Winge has, in this conjunction, urged the similarity of the m.2 of *Cricetus* with other Mammalia[9]. I know of no greater agree-

[1] 'Gnavere fra Lagoa Santa,' p. 11; and footnote 6, p. 151.
[2] "Om græske Pattedyr," Meddel. Naturh. Foren. i. Kjöbenhavn, 1881; 'Gnavere fra Lagoa Santa,' pp. 123, 124.
[3] "Om græske Pattedyr," *l. c.* p. 22.
[4] Zool. Pal. franç. pl. 46. fig. 3.
[5] *L. c.* pl. xii. (viii.) figs. 28, 35.
[6] Leidy.
[7] In the same way the Dipodine *Zapus*, in which m.1 and m.2 are of absolutely the same conformation and size, shows likewise 1, 2, and 3 well developed.
[8] P. Z. S. London, 1896, p. 980.
[9] Meddel. Naturh. Foren. 1881, p. 26; 'Gnavere fra Lagoa Santa,' p. 11.

ment than with the molars of Cercopithecidæ, which Winge himself declares to be anything but primitive [1].

As the same author considers the Muridæ to be a terminal group—and in this I certainly agree with him—I cannot see how we would have to explain the sudden appearance in them of a primitive molar form (that of *Cricetus*, according to Winge). All the other "*Cricetini*," in their more complicated molars, come nearer to the "*Anomaluridæ*" than does *Cricetus*. *Pseudosciurus* and *Sciuroides* are considered by Winge himself to be the most primitive amongst *Anomaluridæ*. Now the mesial "transverse ridge" is present in *Sciuroides* as well as in *Trechomys*, &c., although in the molars of the former it does not reach so far inwards (in upper molars) or outwards (in lower molars) as it does in *Trechomys* [2].

Summary.

The Malagasy *Muridæ* have, by common accord, been placed amongst the "*Cricetinæ*" ("*Sigmodontinæ*"); this is true in a general sense, at least with regard to the great majority of them.

In the foregoing pages I have tried to define more precisely their position, as well as their relationships with *Muridæ* from other regions. Although the present paper deals essentially only with one genus, and though it will be necessary for me to take the Malagasy Rodents (forming, as I consider, a special subfamily, the *Nesomyinæ*) up again as a whole, when all the forms will have been fully worked out, I could not, for comparison's sake, avoid anticipating somewhat the future publication, by throwing side-glances on some of the other genera.

The Malagasy Rodents have to be considered as the lowest of the *Muridæ*—lower even than the Miocene members of the family, so far as these are known,—because in cranial and dental characters they approach more than any other *Muridæ* such more primitive groups of Rodentia as the *Dipodidæ* and Winge's *Anomaluridæ*. These characters are: large infraorbital foramen —well-developed jugale—absence of advanced hypselodontism—intermediate cusps of molars less reduced than in *Hesperomyinæ* and in Old World *Cricetinæ*, and external cusps (of upper molars) less reduced than in the *Murinæ*—greater agreement in pattern and size of m. 1 and m. 2 than in other *Muridæ*; very often all three molars agree with each other.

If I had to regret that in my excavations I came upon but scanty remains of extinct fossil Mammalia, I have had some compensation by these *living* fossils. Were any justification necessary for having divided my time between neontological and palæontological exploration, this result would amply justify my proceeding.

[1] 'Jordfundne og nulevende Aber (Primates) fra Lagoa Santa, &c.,' Kjöbenhavn, 1895 ("E Museo Lundii"), p. 40. "Hvis Simiinernes Kindtænder vare fremkomne af *Tænder saa lidt oprindelig som hos Cercopitheciner . . .*" (The italics are mine.)

[2] The comparison of the molars of *Sciuroides* with those of *Pseudosciurus* shows that the outer termination (in upper molars) of this "transverse ridge" is nothing but the ancient outer cusp, 2, of *Pseudosciurus*.

The light which the investigation of the Malagasy Rodentia has thrown on their relatives outside the Island has been somewhat unexpected to me. From what Peters had noted concerning the affinities of one of the genera [1] and from other considerations, I was prepared to meet with the nearest and perhaps the only close affinities amongst the American *Hesperomyinæ*. These affinities certainly exist, and I have endeavoured to put them in their true light. However, other affinities, apart from those just mentioned, are very remarkable.

The genus *Brachytarsomys*, which, as stated on a former occasion [2], stands somewhat apart from the other Malagasy Rodents, proves to be a forerunner of the *Microtinæ*. It is, however, certainly not a member of the genus *Microtus*, nor of any of the other genera included in the subfamily; it cannot even, in my opinion, be placed within this subfamily, for it lacks the specializations which characterize the latter. Apart from the molars being not only rooted, but even perfectly brachyodont, neither the last upper nor the first lower molar show any additional increase to the normal Muridine form; the skull, too, differs from the Microtine cranium in all the characters, which in these are the direct outcome of the increased vertical size of the molars and the adaptation to a subterranean life. But otherwise the teeth as well as the cranium (size and shape of the jugal, form of the rostrum, of the outer wall of the infraorbital foramen and of the foramen itself, general conformation of the upper region of the skull and its crests) are precisely such as we might expect them to have been in the forerunners of the *Microtinæ*.

Next as to the genus *Nesomys*. The large size and breadth of the foramina incisiva, and, what is still more to the point, the large size of the infraorbital foramen, and the strong development of the jugal—which characters this genus shares with most of the other Malagasy Rodents—show it to be a very low member of the *Muridæ*, approaching the *Dipodidæ*. The two anterior molars, agreeing in size and general form with each other, tell the same tale. The intimate structure of the molars, as compared with the *Hesperomyinæ* and the *Murinæ*, might induce us to consider *Nesomys* as a connecting-link between these two groups. But the relationship to them will be more rightly expressed by considering it to be ancestral to both; especially if we bear in mind that the characters of both the cranium and teeth are less specialized than in the two subfamilies mentioned.

The present paper deals chiefly with a third genus, *Brachyuromys*. Its affinities with some fossorial Rodents, viz. *Tachyoryctes* from Abyssinia, *Rhizomys* from the Oriental Region, *Spalax* and *Siphneus* from the Palæarctic, have been fully discussed, and as one of the results these four genera are classed amongst the lowest *Muridæ*. Retirement under the earth and adaptation to fossorial habits have done for these four genera what isolation has done for

[1] Sitzungsber. Ges. naturf. Freunde Berlin, Oct. 18, 1870, pp. 54, 55. See also P. Z. S. 1896, p. 978.
[2] P. Z. S. 1896, p. 979.

Brachyuromys &c., *i. e.* the preservation of primitive types of *Muridæ*[1]. Theirs is a parallel to that of the African insectivorous family *Chrysochloridæ*, as compared with the more generalized memebrs of the Malagasy family *Centetidæ*.

Whilst the somewhat closer agreement with *Brachyuromys* than with the rest of Malagasy Rodents may in the case of *Rhizomys*, *Spalax*, and *Siphneus* be due to the circumstance that in each the molars are hypselodont (though in a much lesser degree in *Brachyuromys*), the case seems to be different with regard to *Tachyoryctes*. This latter is in the pattern of its molars almost identical with one of the species of *Brachyuromys* (*B. ramirohitra*).

The mutual relations of the *Hesperomyinæ*, *Microtinæ*, *Murinæ*, and *Spalacidæ* with each other and with the Malagasy *Nesomyinæ* have thus to a certain extent been cleared up by a better acquaintance with the latter.

EXPLANATION OF THE PLATES.

Plate XXXVII.

Fig. 1. Skull of *Brachyuromys betsileoensis* (Bartl.): fig. 1, side view; 1 *a*, from below; 1 *b*, from above; 1 *c*, front view.
2. Skull of *B. ramirohitra*, Maj.: fig. 2, side view; 2 *a*, from below; 2 *b*, from above; 2 *c*, front view; 2 *d*, side view of mandible.
3. Skull of *Tachyoryctes splendens*, Rüpp.: fig. 3, side view; 3 *a*, from below; 3 *b*, from above; 3 *c*, front view.

All figures nat. size.

Plate XXXVIII.

Different views of the skull of *Rhizomys sinensis*, Gray. Nat. size. Fig. 1, side view; fig. 2, from above; fig. 3, from below; fig. 4, from behind; fig. 5, oblique view of left infraorbital foramen; fig. 6, postero-superior part of left mandible, from behind.

Plate XXXIX.

Figs. 1 *a*–8 *a*. Upper molars of *Brachyuromys* and *Tachyoryctes*, enlarged.
1 *b*–8 *b*. Lower molars of ditto.
1 *a*–3 *b*. *Brachyuromys ramirohitra*, Maj.
4 *a*–4 *b*. *Tachyoryctes annectens*, Thos.
5 *a*–6 *b*. *T. splendens*, Rüpp.
7 *a*–8 *b*. *Brachyuromys betsileoensis* (Bartl.).

Plate XL.

Figs. 1 *a*–7 *a*. Upper molars of various species of *Rhizomys*, enlarged.
1 *b*–9 *b*. Lower molars of ditto.
1 *a*–3 *b*. *Rhizomys badius*, Hodgs.
4 *a*, 4 *b*. *R. pruinosus*, Blyth.
5 *a*–6 *b*. *R. sumatrensis* (Raffles).
7 *a*–8 *b*. *R. sinensis*, Gray.
9 *b*. *R. sivalensis*, Lyd.

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[1] Still more striking instances amongst Rodentia of adaptation as a preserver of primitive types are afforded by the *Aplodontidæ* and the *Leporidæ*, both of them very primitive Rodent families showing the curious combination of some very specialized features with their primitive characters.

June 15, 1897.

Dr. St. George Mivart, F.R.S., V.P., in the Chair.

The Secretary read the following report on the additions to the Society's Menagerie during the month of May 1897.

The registered additions to the Society's Menagerie during the month of May were 199 in number. Of these 63 were acquired by presentation, 22 by purchase, 65 in exchange, 7 were born in the Gardens, and 42 were received on deposit. The total number of departures during the same period, by death and removals, was 113.

Amongst these special attention was called to:—

1. A fine collection of West-Indian and North-American Reptiles, presented by Mr. R. R. Mole, C.M.Z.S., May 11th, 1897.

2. Two Blue Penguins (*Eudyptula minor*), from New Zealand, purchased May 21st. Only one example of this elegant little Penguin has been previously received by the Society.

Dr. G. H. Fowler, on behalf of the Zoological Museum at University College, exhibited the unique specimen of a Crab (*Carcinus mænas*) recently described by Dr. Bethe, which carried a right thoracic leg on the left half of the sixth abdominal segment.

Mr. Keith exhibited some lantern-slides of the Orang-outang, lately living in the Society's Gardens. He pointed out that the Orang assumed the same posture as man in sleep, prone upon its side, with its arms and legs folded on its belly, one hand over and one hand under its head, and that the hair was arranged to afford the animal protection while it was in that posture. The hair upon the body and limbs formed together a continuous thatch for the animal while it slept. This explanation accounted for the transverse direction of the hairs upon the distal portions of the leg, foot, forearm, and hand. He was unable to verify the distinction Dr. Walker Kidd had drawn between the human and anthropoid types of hair-arrangement on the limbs. In the Orang, as in man, there was a distinct line of division between the dorsal and ventral hairs on the body, the line running from the groin to the axilla and some way on to the thigh below and the arm above. This line might be called the inguino-axillary line of division. While the meaning of this "hair-shed" in man was obscure, its explanation was perfectly evident in the Orang. Along that line, the thigh and arm were folded on the belly, the hair on the body dorsal to that line being, in the sleeping posture, continuous with the hair on the thighs and arms, while ventral to the line the hair was grouped round the umbilicus.

The present animal had died of acute disseminated tuberculosis, the primary seat of infection being probably in the intestines,

which had shown many small tubercular ulcers. The spleen and lungs, and especially the glands of the mesentery, were also infected.

Mr. Oldfield Thomas, F.Z.S., gave an account of the Mammals obtained by Mr. John Whitehead during his recent expedition to the Philippines, and read some field-notes upon them by the collector.

This memoir will be printed in the Society's 'Transactions.'

The following papers were read:—

1. On the Presence of Ribs in *Polyodon* (*Spatularia*) *folium*. By Prof. T. W. Bridge, D.Sc., F.Z.S.

[Received May 21, 1897.]

The ordinary text-book and other references to the presence or absence of costal elements in the skeleton of this Chondrostean Ganoid leave much to be desired on the score of precision, and not infrequently are diametrically opposed one to another on matters of fact.

Thus, for example, in that excellent store-house of zootomical knowledge, the 'Handbuch der Anatomie der Wirbelthiere' of Stannius (Aufl. 2, 1854, "Die Fische") there occurs the following passage:—"In den wesentlichsten Verhältnissen zeigt *Spatularia* sich übereinstimmend mit *Accipenser*; nur fehlen die Rippen, oder werden vielmehr durch ligamentöse Stränge vertreten, die an der Basis knorpelige Elemente enthalten" (p. 21). Subsequently, in a footnote (p. 31) it is stated, "Harte Rippen fehlen bei *Spatularia*."

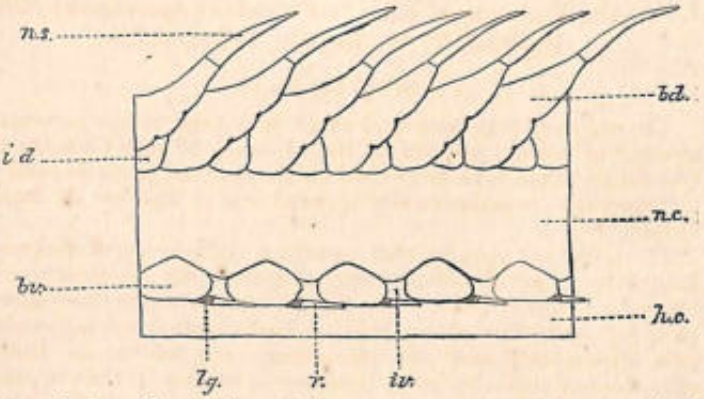
On the other hand, Günther ('The Study of Fishes,' 1880), in referring to the skeleton of the Ganoids, remarks:—"Ribs are present in most, but replaced by ligaments in *Polyodon*" (p. 75).

Again, Wiedersheim, in his 'Comparative Anatomy of Vertebrates' (English translation by Newton Parker, 1886), says, "The ribs of fishes show a very primitive condition usually extending along the whole length of the vertebral column (Lophobranchii, *Spatularia*)" (*l. c.* p. 48). In the same work a figure representing a lateral view of a portion of the vertebral column of *Polyodon* is given (*l. c.* fig. 21, p. 35), but no costal elements are indicated. The same author, in his larger treatise, 'Lehrbuch der vergleichenden Anatomie der Wirbelthiere' (1886), referring to the same point, remarks:—"Bei Knochenfischen, z. B. bei Lophobranchiern, sowie auch bei Ganoiden (*Spatularia*), können die Rippen vollständig fehlen" (*l. c.* p. 80).

Finally, Vogt and Yung, in their 'Lehrbuch der praktischen vergleichenden Anatomie' (1889–94), refer to the absence of ribs in *Chimæra*, many Rays, the Lophobranchii, and *Spatularia* (Bd. ii. p. 534).

In one or two works (Huxley's 'Anatomy of Vertebrated Animals,' p. 139, and the 'Text-book of Zoology' by Boas [English transl. by Kirkaldy and Pollard, p. 361]) statements occur which imply the absence of ribs in *some* existing Ganoids, and, as there is no question as to their presence in *Acipenser*, *Polypterus*, *Amia*, and *Lepidosteus*, the statements in question presumably refer to *Polyodon*. In others, again, no mention is made of the presence or absence of ribs in *Polyodon*, although references to the corresponding structures in *Acipenser* are sufficiently frequent.

These quotations are sufficient to prove that the question of the presence or absence of ribs in *Polyodon* has been the subject of several contradictory statements, and is still involved in no little obscurity.



Lateral view of a portion of the anterior section of the vertebral column of *Polyodon folium*.

bv., inferior vertebral arch or "basi-ventral" cartilage; *bd.*, superior vertebral arch or "basi-dorsal" element; *hc.*, hæmal canal; *id.*, neural intercalary or interdorsal element; *iv.*, inter-ventral or hæmal intercalary cartilage; *lg.*, ligament; *nc.*, notochord; *n.s.*, neural spine; *r.*, rib.

With regard to the actual facts of the case there can be no doubt as to the presence of ribs in *Polyodon*. In a specimen about 40 inches in length I found a series of fifteen simple, filament-like, cartilaginous ribs, commencing anteriorly near the point where the superior vertebral arches first commence distinctly to differentiate themselves from the continuous cartilaginous mass which is formed by the fusion of certain of the anterior arches with the chondrocranium, and terminating a little posterior to the anterior half of the pre-cloacal section of the vertebral column. The third to the fifth ribs, inclusive, are perhaps the longest, being about 7 mm. in length and about 1 mm. in thickness. The first and second are a trifle shorter, but behind the fifth the ribs rapidly decrease in size until the hindermost of the series are less than 1 mm. in length, being, in fact, simple nodules of cartilage. Each rib (fig., *r*) is rather loosely connected by ligament (*lg.*) with the hinder extremity of a longi-

tudinal ridge on the lateral surface of the basal or proximal portion of an inferior vertebral arch or "basi-ventral" cartilage (*bv.*). From its point of attachment the rib is directed obliquely backwards and a little outwards, slightly overlapping the succeeding "interventral" or hæmal intercalary cartilage (*iv.*), and extending into the ventral edge of one of the fibrous septa separating two successive myotomes of the body-wall. Hence it follows that in the latter part of their course the ribs are situated immediately external to the peritoneal lining of the subjacent cœlomic cavity, as in other Ganoids and in Teleosts. No trace of ossification could be detected in any of the ribs.

In two or three instances the cartilage of a rib was broken up into two or more separate nodules, as if undergoing fragmentation as a preliminary to suppression.

Polyodon therefore possesses a series of distinct but fully developed and wholly cartilaginous ribs, in substantial agreement with the account originally given by Stannius, but apparently overlooked by every subsequent writer.

When *Polyodon* is compared with its nearest living ally, *Acipenser*, the differences in the relative development of their costal elements are very striking. In the latter Ganoid, as is well known, nearly all the pre-cloacal "basi-ventrals" possess ribs, comparable both in size and in their relations to the cœlomic cavity to the normally developed ribs of other Ganoids and most Teleosts, and of these the majority are more or less well ossified, only a few of the more diminutive posterior ones being reduced to the condition of simple cartilaginous rods or filaments. In *Polyodon*, on the contrary, the ribs are restricted to about one-half of the normal costiferous region of the vertebral column, and to this may be added their relatively minute size and wholly cartilaginous condition.

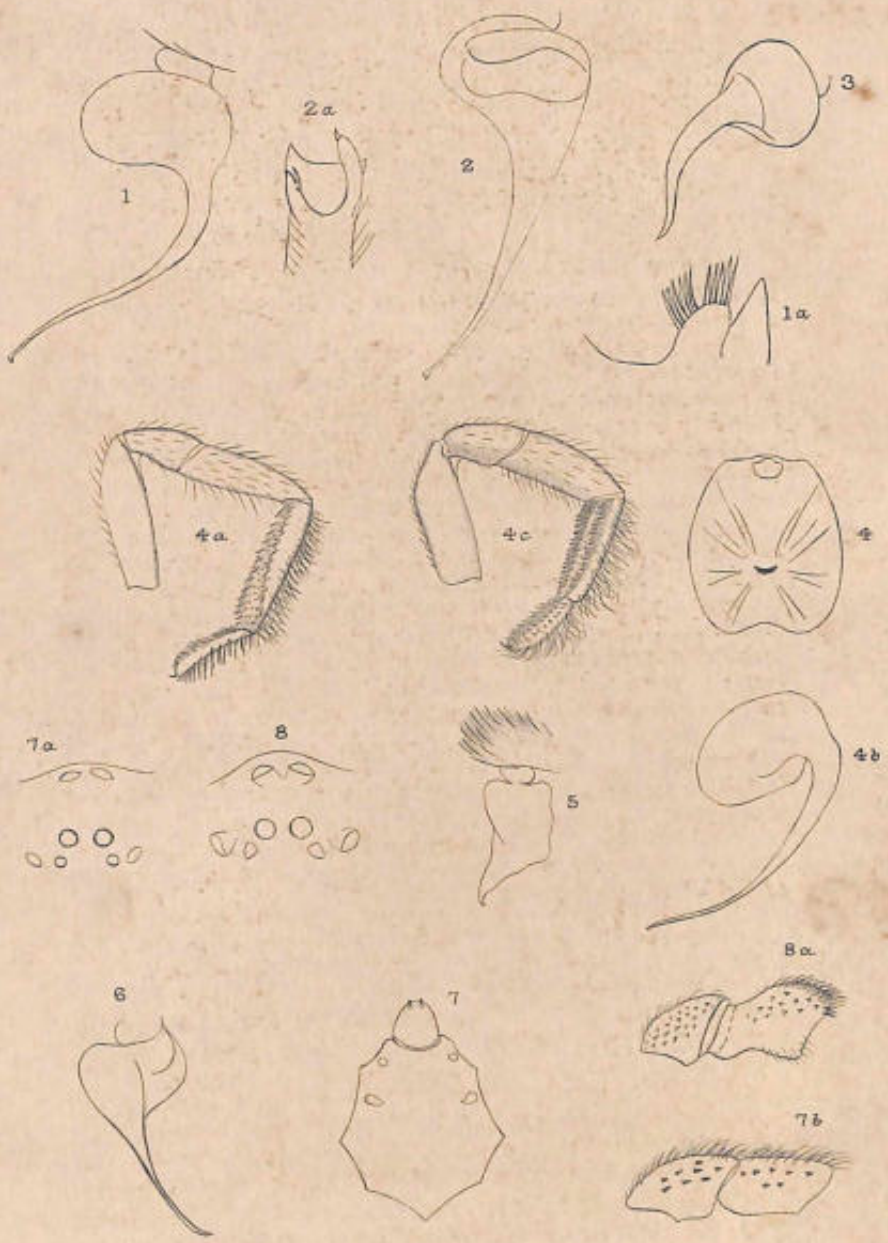
How far it is permissible to regard the ribs of *Polyodon* as incipient, nascent, or rudimentary elements, or as degenerate and vestigial structures, is by no means easy to determine with certainty, but their obvious uselessness, and especially their occasional tendency to undergo fragmentation, strongly suggest the probability of the latter alternative.

2. On the Spiders of the Suborder Mygalomorphæ from the Ethiopian Region contained in the Collection of the British Museum. By R. I. Pocock, of the British Museum (Nat. Hist.).

[Received June 2, 1897.]

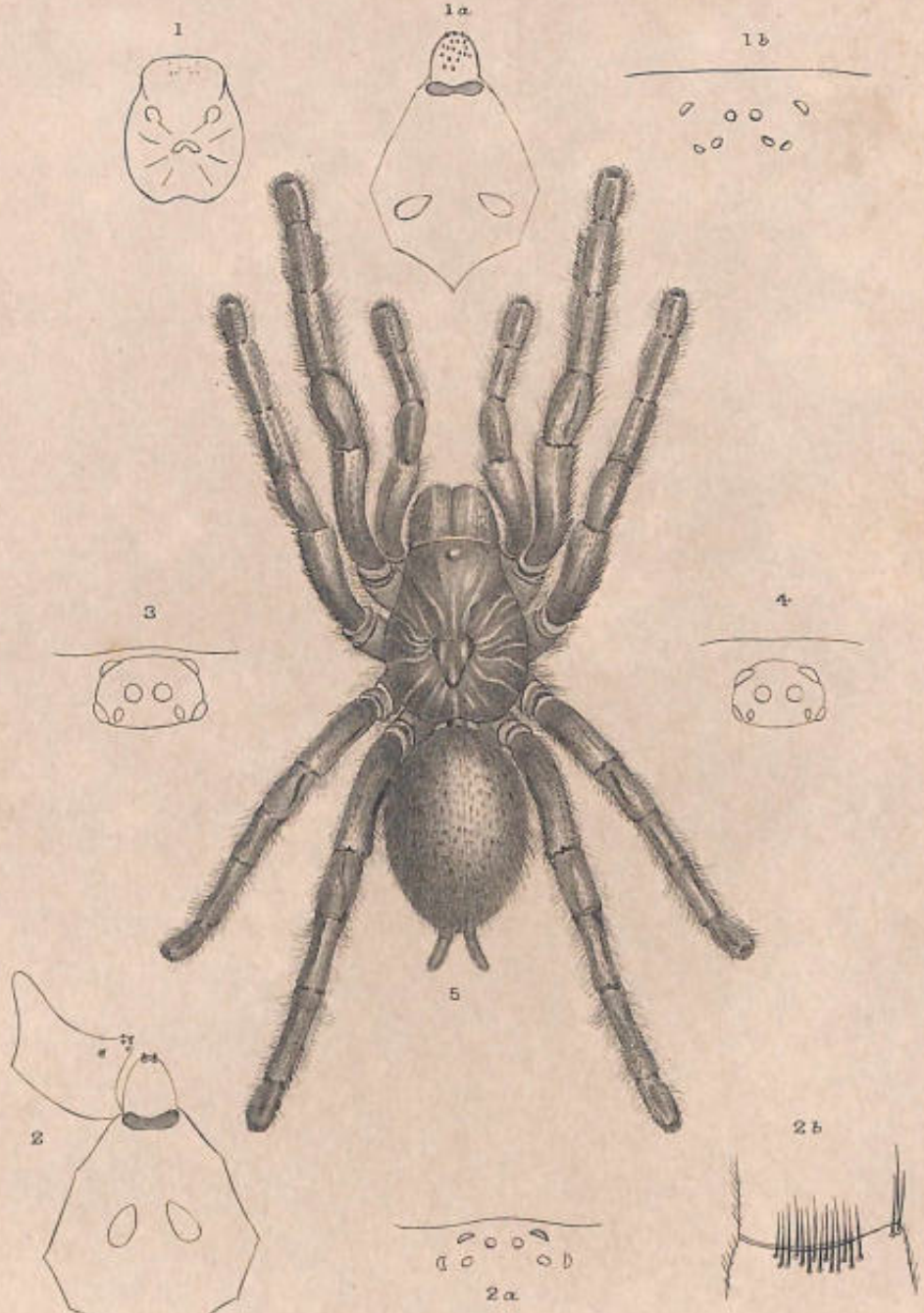
(Plates XLI.–XLIII.)

This paper, based upon the material contained in the collection of the British Museum, deals with those species which are usually known as Trap-door Spiders and with the larger kinds of hairy



F.O.Pickard-Cambridge del et lith. West, Newman imp.

Tropical African Mygalomorphæ.



F.O.Pickard-Cambridge del et lith.

West Newman imp.

Tropical African Mygalomorphæ



F.O.Pickard-Cambridge del et lith

West, Newman imp.

Tropical African Mygalomorphæ

species so frequently spoken of in a comprehensive sense as '*Mygale*.' These belong to the suborder to which I have elsewhere applied the name *Mygalomorphæ*, and differ from the vast majority of other spiders in possessing two pairs of lung-sacs, instead of one pair of lung-sacs and a pair of tracheal tubes, and in the circumstance that the mandibles project horizontally forwards, instead of vertically downwards, and that the fang closes almost longitudinally, instead of obliquely, backwards. The African species presenting these features appear to me to be conveniently referable to four families, each containing a considerable number of genera and each in its broad outlines easily distinguishable from the rest; though, as is the case in almost all the groups of this rank within the order Araneæ (Spiders), not to mention other divisions of the Animal Kingdom, genera occur in each family which more or less partake of the characters of one or more of the others and makes the task of drawing a hard-and-fast line between the groups a task of no little difficulty. This consideration has induced Mons. Simon, and following him Dr. Thorell, to look upon all the genera mentioned in this paper, as well as many others from different geographical areas, as belonging to a single family. But it appears to me that the sections here recognized as families and subfamilies have a greater value, and are more easily defined than M. Simon's families *Theridiidæ* and *Argiopidæ*, and all the subfamilies of the latter, the diagnostic features of which he has not attempted to express in tabular form.

The families may be recognized as follows:—

a. Tarsi with only two claws on the legs, but furnished on each side of them with a dense tuft of hairs (ungual tufts).

a'. The terminal segment of the posterior spinning-organs long; mandible without any apical setiform spines forming a 'rastellum' ..... THERAPHOSIDÆ.

b'. The terminal segment of the posterior spinning-organs short and obtuse; mandible usually with a set of stout spiniform setæ forming a 'rastellum' ..... BARYCHELIDÆ.

b. Tarsi with three claws and almost always no ungual tufts.

a². Posterior spinners long and slender like those of the Theraphosidæ, but longer; the anterior spinners more widely separated; lower edge of mandible with a single internal row of teeth, as in the Theraphosidæ and Barychelidæ; no rastellum on mandible. DIPLURIDÆ.

b². Posterior spinners shorter and thick, the anterior adjacent: mandible armed below with two rows of teeth.

a³. Mandible long, projecting as in the preceding families, with the fangs closing almost straight backwards; furnished with a rastellum either in the form of setiform spines or of a spine-tipped process; thoracic fovea usually strongly procurved. (Ground Trap-door Spiders.) ..... CTENIZIDÆ.

b³. Mandibles short, curving abruptly downwards; the fangs short, stout, and closing more obliquely inwards; not armed with a rastellum; thoracic fovea strongly recurved. (Tree Trap-door Spiders.)..... .... MIGIDÆ.

So far as the habits of these families are known they afford some clue to the structural differences. The Ctenizidæ and Migidæ, belonging to the group of Trap-door Spiders, are of heavy build and adapted to a sedentary life; but while the former dig their burrows in the ground and are furnished in consequence with the armature of spines on the mandible, known as the rastellum, the latter spin their tubes on the trunks of trees, taking advantage of some suitable depression in the bark, or, with their strong mandibular fangs, biting away roughnesses and inequalities to form a level surface, and chipping off pieces of lichen or bark wherewith to conceal the silk. The Dipluridæ, on the contrary, spin snares in the form of horizontal sheets of webbing, which lead at one extremity into a silken tubular retreat; and since the livelihood of these species depends upon the agility with which they dart upon insects that fall upon the web, their light build and long slender legs become at once intelligible. The Barychelidæ live in burrows in the ground, and some of them make trap-doors like those formed by the Ctenizidæ. Many of the Theraphosidæ too dig tubes in the soil, but the tube is never closed by a door; while others of this section live in trees, spinning a silken domicile in the hollow trunks, in forked branches, or in rolled leaves.

Family Ctenizidæ, Thorell.

Ctenizoidæ, Thorell, Ann. Mus. Genova, xxviii. p. 394, 1889–1890 (—*Diplura*, &c.).

The known African genera of this family may be distinguished as follows:—

a. Eyes forming a single cluster on the fore part of the head, being arranged in two transverse lines; maxilla (basal segment of palp) furnished with a longer process at its distal end, only armed with a few basal teeth; sternum with a pair of sigilla (scars) remote from the margin and opposite the coxæ of the 3rd pair of legs.—(Subfam. Ctenizinæ.) ..... *Stasimopus*.

b. Eyes forming two clusters, a pair situated close together in the middle line upon the border of the carapace; the remaining six some distance behind; maxilla with a smaller distal expansion, toothed all along the anterior edge; sternum with two pairs of sigilla close to the margin and opposite the bases of the 1st and 2nd legs.—(Subfam. Idiopinæ.)

a'. Tibia of 3rd leg not excavated above at the base ..... *Acanthodon*.

b'. Tibia of 3rd leg distinctly excavated above at the base. *Heligmomerus*.

Mons. Simon refers *Stasimopus* to a subfamily, the Actinopodinæ, which contains in addition the genus *Actinopus* from the Neotropical Region and *Eriodon* from Australia. In my opinion there is very little evidence that the three are related. In the first place, *Stasimopus* does not possess the square maxilla found in the other two, this segment being no wider than the other coxæ and nearly twice as long as wide, though it possesses a longer distal process

than most of the genera of Ctenizinæ. It has, moreover, only a pair of submedian sternal sigilla, like, for example, *Pachylomerus*. And in the second place, though *Eriodon* possesses the nearly square maxilla, its sternal impressions or sigilla are quite different from those of *Actinopus*, numbering 4 pairs placed about halfway between the centre and the margin, increasing in size from before backwards, the anterior pair, representing apparently those that define the labium in *Stasimopus*, and corresponding to the palp, being small, close to the middle line and behind the base of the labium; whereas in *Actinopus* the sternal sigilla are indistinct, their inner extremities more or less running together to form a central depression on the sternum. Setting aside for the moment, however, the question as to the relationship between these two genera, it will, I think, be quite safe to remove *Stasimopus* from their vicinity and leave it in the subfamily *Ctenizinæ*.

Subfamily Ctenizinæ.

Genus Stasimopus, Simon,

Hist. Nat. Araignées, i. p. 81 (1892).

This genus was based upon the species described by C. Koch as *Actinopus caffrus* from S. Africa (Die Arachn. ix. p. 98). It contains the following three forms:—

Stasimopus caffrus, C. Koch, Die Arachniden, ix. p. 98, fig. 751 (described as *Actinopus caffrus* from the Cape of Good Hope).

Stasimopus rufidens, Ausserer, Verh. z.-b. Ges. Wien, 1871, p. 160 (described as *Cyrtocarenum rufidens* from Natal).

Stasimopus natalensis, O. P. Cambridge, P. Z. S. 1889, p. 35, pl. ii. fig. 1 (described as *Pachylomerus natalensis* from Natal).

Unfortunately the figures published by C. Koch and Mr. Cambridge are so discrepant that no one would suppose them to represent the same genus, the width of the carapace in *caffrus* being only equal to the length of the cephalic area, whereas in *natalensis* and the specimens of the genus known to me the width is nearly as great as the length. Nevertheless there is, I think, but little doubt that the two are congeneric, very possibly co-specific.

Moreover, on geographical grounds it seems probable that *rufidens* is also co-specific with *natalensis*, and there is nothing in the descriptions to discredit such a belief. It may consequently be assumed, at all events provisionally, that this is the case.

Stasimopus rufidens (Ausserer).

? Syn. *Actinopus caffrus*, C. Koch, *loc. cit.*
" *Cyrtocarenum rufidens*, Ausserer, *loc. cit.*
" *Pachylomerus natalensis*, Cambridge, *loc. cit.*

The British Museum possesses a single adult ♀ of this species,

recently received from Estcourt in Natal, 4000 ft. (*Guy A. K. Marshall*).

Mons. Simon (Hist. Nat. Araignées, i. p. 96) referred the species *natalensis*, Cambr., as well as *rufidens*, Auss., to the genus *Cyrtocarenum*. My surmise, however, that *natalensis* is referable to *Stasimopus* has been kindly verified by Mr. F. Cambridge, who examined the type at my request and furnished me with some notes respecting the inaccuracy of the figure and other matters, *e. g.* the claw-armature of the legs.

STASIMOPUS OCULATUS, sp. n. (Plate XLII. figs. 2–2*b*.)

Colour of carapace dark chestnut; legs and mandibles darker, the latter with copper-red hairs near the extremity.

Carapace longer than wide, its length almost equal to that of the patella, tibia, and protarsus of the 1st leg, excelling those of the 2nd, almost equal to the tibia, protarsus, and tarsus of the 4th; ocular area wide, width of posterior row equal to length of 1st protarsus and 4th tibia; eyes of front line slightly procurved, equidistant, the lateral larger than the median, distance between the median a little greater than their diameter; posterior line much wider, a line parallel to the long axis of the body and touching the outer edge of the anterior laterals would pass between the median and posterior laterals, nearer to the laterals but not touching them; posterior laterals larger than anterior medians; distance between anterior medians and posterior medians a little more than twice as great as distance between posterior medians and posterior laterals.

Mandible with its lower margin covered with granules, armed with 4 strong external teeth, 3 strong internal teeth, and one or two smaller ones.

Labium conical, with a pair of teeth. *Maxillæ* with a few basal teeth amidst the hairs. *Sternum* with a single pair of submedian sigilla; widest posteriorly opposite the coxæ of the 4th leg.

Legs 4, 1, 3, 2; patella and tibia of 4th equal to patella and tibia and one-third of the protarsus of the 1st; tarsi and protarsi of 1st, 2nd, and palp very closely and thickly studded with short spines; tibia of palpi with a few longish spines intermixed with hairs on the inner side, thickly spiny externally like the postero-inferior surface of these segments on the 1st and 2nd legs; tibia of 1st leg armed internally in its distal half with a cluster of over 12 spinules, tibia of 2nd with about 6 spinules in the same position; on the 3rd leg there are a few scattered spicules on the anterior aspect of the patella and a few on the tibia in front and behind; protarsus with a broad band of them in front and another behind, and a tuft of spiniform setæ at the distal end below; tarsus with a few spicules in front and behind; 4th leg not spined posteriorly; patella with a thick cluster of spicules in its basal half above; tibia and protarsus with scattered spines in front, protarsus with a posterior distal cluster of spiniform setæ; tarsus spiny in front. Tarsus of 3rd and 4th legs rather thickly hairy;

tibia of 4th also covered in front with a thick coating of silky red hairs. Claws of 1st, 2nd, and 3rd legs armed with a single long tooth and one short one. Claws of 4th leg unarmed.

Measurements in millimetres. Total length 30; length of carapace 13; width of posterior line of eyes 4·5; length of palp 16·5, of 1st leg 22, of 2nd 20·5, of 3rd 21, of 4th 27; length of 4th protarsus 6, of 1st protarsus 4·7.

Loc. Bloemfontein in the Orange Free State.

A single female example with its trap-door nest was received from Dr. Exton.

The door of this nest is thick with bevelled edge, being 37 mm. (almost $1\frac{1}{2}$ inches) from side to side, and 30 mm. ($1\frac{1}{6}$ inch) from hinge to the opposite border; the bore of the tube one inch from the aperture is about 23 mm. ($\frac{1}{2}\frac{1}{2}$ of an inch).

This species and the Natal form identified as *rufidens*, Auss., may be determined as follows:—

a. Width of the ocular area (posterior line of eyes) almost equal to the protarsus of 1st leg, and about three-quarters the length of the 4th protarsus; length of carapace almost equal to length of patella, tibia, and protarsus of 1st leg, greater than the same segments of the 2nd; protarsi of 3rd and 4th legs with apical tuft of spinules beneath	*oculatus*, sp. n. (Bloemfontein).
b. Width of ocular area (posterior line of eyes) equal to only about two-thirds of the protarsus or tibia of the 1st leg, and less than half the 4th protarsus; length of carapace just excelling the length of the patella, tibia, and half the protarsus of the 1st leg, less than these three segments of the 2nd leg; protarsi of 3rd and 4th legs without inferior apical tuft of spinules	*rufidens*, Auss. (Natal).

Subfamily IDIOPINÆ, nov.

Idiopeæ of Simon, Hist. Nat. Araignées, i. p. 89 (1892)[1].

Genus HELIGMOMERUS, Simon,

Hist. Nat. Araignées, i. p. 90 (1892).

In addition to the two African species recorded below, this genus contains two described by Simon from S. India and Ceylon.

HELIGMOMERUS SOMALICUS, Poc. (Plate XLI. figs. 8–8 *a*.)

Heligmomerus somalicus, Pocock, Ann. Mag. Nat. Hist. (6) xviii. p. 183 (1896).

A single typical example from the Goolis Mountains, Somaliland (*E. Lort Phillips*).

[1] Of the *Idiopeæ*, M. Simon says that apart from the eye-formula the group presents all the characters of the *Pachylomereæ*; this, however, is hardly in accordance with fact, since in *Pachylomerus* there is a single pair of submedian sternal sigilla corresponding to the 3rd pair of legs, those representing the 1st and 2nd pair being evanescent, whereas in the genera of *Idiopeæ* it is the latter sigilla that persist, the posterior pair having disappeared.

HELIGMOMERUS CARSONII, sp. n.

Closely allied to *H. somalicus*, Poc., but with the ocular area more compact, the posterior lateral eyes separated from the median laterals by a space which is less than the diameter of the latter, and the distance between the anterior median and posterior lateral not nearly twice as great as the distance between the anterior medians; distance between anterior medians equal to nearly twice their diameter; anterior lateral eyes closer to the rest, the tubercles that bear them more widely separated, the distance between them equal to the diameter of an anterior median eye, the oblong area formed by these eyes and the anterior medians a little longer than wide.

Mandible armed below internally with 7 (5 large and 2 small) teeth, externally with 4; *labium* with an irregular marginal series of 4 teeth and about 2 behind it.

Sternal sigilla situated as in *somalicus* but smaller. Spine armature of legs practically as in *somalicus*, except that there is no anterior spine on the tibia of the 4th leg.

Measurements in millimetres. Total length 14; length of carapace 5·5, of palp 7, of 1st leg 9, of 2nd 9·5, of 3rd 9·5, of 4th 12; patella and tibia of 4th 4·8; patella, tibia, tarsus, and protarsus of 1st 6, of palp 5.

Loc. Niomkolo, Lake Tanganyika (*A. Carson*). A single female specimen.

This specimen is perhaps not quite mature, and the differences it presents from the type of *somalicus* may be attributable to differences of age. But since there is no evidence of this fact and since the localities are widely separated, it is right to regard them as of specific value. Briefly the two forms may be distinguished as follows:—

a. Distance between posterior lateral and posterior median eyes at least as great as the diameter of the latter; distance between anterior median eyes about equal to their diameters; the tubercles bearing the anterior lateral eyes close together, the distance between them less than the diameter of an anterior median eye ..... *somalicus*, Poc.

b. Distance between posterior lateral and posterior median less than the diameter of the latter; distance between anterior medians greater than their diameter; ocular tubercles separated by a space which about equals the diameter of an anterior median eye ..... *carsonii*, sp. n.

Genus ACANTHODON, Guérin.

Guérin, Rev. Zool. 1838, p. 10; Simon, Hist. Nat. Araignées, i. p. 91 (1892).

ACANTHODON MEADII (Cambr.).

Idiops meadii, Cambridge, Proc. Zool. Soc. 1870, p. 152, pl. viii. fig. 4.

A single specimen (*type*) from East Africa (*Capt. Speke*).

ACANTHODON THORELLII (Cambr.).

Idiops thorellii, Cambridge, *op. cit.* p. 156, pl. viii. fig. 6.

A single example (*type*) from S. Africa.

ACANTHODON LACUSTRIS, sp. n. (Plate XLI. figs. 7–7 *b*.)

♀.—*Colour*. Carapace and mandibles deep brown; legs clearer, more castaneous, but the distal half, that is to say from the patella to the tarsus of the palpi and first two pairs, almost piceous, and contrasting strongly with the pale colour of the femora.

Carapace about as long as the patella and tibia of the 4th leg, excelling those of the 1st leg by about half the length of the protarsus; cephalic area not very strongly elevated, depressed behind the ocular cluster; anterior median eyes separated by a space equalling above twice their diameter, the space between these and the posterior laterals greater than that; posterior medians only a little smaller than anterior medians, separated from each other by about three diameters and from the posterior laterals and anterior medians by a space which a little excels their diameter; a line running parallel to the long axis of the body and touching the outer rim of the anterior medians would pass through the centre of the posterior medians; posterior laterals long, elliptical, but not twice the length of the anterior medians; anterior laterals on a double tubercle, about as wide as the anterior medians, the quadrangle they form being about parallel-sided and rather more than twice as long as wide.

Armature of *mandible* normal; the lower border furnished with about 6 external and 6 internal teeth. *Labium* with 2 teeth; *maxillæ* toothed all up their inner edge. *Sternum* convex from side to side; the sigilla opposite the coxæ of the 1st and 2nd legs, removed from the margin by a space which equals about half their own length.

Femora and patellæ of 1st and 2nd *legs* and *palpi* unspined, though coarsely bristly; tibiæ, protarsi, and tarsi armed externally and internally with numerous spines, shorter above, longer beneath, those on the outer surface of the tibia of the 2nd are long and setiform however, similar spiniform setæ being also observable on the lower surface of the patella and on the distal extremity of the femur of the palp; patella of 3rd with about half a dozen spines in front and one above; tibia with a few spines in front and behind and one or two below; protarsus with two series of spines above and below as well as others round the apex; tarsus with about a dozen spines below and at the sides; patella of 4th with a cluster of spines in its basal half in front, tibia unspined though with a few setiform spines below, protarsus strongly spined in its distal half below; tarsus strongly spined below and at the sides. Claws armed with a single strong tooth.

Measurements in millimetres. Total length 19; length of carapace 9; of palp and of 1st leg 18·8, of 2nd 16, of 3rd 16, of

4th 23; patella and tibia of 4th 8·5, of 1st 7·5; protarsus and tarsus of 4th 8.

Loc. Kinyamholo, Lake Tanganyika.

Two female examples.

The males of the genus *Acanthodon* differ so strikingly from the females that unless taken during courtship it is almost impossible to compare them together. From its distribution *A. meadii* might be the ♂ of *A. lacustris*, but would seem to be considerably too large; for whereas the males of nearly all spiders are smaller than the females, the type of *meadii* exceeds that of *lacustris*, the carapace measuring 12 mm. in length as compared with 10·5. Allowing for differences owing to drying, the eye-formula seems to be practically the same in the three species. The male of *thorellii* may, however, be at once recognized from that of *meadii* by having the carapace smooth instead of coarsely granular, and by its much smaller size, the carapace measuring only about 4 mm. in length.

The following two species are unknown to me:—

Idiops compactus, Gerstaecker in Von der Decken's Reisen in Ost-Africa, iii. ii. p. 484 (1873), based upon a female example from Dafeta (Kilimanjaro), is referable either to the genus *Acanthodon* or *Heligmomerus*.

Idiops aussereri, Simon, Bull. Soc. Zool. France, 1876, p. 223, from Landana on the Congo, is compared with *A. meadii*, Cambridge; but said to differ from all the known species of *Idiops* in possessing *six* (instead of four) spinning-mammillæ !!

The following genera and species from Africa belonging to the Ctenizidæ are unknown to me:—

Acontius hartmanni, Karsch, SB. Ges. nat. Fr. Berlin, 1879, p. 64. Loango.

Aporoptychus africanus, Simon, Act. Soc. L. Bordeaux, xlii. p. 405 (1889). Landana, Congo.

Ancylotrypa fossor, id. loc. cit. p. 406, Landana, Congo; and *spinosa*, p. 407, Port Elizabeth.

Cyrtauchenius zebra, Simon, Ann. Soc. Ent. France, lxi. p. 272 (1893). Zululand.

Homostola vulpecula, id. loc. cit. p. 271. Zululand.

Hermacha caudata, id. Act. Soc. L. Bordeaux, xlii. p. 408. Delagoa Bay.

Spiroctenus personatus, id. loc. cit. p. 409. Delagoa Bay.

The first of these, namely *Acontius hartmanni*, is not satisfactorily diagnosed for classification. The second and third, namely *Aporoptychus* and *Ancylotrypa*, are referred by Simon to the section *Aporoptychew* of his subfamily Ctenizinæ, characterized by having the maxillæ nearly square as in *Actinopus* and *Eriodon*, and two pairs of small marginal sigilla opposite the 2nd and 3rd pairs of legs, the terminal segment of the spinning-mammillæ long and acuminate, while all or some of the feet have the claws biserially

dentate. They differ strikingly from the genera known to me; while *Ancylotrypa* is said to differ from *Aporoptychus* in having the labium as wide as long (in *Aporoptychus* it is much longer than broad) and the posterior tarsus spined.

Cyrtauchenius and *Homostola* belong to the Cyrtaucheniæ, which differ from the Ctenizeæ in having the anterior legs scopulate and no angular prolongation for the rastellum on the mandible. *Cyrtauchenius* has the posterior line of eyes wider than the anterior, and the latter strongly procurved; in *Homostola*, on the contrary, the two ocular lines are subequal, the first not strongly procurved, &c.

The remaining two genera, namely *Hermacha* and *Spiroctenus*, fall into the Nemesieæ, which differ from the Cyrtaucheneæ in having the head lower and the thoracic fovea transverse or recurved. In *Hermacha* the claws are furnished with two series of teeth; while in *Spiroctenus* there is but one.

Family Migidæ.

= *Miginæ*, Simon, Hist. Nat. Araignées, i. p. 82 (1892).

Genus Moggridgea, Cambridge,

Ann. Mag. Nat. Hist. (4) xvi. p. 318.

Moggridgea dyeri, Cambr.

Moggridgea dyeri, Cambr. *loc. cit.* p. 318, pl. x.

Of this species the British Museum has one example from Uitenhage, near Port Elizabeth, whence the original specimens were obtained.

Moggridgea abrahami, Cambr.

Moggridgea abrahami, Cambridge, Proc. Zool. Soc. 1889, p. 44, pl. ii. (published in April).

Moggridgea tidmarshi, Lenz, Zool. Anz. xii. p. 578, 1889 (published on Nov. 4).

The British Museum has specimens of this species from Grahamstown, whence they were received together with their nests from the Rev. N. Abraham, who originally forwarded examples of this species to Mr. Cambridge. The typical examples of *tidmarshi* were from the same locality, and since the description of the two forms agree, there is no reason for supposing them to be distinct. Mons. Simon placed this species in the genus *Migas*, the type of which comes from New Zealand; but as I have elsewhere (Ann. Mag. Nat. Hist. (6) xvi. p. 187) stated, I can see no valid reason for regarding it as other than a well marked species of *Moggridgea*.

Moggridgea whytei, sp. n. (Plate XLII. figs. 1–1 *b*.)

Colour of carapace a deep blackish brown, polished; legs indistinctly variegated, the patella and protarsi deeper coloured than the femora, the distal end of the tibia pale blue.

Carapace almost equal to the patella, tibia and protarsus of the

1st leg; clypeus nearly as long as the ocular area; anterior line of eyes slightly procurved, wider than the posterior line; posterior lateral eyes smaller than posterior median; radiating grooves on the carapace represented by shallow depressions, with the exception of a deep pit on each side behind the head.

Mandible armed below with 4 large internal teeth and 4 external, of which 3 are much smaller than the other.

Distal half of *labium* and front half of lower side of *maxilla* armed with strong spicules. *Sternum* broad, its width between the 1st coxæ equal to about half its length; furnished with a single pair of large sigilla remote from the margin and opposite the coxæ of the 3rd leg; *coxæ* of 2nd and 3rd legs armed behind with a cluster of spinules, that on the 3rd greater than that on the 4th.

Legs—1st and 2nd pairs stouter than 3rd and 4th; 4th a little longer than the 1st; tibia of 1st armed internally with 4 spines externally with 8, of which 3 are small and short; tibia of 2nd with 3 in front and 5 behind; protarsus of 1st with 8 larger and smaller behind and 6 in front; protarsus of 2nd with 7 behind and 6 in front; tarsi unspined; 3rd and 4th legs almost without spines, one stout one on the anterior side of the patella of the 3rd and spiniform setæ on the lower side of the 4th protarsus. *Claws* armed with a single long tooth and one or two smaller ones behind it.

Palp short, slender, extending just past the patella of the 1st leg, its tibia armed with 1 outer and 1 inner spine, tarsus with 2 outer and 2 inner spines.

Measurements in millimetres. Total length 15; length of carapace 7, width 6; length of palp 6·5, of 1st leg 11·5, of 2nd 10·8, of 3rd 9, of 4th 13.

Loc. The Nyika plateau 6000–7000 ft., between Lake Nyasa and Lake Tanganyika (*A. Whyte*).

The three species of the genus known to me may be readily recognized by the following table:—

a. Sternum broader in front, its width between the 1st legs equal to about half its length; cluster of spinules on base of 3rd coxa larger than that on the 1st; eyes of anterior line nearly straight, the laterals separated from the edge of the clypeus by a space which is about equal to three diameters; posterior median eye larger than the posterior lateral ..... *whytei*, sp. n.

b. Sternum narrower in front, its width between the 1st legs less than half its length; cluster of spinules on base of 3rd coxa larger than that on the 4th; distance between anterior lateral eye and edge of clypeus less than three times a diameter, the anterior row of eyes being more strongly procurved; posterior lateral eye larger than posterior median.

a'. Eyes smaller and more scattered, the anterior laterals twice their diameter from the edge of the clypeus and three times their diameter from the medians, which are separated by a space equalling twice their own diameter; six spines on the outer side of the tibia and protarsus of 2nd leg; legs more or less parti-coloured ..... *abrahami*, Camb

b'. Eyes larger; anterior laterals about once their diameter from the edge of the clypeus and twice their diameter from the medians, which are separated by a space equalling their diameter; 4 spines on outer surface of tibia and protarsus of 2nd leg; legs uniform in colouring	*dyeri*, Camb.

The following species is unknown to me:—

Moggridgea meyeri, Karsch, Zeits. Naturwiss. (3) iv. p. 384 (1879), from Hantam (S.W. of Cape Colony nearly midway between Cape Town and the Orange River).

Family Dipluridæ.

= *Diplurinæ*, Simon, Hist. Nat. Araignées, i. p. 174 (1892).

The two African genera of this group known to me may be readily recognized as follows:—

a. Tarsi furnished with distinct ungual tufts; claws with a single series of teeth, &c.	*Heterothele*, Karsch.
b. Tarsi without ungual tufts; claws armed with a double row of strong teeth, &c.	*Brachythele*, Auss.

Genus Brachythele, Ausserer,

Verh. z.-b. Wien, 1871, p. 173; Simon, Hist. Nat. Araignées, i. p. 180 (1892).

Brachythele bicolor, sp. n.

Colour. Carapace deep brown, clothed with golden yellow hairs; mandible the same colour, with longitudinal bands of golden hair; legs with femora and lower surface of all the segments blackish, upperside of patella, tibia, and protarsus, especially patella, reddish and contrasting with the dark tint of the rest of the appendage, clothed with yellowish hairs intermixed with blackish setæ; (abdomen crushed); coxæ and sternum infuscate.

Carapace a little longer than patella and tibia of 1st and 4th leg, almost as long as protarsus and tarsus of 4th; fovea a little recurved; tubercle high, anterior line of eyes slightly procurved; the eyes nearly equidistant, the space between the medians less than their diameter, laterals smaller than medians; posterior laterals a little smaller than anterior laterals, their short diameter shorter; the posterior medians perhaps about half the size of the anterior medians.

Mandible armed below with a single inner row of 8–9 teeth; *labium* with a single spicule, very short, with convex bristly border; the sigilla defining it very distinct, meeting in the middle line. *Sternum* oval, the sigilla very distinct, tuberculiform, the anterior two pairs submarginal, the posterior removed from the margin to a space which nearly equals their long diameter. *Maxilla* without stridulating organ; its internal basal portion thickly armed with a large number of clawed spicules.

Legs 4, 1, 2, 3; tarsi and protarsi of 1st and 2nd scopulate to the base, scopulæ more or less scanty but undivided; tarsal scopulæ

of 3rd and 4th divided by a complete band of setæ; protarsi of these legs with only faint traces of scopulæ at their distal ends; *tibiæ* of 1st and 2nd with 1, 1, 2 setiform spines below, tibia of 3rd with 2, 2, 2 setiform spines below and in addition 2 strong spines behind, 2 above and 3 in front; *patellæ* of 1st and 2nd leg unarmed, of 3rd with 2 spines in front and 2 behind; patella of 4th with 1 spine behind; protarsus of 1st and 2nd with 2 spines (3 on 2nd protarsus) beneath amongst the scopular hairs and 1 at apex; protarsus of 3rd armed with 15 spines arranged in rows of 3 each; protarsus of 4th with a large number of irregularly arranged spines. Each claw with two rows of strong teeth.

Palp: femur armed internally at apex with one spine, bristly, patella unspined; tibia armed below with about 7 spines, of which two pairs are at the apex; tarsus scopulate throughout below scantily posteriorly, with one external basal spine.

Posterior spinners more than half the length of the carapace, the apical segment the longest.

Measurements in millimetres. Total length 16; length of carapace 7·5, width 5·5; length of 1st leg 18, of 2nd 16·5, of 3rd 14·5, of 4th 20, of posterior spinner 4·3.

Loc. Durban (*H. A. Spencer*). A single female example.

The only other known S. African species of this genus is *B. capensis* from the Cape of Good Hope, described by Ausserer (Verh. z.-b. Wien, 1871, p. 175). The new species from Durban appears to differ from *capensis*, according to Ausserer's description, in having the 4th tarsus scopulate, in the colouring of its legs, the recurved thoracic fovea, &c.

Genus Heterothele, Karsch,
SB. Nat. Fr. Berlin, 1879, p. 64.

This genus was omitted by Simon from his classification of the *Diplurinæ* as "*invisum et incertæ sedis.*" The genus, however, is highly important, inasmuch as it partakes of the characters of Simon's *Diplureæ* and *Macrotheleæ*, and yet differs from both as well as from all the other genera of the family in possessing ungual tufts.

The tarsi of all the *legs* are weakly scopulate, the scopulæ being divided by a line of setæ; scopular hairs are also visible at the apices of the protarsi. The 3rd claw is distinct except on 1st leg, where it seems to be absent, but there is a very distinct ungual tuft on each side of it as Karsch states. The superior claws are furnished with a single row of teeth; the tibiæ and protarsi of the legs are strongly spined; the tarsi are straight, shorter than the protarsi and not flexible. The tibia of the 1st leg in the male is not spurred, and the spine of the palpal organ is long and slender.

The *thoracic fovea* is subcircular; the *ocular tubercle* wide, the anterior line of eyes almost straight.

The anterior *spinners* are adjacent, the distance between them

about equalling their thickness; the posterior spinners are long and slender, longer than the carapace, the second and third segments about equal and longer than the first; the third segment not flexible.

The *labium* and basal part of *maxillæ* are spinulose; the *sternum* oval with posterior sigilla submarginal.

In the possession of ungual tufts this genus appears to be peculiar in the family Dipluridæ. For the rest it falls into the Diplureæ in having the tarsi and protarsi scopulate, the tarsi unspined, and the anterior spinners close together, and into the Macrotheleæ in having the claws armed with a single series of teeth.

HETEROTHELE SPINIPES, sp. n. (Plate XLI. fig. 6.)

♂. *Colour* (specimen mostly rubbed). Carapace and limbs chestnut-brown, ocular tubercle and mandibles blackish; clothed with yellowish-brown hairs.

Carapace about as long as the patella and tibia of the 3rd leg, less than protarsus of 4th.

Eyes of anterior line very slightly procurved, the medians considerably larger than the laterals, the space between the medians rather greater than their radius, that between the medians and laterals rather less than the radius of the medians; posterior laterals smaller than anterior laterals, space between them about equal to short diameter of posterior laterals; median laterals considerably smaller than posterior laterals, the space between them about equal to half the space between the anterior and posterior medians.

Mandible armed below with 10 teeth, granular behind.

Legs 4, 1, 2, 3, long and slender; segments all normal; patella and tibia of 1st and 4th about equal, protarsus of 4th equal to protarsus and half the tarsus of the 1st; tibia and protarsus of 1st less than tarsus and protarsus of 4th; femora with spiniform setæ above, armed near the tip on the inner side with 1 spine, also 1 outer spine on the femur of the 3rd; patella of 3rd with an anterior and a posterior spine; tibia of 1st with 4 inferior spines (2 apical) and 1 anterior spine; tibia of 2nd with an extra anterior spine; tibia of 3rd and 4th with about 9 spines; protarsi also strongly spined.

Palp projecting past the patella of the 1st leg; its tibia about one-third longer than its patella, sometimes armed with an inferior spine; tarsus short, bilobate and weakly scopulate; the spine of the palpal organ slightly curved, stout basally, slender apically, but a little incrassate just before the tip, which though fine is truncate and very slightly bifid.

Measurements in millimetres. Total length 16; length of carapace 7, width 5·8; length of palp 10·5, of 1st leg 24, of 2nd 21, of 3rd 20, of 4th 26·5; posterior spinner 8.

Loc. Ugogo, German East Africa (*Emin Pasha*). A single male example.

The only other known species of this genus is its type *H. honesta*, Karsch, from Loango (SB. Nat. Freunde Berlin, 1879, p. 64). *H. spinipes* certainly appears to differ from *honesta* in several points. For example, in the latter the spinnerets are shorter than the carapace (6 mm.: 7·2 mm.), and on the tip of the tibia of the 1st leg on the inner side there are some long strong spines.

The only other known Ethiopian members of this family are:—

Macrothele gabonensis, Lucas, Arch. Ent. 1858, p. 382. Gaboon (? generic position).

Diplura longipalpis, Karsch, Zeits. Naturwiss. (3) iv. p. 564. From W. Africa.

Thelechoris karschi, Bösenberg, Jahrb. Hamb. Anst. xii. p. 27, pl. ii. fig. 31 (1895). German East Africa.

These three species are unknown to me. Their generic determination appears to be doubtful.

Family Barychelidæ.

= *Barychelinæ*, Simon, Hist. Nat. Araignées, i. p. 116 (1892).

Genus Eubrachycercus, nov.

Carapace oval, longer than wide; thoracic fovea broad, deep, its extremities procurved; cephalic area moderately elevated, compressed posteriorly, the radiating grooves deep; ocular tubercle moderately high. *Eyes* of anterior line strongly procurved, laterals close to the edge of the clypeus (not including the membranous border of the plate as clypeus), their posterior angles slightly in advance of the anterior border of the medians; distance between the medians almost equal to their diameter, distance between medians and laterals a little greater than diameter of the former; distance between the two laterals a little greater than the diameter of the anterior medians, and nearly if not quite equal to the long diameter of the anterior medians; distance between anterior and posterior medians nearly equal to radius of the former, the posterior medians, being close to the posterior laterals, about half their size, with their short diameter about equal to the radius of the anterior medians, which are a little smaller, area for area, than the anterior laterals; the membranous clypeus at least as long as the long diameter of the anterior lateral eyes, which are separated from each other by a space which a little excels twice their long diameter.

Mandibles with rake consisting of thickened spiniform setæ, intermingled with the normal setæ and overhanging the base of the fang; external surface of mandible naked below; the lower margin furnished with a single row of about 9 teeth and a few granules behind.

Maxillæ with a cluster of clavate granules on their basal inner angle.

Labium much wider than long; with a few (3) serially arranged clavate granules on the distal margin.

Sternum subspherical, almost as wide as long; posterior sigilla submarginal.

Legs elongate and slender; the anterior with scarcely any spines, the posterior somewhat strongly spined; tarsi and protarsi of 1st and 2nd somewhat thickly scopulate, the scopulæ on protarsi extending to the base, though becoming scanty on that of the 2nd leg; tarsal scopula of 1st divided by a very faint line of setæ, of 2nd distinctly divided, of 3rd and 4th divided by a band as broad as the segment, the scopular hairs being visible at the sides; protarsal scopulæ of 3rd and 4th represented by a few hairs intermixed with setæ and spines, scarcely traceable on the 4th. Ungual tufts distinct. Claws armed with a single short series of teeth in their proximal half.

Spinners with basal segment longer than the others taken together; the apical (?retracted) very much shorter than the second, only about one-fourth of its length.

This genus, with the ocular area wider than long, the distance between the lateral eyes not or hardly excelling their long diameter, and with normal mandibles, falls into the section *Leptopelmateæ* of the subfamily *Barychelinæ* of Simon (*cf.* Hist. Nat. Araignées, i. p. 117); and tested by the generic characters of the group published on p. 126, it is related both to *Leptopelma* and *Psalistops*, resembling the latter and differing from the former in having the anterior line of eyes strongly procurved, the posterior median eyes small and about half the size of the posterior laterals; the four anterior tarsi finely, the four posterior very broadly divided, the apical segment of the mammilla very obtuse and shorter than the second, &c., and, if the membranous border be not considered as clypeus, in having the anterior lateral eyes close to the edge of the clypeus. From both, however, it appears to differ in having but three labial teeth, Simon describing the labium of *Leptopelma* and, by implication, that of *Psalistops*, as "*inordinate spinulosa in parte apicali*." It must be remembered, however, that the apparent differences from *Leptopelma* presented by the divisional line of setæ on the tarsal scopulæ may be merely a question of age. Unfortunately, since neither of the genera in question are known to me in nature, I can make no further comparison between them and *Eubrachycercus*.

EUBRACHYCERCUS SMITHII, sp. n. (Plate XLII. fig. 3.)

Colour a uniform ochre-yellow on carapace and limbs; testaceous yellow clouded with black on the upper side of the abdomen.

Carapace sparsely and subserially hairy; as long as the patella and tibia of the 1st and 4th legs and the tibia and protarsus of the 1st leg; less by about half the length of the tarsus than the protarsus and tarsus of the 4th leg.

Legs 4, 1, 2, 3; the 4th considerably the longest, its patella and tibia about equal to those of the 1st; 1st leg without spines

(? 1 at base of protarsal scopula); 2nd leg with one spine at base and another at apex of protarsal scopula; tibia and protarsus of 2nd and 3rd strongly spined, especially in front; the patellæ thickly studded with spiniform setæ; spinuliform hairs on the anterior aspect of the base of the coxæ, especially of the 1st and 2nd legs; tibia of palp spined beneath, its tarsal scopula divided.

Abdomen rather coarsely and sparsely hairy.

Measurements in millimetres. Total length 14: length of carapace 5·5, width 4·5; length of palp 9, of 1st leg 13·5, of 2nd 12·3, of 3rd 11·2, of 4th 17·5.

Loc. Somaliland (*Dr. Donaldson Smith*). A single female example, intermixed with immature and unidentified examples of a species of *Pterinochilus*.

Genus Brachionopus, nov.

Somewhat allied to the preceding, with substantially the same ocular arrangement, but the tubercle situated some little distance from the anterior border of the carapace, the clypeus thus constituted being about equal to half the length of the tubercle. The sternal sigilla are situated as in *Eubrachycercus*, and the labium is only furnished with a few minute granules; the adjacent area on the maxilla being also sparsely granular. *Legs* short and robust; the scopulæ are not broader than the segments, and the tarsal scopula of the palp and of the 1st leg are entire, those of the 2nd and 3rd just visibly divided, that of the 4th more distinctly so; the protarsal scopulæ of 3rd and 4th, though not very thick, extend past the middle of the segment; there are spines on the *legs* and the ungual tufts are exceedingly thick, completely concealing the two claws, which are not toothed. On the mandible there is a scarcely perceptible *rastellum*; some of the hairs being merely thickened and spiniform. The basal segment of the posterior *spinners* is about as long as the other two, and the second is a little longer than the conical apical segment.

Brachionopus robustus, sp. n. (Plate XLII. fig. 4.)

Colour. Carapace and abdomen covered with golden brown hairs; mottled on the abdomen, especially at the sides and below, with blackish; small spots of brighter coloured hairs on the tibiæ and protarsi of the legs, and narrow bands of light coloured hairs at the extremities of the segments.

Carapace oval, cephalic area but little elevated, narrow; about as long as the patella, tibia, and protarsus of the 1st leg, and as the patella, tibia, and half the protarsus of the 4th; longer than the tarsus and protarsus of the 4th.

Legs short and robust; 4, 1, 2, 3; patella and tibia of 1st about equal to those of 2nd; patella of 1st longer than the tibia, much longer than the protarsus; patella of 4th equal to its tibia, shorter than its protarsus; palp without spines; 1st and 2nd legs with a single spine at the apex of the protarsus beneath; tibia of 3rd armed with two spines below and one in front, protarsus with one

spine beneath and four in front; tibia of 4th with two spines beneath and two in front, protarsus with one apical beneath and about five in front; all the spines intermixed with coarse bristles.

Measurements in millimetres. Total length 16·5; length of carapace 8, width 6; length of palp 9, of 1st leg 13·5, of 2nd 12·5, of 3rd 12·3, of 4th 16.

Loc. East London (*H. A. Spencer*). A single female example.

Apart from the characters pointed out in the generic diagnosis, this new Spider differs from *Eubrachycercus* in its much shorter legs, the carapace for example being one half instead of one third the length of the 4th leg, and as long as the patella, tibia, and protarsus of the 1st.

The two may be easily recognized as follows:—

a. Ocular tubercle close to the anterior border of the carapace (not including the membranous edge); ungual tufts not so thick, not concealing the claws, which are distinctly toothed; legs relatively long and slender, scopulæ of anterior pair broad; all the tarsal scopulæ divided, the posterior very broadly; protarsi of posterior legs scarcely scopulate ..... *Eubrachycercus*, nov.

b. Ocular tubercle distinctly removed from the margin; ungual tufts very thick, concealing the claws, which are unarmed; legs short and thick, with narrow scopulæ; protarsal scopula of 3rd and 4th legs extending past the middle of the segment; tarsal scopulæ only finely divided ..... *Brachionopus*, nov.

In addition to *Leptopelma* the two following genera of the family *Barychelidæ* are found in the Ethiopian Region; namely, *Pisenor* and *Cyphonisia*, both described by Simon (Act. Soc. L. Bordeaux, 1889, pp. 409–411); but according to the diagnoses these genera fall into the section *Barycheleæ*, in which the ocular area is at least as long as wide. They both further differ from *Brachionopus* in having the anterior lateral eyes placed upon the anterior edge of the carapace. In some respects *Pisenor* seems to approach very closely to *Eubrachycercus*, but the two are certainly generically distinct, judging by what is said of the eyes of *Pisenor*, seeing that the ocular area of *Eubrachycercus* is transversely oblong, and nearly, if not quite, twice as broad as long.

Cyphonisia differs from *Pisenor*, according to Simon, in having the ocular area narrower in front than behind, and the thoracic fovea lightly recurved instead of transverse, &c.

The following species of these genera have been established:—

Cyphonisia obesa, Simon, Act. Soc. L. Bordeaux, xlii. 1889, p. 409. From the Congo (River Quiliou).

Pisenor notius, Sim. loc. cit. p. 411. From the Zambesi.

P. nigellus, id. ibid. From the Congo (Landana).

P. höhneli, id. Ann. Soc. Ent. France, 1890, p. 125. From Kilimanjaro.

Possibly to the genus *Pisenor* belongs the species described from Moschi as *Idiommata lepida* by Gerstaecker (Von der Decken's 'Reisen in Ost-Afrika,' iii. 2. p. 485).

Family THERAPHOSIDÆ, Thorell (*sensu stricto*).

The classification of the large Spiders referred to in text-books as '*Mygale*,' and known at the present time to systematists as *Avicularidæ* or *Theraphosidæ*, has hitherto proved to be a task of great difficulty and can as yet by no means be regarded as definitely settled. It is needless now to enumerate in detail the steps by which our knowledge of the group has been built up, and to trace the gradual appreciation of the value of characters for grouping the genera into natural assemblages. For practical purposes it will be sufficient to refer back no further than 1892, that is to say to Mons. Simon's latest classification [1], which is a modification and an extension of the one propounded twenty years earlier by Dr. Anton Ausserer [2].

Simon classifies the Aviculariinæ (= Theraphosidæ, Thorell, as adopted by me) as follows :—

a. Scopulæ* of at least the posterior tarsi divided by a line of bristles.	
a'. Tarsal scopulæ of all the legs divided	*Ischnocoleæ*.
b'. Tarsal scopulæ of 1st and 2nd legs undivided.	
a^2. Tarsal scopulæ of 3rd and 4th legs divided	*Chætopelmateæ*.
b^2. Tarsal scopula of 4th leg only divided.	
a^3. Legs armed with numerous spines	*Crypsidromeæ*.
b^3. Legs without spines, except on the tip of the protarsi	*Phlogieæ*.
b. Tarsal scopulæ of all the legs undivided.	
a^4. Legs without spines, or at most a few.	
a^5. Tarsi and protarsi narrower; generally spines at the tip of the protarsi; thoracic fovea generally semilunar	*Selenocosmieæ*.
b^5. Tarsi and protarsi wider; legs not spined; fovea not semilunar.	
a^6. Thoracic fovea minute; anterior legs longer than the posterior	*Paxilothericæ*.
b^6. Thoracic fovea large and deep; posterior legs longer than the anterior	*Aviculariæ*.
b^4. Legs with many spines.	
a^7. Posterior femora internally scopulate; protarsus of 4th pair not scopulate	*Theraphoseæ*.
b^7. Posterior femora not scopulate; protarsus of 4th leg with small scopula.	
a^8. Protarsus of 1st leg thickly scopulate to the base and usually without basal spines	*Eurypelmateæ*.
b^8. Protarsus of 1st leg with scopula not reaching the base; with basal spines	*Homœommateæ*.

* 'Scopula' is the term applied to the pad of velvety hairs that clothes the tarsus and sometimes the protarsus of the appendages.

Thus Mons. Simon's system rests primarily upon the presence or absence of a divisional line of setæ upon the tarsal scopulæ. But when discussing the value of the character as applied both to genera and groups of genera, I have elsewhere [3] remarked :—"If

[1] Hist. Nat. Araignées, i. p. 132 (1892).
[2] Verh. z.-b. Wien, 1871, pp. 122–224, also *op. cit.* xxv. 1875, pp. 125–204.
[3] Ann. Mag. Nat. Hist. (6) xvi. p. 228 (1895).

the young stages of a species in which, when adult, the pads are complete, that is show no median divisional line of normal hairs, be examined, it will be found that at first the tarsi are clothed with setæ, and these later on become intermixed with scopular hairs. As the animal increases in size the scopular hairs increase in number, gradually spreading over the tarsus, and apparently replacing the normal setæ. But the replacement does not take place at a uniform rate all over the foot: on the contrary, the pad, beginning at the sides, encroaches by degrees inwards, and, as a consequence, the last part to remain unoccupied is the middle line of the sole, which retains longest its primitive clothing of setæ. In the second place, it will further be noticed that the tarsal pads do not reach their full development contemporaneously, the order of their appearance corresponding with the order of the legs from before backwards—the first tarsus being covered before the second, the second before the third, and the third before the fourth; so that when the pads upon the first or second legs are complete, those on the fourth, or even the third, may still retain their divisional line" . . . "Hence it follows that the division of the scopulæ *may be* nothing but a sign of immaturity . . ." and a species belonging to section a^5 for example of the above table "will in its early days fall into the Ischnocoleæ, a little later into the Chætopelmateæ, then into the Crypsidromeæ."

Nevertheless, species undoubtedly exist in which one or all of the tarsi retain throughout life the divisional band of setæ; but a study of such of these genera as have been available has convinced me that the groups based upon such a character are largely artificial, and that in a natural classification of the family, within one and the same group genera will be found either with all or none of the tarsal scopulæ divided; a conclusion which might be expected if the law of the growth of the tarsal scopulæ mentioned above be true. For the genera that present a band of setæ on the scopulæ are merely a little less specialized than those that lose them. It is, moreover, interesting to observe that in this character the adults of species of small size often resemble the young of closely-allied but larger-sized species.

In another paper[1] I endeavoured to show that most of the genera inhabiting the Oriental region fall into two families, named respectively the Ornithoctonidæ and Selenocosmiidæ; but it has since appeared to me advisable to reduce these to the rank of subfamilies, and term them Ornithoctoninæ and Selenocosmiinæ.

These subfamilies are based upon the possession of a peculiar form of stridulating organ lying between the mandible and maxilla, but the organ is quite different in the two groups. The genera presenting these organs also agree in a number of other features, not, however, sufficient in themselves to differentiate them from some of the African genera.

The Selenocosmiinæ contain the genera referred by Simon to

[1] Ann. Mag. Nat. Hist. (6) xv. pp. 165–184 (1895).

the Phlogieæ, most of the Oriental genera of his Selenocosmieæ, one genus of his Pœcilotherieæ, and one that would fall into his Ischnocoleæ. The Ornithoctoninæ contain the rest of the Oriental genera of his Selenocosmieæ.

But in addition to the Oriental genera, Mons. Simon referred to the Selenocosmieæ a considerable number of genera from Africa. It is these genera, together with the remaining genus of the Pœcilotherieæ, and several additions that constitute the subject-matter of the following pages.

These genera appear to me to fall into two well-marked sections, as arranged on the synoptical table. The first of these is no doubt a perfectly homogeneous assemblage, comparable to the Ornithoctonini or Selenocosmiinæ of the Oriental Region. The second section seems to me as a whole to be inseparable from the genera inhabiting South and Central America and the Mediterranean district of the Palæarctic Region. I have consequently grouped them provisionally (that is to say, pending a further examination of the S. American forms) as Theraphosinæ. This subfamily is, however, very heterogeneous: but to what extent it will ultimately prove divisible into minor groups must for the present be left an open question. My views respecting the classification of the Theraphosidæ may be briefly epitomised as follows:—

a. With a feathery scopula on the external surface of the mandible.	
a'. A stridulating organ present and consisting of a few enlarged plumose hairs on the mandible set in vibration by short spikes on the adjacent surface of the maxilla; sternal sigilla remote from the margin, &c.	Ornithoctoninæ. Oriental Region.
b'. Without a stridulating organ, or when present one consisting of bristles derived from the oral fringe on the mandible and a cluster of plumose hairs on the maxilla; sternal sigilla marginal, &c.	Harpactirinæ. South and East Africa.
b. Without a feathery scopula on the outer surface of the mandible.	
a^2. A stridulating organ present, and consisting of a cluster of bacilliform spines on the maxilla, and a series of spines or spiniform hairs on the mandible.....	Selenocosmiinæ. Oriental Region and Australia.
b^2. Without any stridulating organ between the mandible and maxilla	Theraphosinæ. Tropical and Subtropical America, Madagascar, Ethiopian Region, Mediterranean area of Palæarctic.

These sections may be compared with Simon's "groups" as follows:—

Ornithoctoninæ (=Selenocosmieæ in part).
Harpactirinæ (=Selenocosmieæ in part).

Selenocosmiinæ (=Selenocosmieæ in part, Pœcilotherieæ in part, Ischnocoleæ in part, and Phlogieæ).

Theraphosinæ (=Selenocosmieæ in part, Pœcilotherieæ in part, Ischnocoleæ in part, Chætopelmateæ, Avicularieæ, Theraphoseæ, Eurypelmateæ, Homæommateæ).

The Ethiopian genera known to me may be recognized by the following characters:

a. Outer surface of the mandible furnished above with a thick scopula or pad of feathery hairs; (tarsal scopulæ entire; claws not toothed; anterior tibia of male with a single curved spine-tipped spur; posterior sternal sigilla marginal).—Subfamily Harpactirinæ.

a'. Thoracic fovea very deep and nearly circular, circumscribing a central tubercular prominence, as in the Central American genus *Sphærobothria*; mandible and spinners as in *Pterinochilus* ..... *Ceratogyrus*, nov.

b'. Thoracic fovea normal, transverse.

*a*². Inner surface of mandible without feathery scopula; no stridulating organ, the inner surface of the maxilla between the oral fringe and the suture sparsely beset with simple setæ, the adjacent area on the mandible without rows of modified bristles; apical segment of posterior spinners longer than the second... *Pterinochilus*, nov.

*b*². Inner surface of mandible with feathery scopula above; with stridulating organ, the area on the maxilla mentioned above bearing a thick cluster of notes in the form of feathery hairs, the adjacent area on the mandible below the external scopula with at least one series of modified setæ; apical segment of posterior spinners shorter than the second ... *Harpactira*, Auss.

b. Outer surface of mandible not furnished with scopula of plumose hairs, at most sparsely beset with normal bristles.—Subfamily Theraphosinæ [1].

*a*³. Thoracic fovea forming a round or transversely elongate pit.

*a*⁴. Protarsi and tibiæ of legs armed with many strong spines; protarsal scopulæ scanty, not extending to the base of the segment on the legs of the 1st and 2nd pairs; scopula of 4th tarsus divided by a complete band of setæ; anterior tibia of male without spur ... *Miaschistopus*, nov.

*b*⁴. Leg with at most a few small spines at apex of tibiæ and protarsi beneath; protarsal scopulæ thick, extending to base of segments on legs of 1st and 2nd pairs; scopula on tarsus of 4th leg entire, or at most weakly (*Scodra*) divided in the adult.

*a*⁵. Sternal sigilla submarginal; ocular area wide; without spines on the tibiæ of legs; scopulæ broad and very thick; legs and body thickly hairy; claws with a few small teeth; anterior tibia of male without spur ..... *Scodra*, Becker.

[1] For another and more natural grouping of the genera of this section, see Supplement, p. 773.

b^5. Posterior sternal sigilla remote from the margin; ocular cluster compact; a pair of apical spines on the lower side of the tibiæ of all the legs; scopulæ narrower; body and limbs normally hairy; claws not toothed.

a^6. Tibia of 1st leg in male with a single spur tipped with two bunches of spines (patella and tibia of 4th leg not longer than those of 1st) ..... *Monocentropus*, nov.

b^6. Tibia of 1st leg in male unarmed (patella and tibia of 4th leg longer than those of 1st) ..... *Anoploscelus*, nov.

b^5. Thoracic fovea small, linear, crescentically procurved.

a^7. Tibiæ and protarsi of legs, especially those of the 3rd and 4th pairs, strongly spined; scopula of 4th tarsus divided by a distinct band of setæ; claws toothed; posterior sternal sigilla submarginal; male with a pair of tibial spurs ..... *Selenogyrus*, nov.

b^7. Tibiæ and protarsi of legs, with the exception of a few spines at the apices below, unspined; tarsal scopula of 4th leg (except in *Enmenophorus*) undivided; claws not toothed; posterior sternal sigilla remote from the margin; male without tibial spur (? in *Enmenophorus*).

a^8. Protarsal scopula on 4th leg almost absent; tarsal scopula of 4th divided by a broad band of setæ ..... *Enmenophorus*, nov.

b^8. Protarsal scopula of 4th leg distinct and entire; tarsal scopula of 4th thick and undivided.

a^9. Protarsal scopula of 4th covering only the distal third of the segment; (palp of male extending nearly as far as the apex of the tibia of the 1st leg) ..... *Phoneyusa*, Karsch.

b^9. Protarsal scopula of 4th extending almost to the base of the segment; (palp of male extending only just past the end of the patella of the 1st leg) ..... *Hysterocrates*, Simon.

The following genera are unknown to me:—

Pelinobius, Karsch (Jahrb. Hamb. Wissen. Anst. ii. p. 135, 1885), was based upon a male specimen named *muticus*, from Masailand, which, according to Karsch, differs from *belandana* (♀), the type of *Phoneyusa*, in wanting the apical spines upon the inferior surface of the tibia of the 4th leg. Simon, however, when comparing *Pelinobius* with *Harpaxotheria* (= *Phoneyusa*), states as differential characters of the former, firstly, that the posterior median eye is nearer the anterior median eye than it is to the posterior lateral, and secondly, that the protarsal scopula of the 4th leg is narrower than the segment. But it is not stated that these observations are based upon the type-species. Anyhow, the genus, if distinct from *Phoneyusa*, will fall under the section a^9 of the above table.

Loxomphalia, Simon (Act. Soc. Linn. Bordeaux, 1889, p. 412),

will apparently come under heading b^5, being related in all probability to *Monocentropus* and *Anoploscelus*, but certainly differing in that the legs are without spines, and the protarsal scopula of the 4th leg extends almost to the base of the segment, as in *Hysterocrates*, near which Mons. Simon places it. There is a single species named *rubida*, which was obtained inland of Zanzibar.

Solenothele, Simon (Ann. Soc. Ent. France, 1891, p. 297), based upon a female, named *decemnotata*, from the Upper Congo. Seeing that the length of the specimen is given as only just over 16 mm., there is strong presumptive evidence that it is immature, and therefore no stress is to be laid upon the division of all the tarsal scopulæ by bands of setæ. Similarly with the colouring from which the specific name is taken, the young of many species of this group, e. g. *Avicularia*, being spotted on the abdomen.

The genus is said to differ from *Ischnocolus* in having the external spinners nearly as long as the abdomen, and the anterior two pairs of legs broader than the posterior and with wider scopulæ; the tibiæ and protarsi are spined, and the fovea is transverse, very lightly recurved.

Judging from these characters, the genus would fall under section a^4 in the table, but should certainly be recognizable from *Miaschistopus* by its long spinners, widely scopulate 1st legs, &c.

Lastly the Madagascar genus *Encyocrates* would apparently fall under section b^4, but since the characters of the male are unknown and there is no mention in the original description of the position of the sternal sigilla nor of the armature of the claws, it is hard to say whether it would come under a^5 or b^5. The tibiæ of the legs, however, are said to be unspined, which would separate the genus from both *Monocentropus* and *Anoploscelus*. Moreover a young specimen of a Theraphosine from Senbendrana (Madagascar) which I identify as an *Encyocrates*, has the sigilla submarginal and the claws untoothed.

The three following genera belonging to the Mediterranean area and occurring, at least in the case of *Chætopelma* and *Ischnocolus*, in the countries of North Africa, do not, so far as is at present, known, spread into the true Ethiopian Region.

Chætopelma, Ausserer (Verh. z.-b. Wien, 1871, p. 190), might be introduced into the table under section a^4, having the legs richly spinous &c.; but it certainly differs from *Miaschistopus* in having the tarsal scopulæ of 3rd and 4th leg divided, two tibial spurs on the 1st leg on the male &c. In these respects it resembles *Selenogyrus*, but is quite distinct owing to the form of the thoracic fovea which is broad and transverse. This genus has representatives in Egypt, Syria, and Arabia.

Cratorhagus, Simon (Act. Soc. Linn. Bord. xliv. p. 330, 1892), with two Mediterranean representatives, namely, *concolor* and *tetramera* from Syria (see Simon, Mém. Soc. Liége, (2) v. 1873, p. 31 &c.), is apparently closely related to *Chætopelma*, but at least differs in having the tarsal scopulæ of the 1st and 2nd legs in the adult as well as of the 3rd and 4th divided by a band of setæ.

Ischnocolus, Ausserer (Verh. z.-b. Wien, 1871, p. 184), represented by many species in the Mediterranean countries, differs from the two preceding in having no tibial spurs on the 1st leg in the male. It thus stands nearer to *Miaschistopus*, but may be recognized by having all the tarsal scopulæ divided; the division in *Miaschistopus* being restricted to the 4th leg.

Subfamily HARPACTIRINÆ, nov.

Genus HARPACTIRA, Ausserer,
Verh. z.-b. Wien, xxi. p. 203 (1871).

HARPACTIRA TIGRINA, Ausserer, Verh. z.-b. Wien, xxv. p. 185 (1876). (Plate XLIII. fig. 5.)

In the type and other examples of this species the upper row of notes on the mandible consists of 5 hairs, and the lower of about 10 which gradually decrease in length posteriorly and project internally away from the adjacent and spiniform setæ. On the maxilla there are upwards of 30 notes, forming a thick cluster, those that lie nearest the suture being the largest, while internally and posteriorly they decrease in size and pass without interruption into the hairs of the oral fringe.

The organ is present in the young, but less perfect in its development. For example, in a specimen from East London the carapace of which measures but 5 mm. long, that of the adult attaining to 25 mm., the bristles of the mandible constituting the lower series have not become separated off from the adjacent setæ, though the upper series occupies the same position as in the adult; while on the maxilla only about a dozen of the notes are distinguishable. At this stage the feathery pad on the upper half of the outer surface of the mandible has not appeared; but it is fully formed and the organ complete in all its details in a half-grown specimen from the same locality, with the carapace 12 mm. long.

This species seems to have an exceedingly wide range in Africa. The Museum has examples from the following localities:—Port Elizabeth (including the type and specimens presented by *J. M. Leslie*); Kleinpoort, Eastern Karroo (*Anna Howarth*); East London (*H. A. Spencer*); Osborn, Pondoland (*T. W. Pocock*); Kei Road (*Capt. Trevelyan*); Matabeleland (*H. M. Beddington*); and Sheik Husein in Somaliland (*Donaldson Smith*), as well as others without special locality.

The occurrence of this form so far to the north as Somaliland is exceedingly remarkable. I have failed, however, to distinguish the single female specimen from that locality from Ausserer's type by any reliable character either of colour or structure. The two examples from Pondoland differ from the type in having the legs shorter as compared with the carapace: the carapace for example is considerably longer than the tarsus and protarsus of the 4th as well as a little longer than the tibia, protarsus and tarsus of the 3rd and at least equal to those of the 4th; whereas in the type and other

specimens, including the one from Somaliland, the carapace is only a little longer than the 4th tarsus and protarsus, and a little less than the three terminal segments of the 3rd leg. That the difference is not to be relied upon as of specific importance seems shown by the circumstance that of two of the Museum specimens taken by the same collector, presumably in the same locality, one resembles the type in length of leg-segments, and the other the Pondoland specimens. Unfortunately I have seen no male example of this species. Possibly the discovery of members of this sex will show that some of the forms here identified as *tigrina* are in reality specifically separable.

HARPACTIRA ATRA (Latr.).

Mygale atra, Latreille, Nouv. Ann. Mus. d'hist. nat. i. p. 70 (1832).

Mygale funebra, Walckenaer, Ins. Apt. i. p. 226 (1837).

Mygale coracina, C. Koch, Die Arachn. ix. p. 37, fig. 714 (1842).

There can I think be no doubt that the species named *coracina* by C. Koch is identical with that previously described by Latreille as *atra*, which Walckenaer intentionally renamed *funebra*.

The British Museum possesses an adult male and female from Simon's Town (*H. de la Garde*), one young female from Hoets Bay, near Cape Town (*H. A. Spencer*), a second young female from Worcester, Cape Colony (*H. A. Spencer*), and an adult male from Zululand (*J. F. Angas*), as well as specimens, male and female, without special locality.

Some of the distinctive features of this species are set forth in the subjoined table.

HARPACTIRA LINEATA, sp. n.

♀.—*Colour*. Hairy clothing of carapace greenish black, passing into ochre-yellow at the sides: the plate ornamented as in *H. tigrina*, but less definitely, with obscurely defined whitish lines radiating from the fovea; hairs on legs longish, greyish black, those on the sides and lower surface of the femora foxy red; sternum and coxæ obscure blackish brown.

Carapace exceeding in length the patella and tibia of the 4th leg as well as of the 1st, just about equal to the tarsus and protarsus of the 4th but distinctly less than the tibia, protarsus, and tarsus of the 3rd, and shorter by three quarters of the length of the tarsus than the same segments of the 2nd leg, and just equal to the tibia and protarsus of the 1st.

Legs 4, 1, 2, 3, the 4th a little longer than the 1st; patella and tibia of 1st longer than those of 4th, tarsus and protarsus of 3rd equal to those of 1st.

Mandible with the upper series of notes less oblique and less regularly arranged than in the other species, e. g. *tigrina*, and consisting of a nearly horizontal set of about 10 bristles; the lower series consisting of a cluster of short spines, which, however, are not separated from the adjacent bristles behind the oral fringe.

Measurements in millimetres. Total length (abdomen shrivelled) 35; length of carapace 21 (contracted in width from drying); length of 1st leg 50, of 2nd 47, of 3rd 42, of 4th 51; patella and tibia of 1st 19, of 2nd 17, of 3rd 15, of 4th 17·5.

Loc. S. Africa (*Dr. A. Smith*).

HARPACTIRA CURVIPES, sp. n.

♀.—*Colour.* Hairy clothing a tolerably uniform mouse-brown; fine whitish but indistinct bands at the extremities of the segments of the legs; coxæ and sterna darker; abdomen with lateral blackish stripes.

Carapace the same length as the tibia and patella of the 1st leg and 4th leg, distinctly shorter than the protarsus and tarsus of the 4th and shorter by about one-third of the tarsus than the tibia, protarsus, and tarsus of the 3rd.

Legs 4, 1, 2, 3; patella and tibia of 1st and 4th about equal; protarsus of 4th distinctly bowed, convex internally.

Measurements in millimetres. Total length 24; length of carapace 11; of 1st leg 29, of 2nd leg 26·5, 3rd leg 24·5, 4th leg 31; patella and tibia of 1st and of 4th, tarsus and protarsus of 4th 12·5; tibia, protarsus, and tarsus of 2nd 13·5, of 3rd 13.

Loc. Natal. A single female specimen.

HARPACTIRA CHRYSOGASTER, sp. n. (Plate XLIII. figs. 5 *a*–5 *b*.)

♂.—*Colour.* Carapace covered with greenish-black hairs; its margin like the upper side of the coxa and trochanter, with longer foxy-red hairs; mandibles and limbs clothed with greenish-black hairs intermixed with a coating of long setæ of a greyish-red tint; apices of femora, patellæ, tibiæ, and protarsi with a narrow transverse band of reddish hair; abdomen covered with hairs of a fiery red, indistinctly banded laterally with dark markings; sternum and coxæ dark, with a scanty clothing of red-tipped bristles.

Carapace a little shorter than patella and tibia of 1st and of 4th legs, its width just about equal to length of 4th protarsus; length of the clypeus about equal to half the length of the tubercle.

Legs 4, 1, 2, 3; patella and tibia of 1st and 4th about equal, protarsus of 4th excelling the protarsus and half the tarsus of the 1st; tibiæ of 1st, 2nd, and 3rd with a pair of inferior apical spines, and of 4th with an additional posterior spine; 3rd and 4th legs with a few spines at tip as well as at base of scopula. Tibia of the male with normal spur; protarsus but little modified, only slightly convex above at the base. Palpal organ of substantially the same shape as in *H. atra*.

Mandible with the inner scopula thick; the upper series of notes consisting of an oblique series as in *H. tigrina*; but the lower series composed of a thick cluster of shorter and longer spines removed some distance from the fringe; the notes on the maxilla numbering about fifty or more.

Measurements in millimetres. Total length 31; length of cara-

pace 16·5, width 13·5; length of 1st leg 47, of 2nd 44, of 3rd 41·5, of 4th 52; patella and tibia of 1st 17, of 2nd 15·5, of 3rd 13, of 4th 17.

Loc. S. Africa (the exact locality of this form is unfortunately not known).

The species of *Harpactira* known to me may be recognized as follows:—

Males.

a. Lower cluster of bristles on outer surface of mandible farther removed from the oral fringe and composed of about four rows of spines; abdomen covered with a rich coating of fiery-red hairs; carapace black, with a row of reddish hairs; legs black, but the setæ foxy-grey distally ..... *chrysogaster*, sp. n.

b. Lower cluster of notes on the mandible less close to the oral fringe and consisting of a single row of setæ; prevailing colour of body and limbs velvety black; setæ on the limbs a little greyish at the tips, those on the abdomen a foxy red ..... *atra* (Latr.).

Females.

a. Protarsus of 4th leg noticeably curved from base to tip (carapace about the same length as the patella and tibia of the 1st and 4th legs, distinctly shorter than the tarsus and protarsus of the 4th) ..... *curvipes*, sp. n.

b. Protarsus of 4th leg not noticeably bowed, straight.

a'. Lower series of notes on the mandible not isolated from the rest of the oral fringe; the upper series nearly horizontal and less regularly disposed; (carapace lineate, shorter by half the tarsus than the tibia, protarsus, and tarsus of the 3rd leg; equal in length to protarsus and tarsus of 4th leg) ..... *lineata*, sp. n.

b'. Lower series of notes isolated; upper series forming a regular and oblique series.

*a*². Prevailing colour mouse-grey or brown, carapace dark with distinct white bands radiating from the fovea: carapace not less than tarsus and protarsus of 4th leg and tarsus, protarsus, and tibia of 3rd leg ..... *tigrina*, Auss.

*b*². Prevailing colour black; carapace without white stripes, shorter than tibia, protarsus, and tarsus of 3rd leg and than protarsus and tarsus of 4th ..... *atra* (Latr.).

The following species are unknown to me:—

Harpactira cafreriana, Walckenaer, Ins. Apt. i. p. 225, 1837 (sub *Mygale*). Judging from the description, this species from Caffraria differs from *atra* and *tigrina* in being of a clear reddish colour.

Harpactira villosa, id. ibid. p. 226, from the Cape of Good Hope, is according to Walckenaer like *cafreriana*, but more hairy.

Harpactira constricta, Gerstaecker in Von der Decken's 'Reisen in Ost-Africa,' iii., 2. p. 486, and *H. chordata*, id. ibid. p. 487, from Dafeta, Kilimanjaro. According to Karsch (Mon. Ak. Wiss. Berlin, 1878, p. 316), *constricta* was based upon a young example of *chordata*.

Harpactira elevata, Karsch, ibid., from Tette and Mozambique, is possibly also a *Pterinochilus*; but according to Bösenberg it is synonymous with *H. chordata*, Gerst. (see Jahrb. Hamb. Anst. xii. p. 27, 1894).

These species very likely belong to the genus *Pterinochilus*.

Genus Pterinochilus, nov.

Allied to *Harpactira*, but differing in the entire absence of the stridulating organ, the area on the mandible below the feathery pad being merely sparsely clothed with simple setæ, without 'notes'; while the opposable area lying on the maxillæ between the suture and the oral fringe is also clothed with simple setæ. No feathery scopula on the inner surface of the mandible. Lastly the apical segment of the spinners is long and slender, being longer than the 2nd segment and not shorter than the basal segment.

Type, *P. vorax*, sp. n.

Pterinochilus vorax, sp. n. (Plate XLIII. figs. 3–3*e*.)

Carapace blackish brown, clothed with hairs of an olive-grey tint, shining in parts with a silky golden lustre; edge of carapace and upper side of coxæ and trochanters clothed with long golden yellow hairs; hairs of the same bright tint on the upper surface of the mandible and the base of the femora on the upper side; legs covered with yellowish-brown hairs intermixed with black; tibiæ speckled with whitish spots; a rim of whitish hairs at the distal end of the upper side of all the segments, except the tarsus; inner side of anterior femora greyish black, outer and lower sides like the posterior two pairs of femora, clothed with yellowish-red hairs; abdomen covered with a mixture of blackish and yellowish hairs indistinctly spotted, sides and lower surface with an outer coating of long reddish-yellow hairs; sternum and coxæ of anterior appendages fuscous, posterior coxæ clothed with redder hairs than the anterior.

Carapace just about equal to the patella and tibia of 4th leg, shorter than those of the 1st and shorter than tarsus and protarsus of 1st, not quite one-fourth longer than wide, the width a little excelling the length of the patella and tibia of the 3rd leg, and a shade greater than the protarsus of the 4th; length of clypeus about half that of the ocular tubercle.

Median eyes separated by space a little less than their diameter, which is less than the long diameter of the other three; space between the laterals less than diameter of anterior medians.

Legs 1, 4, 2, 3, the 1st and 4th subequal; armed with very few spines; tibiæ with a pair or a few more at the tip beneath; protarsi of 3rd and 4th with a spine on each side at the base of the scopula and a few spines above and below at the apex of the segment, femur of 3rd thicker than the others; the protarsus of 1st (♂) with its inner border strongly hollowed out in the basal

half, leaving a wide distance between the segment and the tibial spur when the limb is flexed; tibial spur consisting of a single long, lightly curved spiniform process. *Palpal organ* with the spine broad at the base, lightly curved, pointed and filiform at the tip, arising from the posterior half of the bulb.

Measurements in millimetres. Total length 31; length of carapace 16·5, width 13·5; length of 1st leg 50, of 2nd 43, of 3rd 39, of 4th 49·5; patella and tibia of 1st 17·5, of 4th 16.

Loc. Fwambo, Lake Tanganyika (*Alexander Carson*).

PTERINOCHILUS MURINUS, sp. n. (Plate XLIII. fig. 4.)

Colour a nearly uniform mouse-brown, with little white tufts of hair at the extremities of the femora, tibiæ, patellæ, and protarsi of the legs.

Carapace less than one-fourth longer than broad, as long as the patella and tibia of the 4th leg, a little shorter than the same segments of the 1st leg and than the protarsus and tarsus of the 4th; a little longer than tibia and protarsus of 2nd and a trifle shorter than those of the 1st; length from the fovea to the anterior margin almost equal to the length of the 4th protarsus. *Clypeus* narrow, the distance between the tubercle and its edge about equal to one-fourth the length of the tubercle; distance between the edge of the clypeus and the lateral eye less than the long diameter of the eye; distance between the two lateral eyes equal to the short diameter of either.

Legs 4, 1, 2, 3, the 4th exceeding the 1st by about half the length of its tarsus; patella and tibia of 1st a little greater than those of 4th; protarsus of 4th equal to protarsus and half the tibia of the 1st; tibiæ of all the legs with a pair of inferior apical spines; protarsi of 3rd and 4th with a few spines above and below at the apex, one spine at the base of the scopula on the outer side. *Palpi* unspined; tarsus long, much longer than the tibia, about as long as the protarsus of the 1st leg; a little inflated at the base above.

Measurements in millimetres. Total length 35; length of carapace 13·5, of 1st leg 35·5, of 2nd 32·5, of 3rd 30, of 4th 38·5.

Loc. Ugogo (*Emin Pasha*). A single female example. The Museum also has females of the same or of closely allied species from Mombasa and from the N.E. of Lake Victoria Nyanza (*Dr. Ansorge*).

Apart from sexual characters this species and the preceding may be recognized as follows:—

a. Ocular tubercle separated from the edge of the clypeus by a space equalling at least half its length; distance between the anterior lateral eye and the edge of the carapace exceeding twice its long diameter	*vorax*, sp. n.
b. Ocular tubercle separated from the anterior edge of the carapace by a space less than one-fourth its length; distance between lateral eye and edge of carapace less, if anything, than its long diameter	*murinus*, sp. n.

Genus CERATOGYRUS, nov.

Differing from *Pterinochilus* in that the thoracic fovea is very strongly procurved and forms almost a complete circle surrounding a central tuberculiform prominence which sometimes takes the form of a long conical process.

Type, *C. darlingii*, sp. n.

CERATOGYRUS DARLINGII, sp. n. (Plate XLII. fig. 5 and Plate XLIII. figs. 1–1 *a*.)

♀.—*Colour* as in the following species *C. marshalli*, but the carapace ornamented with radiating white lines as in *Harpactira tigrina*, and the lower side of the femora of the 3rd and 4th legs paler, and contrasting with the black of the coxæ much more sharply than is the case in *C. marshalli*.

Carapace exceeding the length of patella and tibia of 1st leg by one-third of the protarsus, of the 4th by one-half the protarsus; about equal to tarsus, protarsus, and tibia of 2nd; much exceeding protarsus and tarsus of 4th; elevated especially in the cephalic region; the process arising from the fovea taking the form of a long conical horn, longer than its basal width, which is twice the width of the ocular tubercle; tubercle nearly spherical, only a little longer than the clypeus.

Legs 1, 4, 2, 3; patella and tibia of 1st longer than of 4th, also longer than tarsus and protarsus of 4th, and almost equal to tibia, protarsus, and tarsus of 3rd; tarsus and protarsus of 3rd a little less than those of 2nd; spine armature as in the other species of the group.

Measurements in millimetres. Total length 51; length of carapace 24·5, width 20; length of 1st leg 59, of 3rd 51, of 2nd 44, of 4th 56; patella and tibia of 1st 22, of 4th 18·5; tarsus and protarsus of 4th 21.

Loc. Enkeldoorn, 110 miles S. of Salisbury in Mashunaland (*J. ffolliott Darling*). Three adult females.

I have great pleasure in dedicating this species, certainly the most remarkable Spider of this group that has been discovered of late years, to Mr. J. ffolliott Darling, who obtained the specimens by digging them out of their deep burrows.

CERATOGYRUS MARSHALLI, sp. n. (Plate XLIII. figs. 2–2 *b*.)

♂.—*Colour*. Carapace pitchy brown, clothed with dark olive-grey hairs, hairs of the same colour covering the upper side of the femora of the appendages, while the three distal segments of the limbs are clothed with grey hairs intermixed with black; the femora of the posterior two pairs are not, however, so dark as the others, being clothed, especially basally, with hairs of a greyish golden hue; the distal extremities of femora, patellæ, tibiæ, and protarsi are distinctly whitish, while on the tibiæ there are two faintly defined whitish lines; coxæ, sternum, and inner sides of femora and patellæ of palpi and first two pairs of legs velvety black, the outer sides of the anterior femora and the lower surface of the

rest of these and the other limbs clothed with foxy-grey hairs; abdomen blackish above, black and grey hairs intermingling; at the sides the greyish hairs predominate, while below the area between the spinners and the lungs is again black.

Carapace distinctly longer than patella and tibia of 4th leg but less than those of 1st and greater than tarsus and protarsus of 1st; the central tubercle in the middle of the fovea not rising above the level of the surrounding area of the carapace and consequently much wider at the base than it is high, its basal width a little excelling that of the ocular tubercle, which is high, wider than long, not quite twice as long as the clypeus. *Eyes* as in *Harpactira*; space between the medians rather less than their diameter, which about equals the space between the laterals and is not greater than their long diameter.

Legs 1, 4, 3, 2; patella and tibia of 1st considerably longer than those of 4th; tarsus and protarsus of 3rd a little shorter than those of 1st; tarsus and protarsus of 4th about equal to patella and tibia of 1st; legs spiny as in *Harpactira*; 3rd but little thickened; protarsus of anterior legs unmodified in male; tibial spine as in *Harpactira*, *i. e.* consisting of a curved conical process tipped with a long curved spine. Palpal organs on the same plan as in *Harpactira* and *Pterinochilus*.

Measurements in millimetres. Total length 35; length of carapace almost 18, width 15; length of 1st leg 54, of 2nd 47, of 3rd 41, of 4th 54; patella and tibia of 1st 20, of 4th 17.

Loc. Salisbury, Mashunaland (*J. ffolliott Darling*).

Two adult male examples.

Apart from some differences of colour this species may be at once recognized from the preceding by the small size of the cephalothoracic tubercle. There is no evidence that this distinction is merely of sexual importance.

I dedicate this species to Mr. Guy Marshall, who has been good enough to collect many Arachnida for the British Museum both in Mashunaland and Natal. As long ago as the spring of 1895, he sent me an example of this genus from Salisbury; but the specimen unfortunately had the carapace crushed in the region of the fovea, so that the clue to its generic peculiarity was destroyed and the example was set aside as an unidentifiable species allied to *Harpactira*.

Subfamily Theraphosinæ.

Genus Scodra.

Scodra, Becker, CR. Soc. ent. Belg. 1879, p. cxlii; Simon, Hist. Nat. Araignées, i. p. 174 (1892).

Stromatopelma, Karsch, Berl. ent. Zeits. 1881, p. 218.

Scodra calceata (Fabricius).

Syn. *Aranea calceata*, Fabricius, Ent. Syst. ii. p. 427.

" *Scodra aussereri*, Becker, CR. Soc. ent. Belg. 1879, p. cxlii; ibid. 1881, pl. 2. fig. 1.

Syn. *Stromatopelma alicapillatum*, Karsch, Berl. ent. Zeits. 1881, p. 218.

The *Aranea calceata* of Fabricius was based upon a fragmentary specimen from Guinea; *Sc. aussereri* of Becker upon specimens from Liberia; and *St. alicapillatum*, Karsch, upon specimens from Accra in Fantee. Judging from the descriptions given by Becker and Karsch, the two species they described are identical. The *Aranea calceata* of Fabricius is also certainly identical with one of the species of this genus; and I see no valid reason for dissenting from Mons. Simon's opinion that it is synonymous with the one that Becker and Karsch have established.

The British Museum has in all 9 female specimens of this species; namely 6, varying in length from 19 to 48 mm., from Accra (*G. A. Higlett*), one from the Cameroons (*Capt. Burton*), one from Ashanti, and one from the Afran plains, inland of Ashanti.

Scodra griseipes, sp. n. (Plate XLIII. figs. 7–7 *a*.)

♀. A detailed description of this new species is unnecessary, seeing that it apparently only differs from the foregoing in the colouring of the underside of the femora. In *calceata*, or, to be strictly accurate, in the forms described as *aussereri* and *alicapillatum*, the lower side of the femora of the legs and palpi as well as the inner surface of the femora of the 1st and 2nd pairs and of the palpus are distinctly black, being, like the coxæ and sternum, clothed as Becker describes it, "*d'une très epaisse couche de poiles noirs courts veloutés*," and against the black the bright foxy-red hairs on the outerside of the segments show up conspicuously. But in *griseipes*, though the sternum and coxæ are dark brown, the lower and inner sides of the femora of all the appendages are clothed with whitish-grey hairs, and the long setæ on the limbs are rather yellowish brown than foxy red.

In the adult the length of the carapace is a little less than or about equal to that of the patella and tibia of the 4th leg, a little greater than those of the 2nd leg, and by about the same amount less than those of the 1st, while it falls short of the length of the tibia and protarsus of the 1st leg by more than one-third of the protarsus, and is just about equal to those two segments on the 3rd leg. The proportions seem to be practically the same in *Sc. calceata*.

♂. In this sex the legs are relatively longer and more hairy, with longer fringes; the carapace broader, flatter and more woolly; the upperside of the abdomen with a thick woolly clothing of hairs copiously intermixed with bristles; the hairs on the sterna and coxæ are paler in colour than in the female, the maxilla showing up darker on account of its scantier clothing.

Length of carapace equal to that of 4th protarsus, slightly shorter than patella and tibia of 3rd leg, equal to protarsus of 1st + the area to the base of the spot on the tarsus, about equal to the patella and tibia of the palpi; less than the tibia + the area to the spot on the 1st leg. The protarsus of the 1st l

is furnished at the base on the inner side with a conspicuous tuft of scopulate hairs, the segment at this spot being distinctly bowed, its lower surface being convex basally and its upper concave (this character is readily perceptible by touch, less so by sight owing to the thickness of the hairs); a similar scopular tuft has been described by Karsch in the male of his *alicapillatum*.

Viewed from the front the palpal spine is seen to curve a little outwards, but from the outside it is almost quite straight and defined behind at the base by a shallow notch.

Measurements in millimetres. — ♀ (type). Total length 48; length of carapace 25, width 22; length of 1st leg 72, of 2nd 64, of 3rd 56, of 4th 66; patella and tibia of 1st 27, of 4th 24; tibia and protarsus of 1st 30; tarsus and protarsus of 4th 24[1].

♂. Total length 32; length of carapace 14, width 13; length of 1st leg 54, of 2nd 50, of 3rd 43, of 4th 53; patella and tibia of 1st 20, of 4th 18·5; protarsus and tarsus of 4th 20.

Loc. Sierra Leone. Specimens of both sexes received from various sources, including Mr. Charles Wilson and Mr. Mitford.

SCODRA BRACHYPODA, sp. n. (Plate XLIII. figs. 8–8*a*.)

♀.—*Colour* practically as in *griseipes*; prevailing tint an ashy yellowish grey; an irregular brownish band on each side of the carapace from the ocular tubercle backwards; a black patch on the upperside of the tarsus and protarsus, and a less distinct double one at the base of the tibia; femora, patellæ, and tibiæ in part with a pair of pale whitish lines; abdomen with a median interrupted band, spotted at the sides.

Carapace a trifle longer than the patella and tibia of the 1st leg, and as long as its tibia and protarsus, and as the tibia, protarsus, and half the tarsus of the 3rd (4th leg absent).

♂. Differing from the female in the same respects as in the case of *Sc. griseipes*; differing from the male of *Sc. griseipes* in the following particulars. There is no cushion-like projection on the base of the scopula of the 1st protarsus, and this segment is not bowed but straight, and the palpal spine when viewed from the front is not lightly curved outwards but rather inwards, while from the side it is seen to be very distinctly arched from the base to the point; the point, moreover, is not evenly and gradually attenuate, but is more abruptly narrowed in the distal third of its length.

The length of the carapace is a little greater than the length of the 4th protarsus, a little longer than the patella and tibia of 3rd leg, equal to the protarsus of 1st + the area of the tarsus to the distal end of the spot, a little greater than the patella and tibia of the palp; equal to the tibia of the 1st leg + the part reaching up to the spot on the protarsus.

Measurements in millimetres. — ♀ (type). Total length 35; length of carapace 15, width 13; length of 1st leg 37, of 2nd 34,

[1] In this and all cases the measurements of the limbs are taken from the base of the femur.

of 3rd 32 (4th absent); patella and tibia of 1st 14, tibia and protarsus 15.

♂. Total length 28; length of carapace 14, width 13; length of 1st leg 49, of 2nd 45, of 3rd 39, of 4th 52; patella and tibia of 1st 17, of 4th 18; protarsus and tarsus of 4th 19.

Loc. Asaba, on the river Niger (*Dr. Crosse*). Two males and a female. Also a male of apparently the same form from Cape Palmas (*Alvan Millson*).

The female specimen, judging from its size as compared with the male and with the adult females of *calceata* and *griseipes*, is not full-sized. But the shortness of its legs cannot be ascribed to immaturity, seeing that much smaller examples of *calceata* have the appendages relatively as long as the adult.

The following key will serve to differentiate the females of the three known species of the genus.

a. Carapace longer than the patella and tibia of the 1st leg, and as long as the tibia and protarsus of this limb, &c. ..... *brachypoda*, sp. n.

b. Carapace considerably shorter than the patella and tibia of the 1st leg, and shorter by at least one-third of the protarsus than the tibia and protarsus of the 1st.

*a*². Lower and inner surfaces of femora of palp and of the first pair of limbs greyish or yellowish brown; long hairs yellowish brown ..... *griseipes*, sp. n.

*b*². Lower surface of all the femora and inner surface of those of the palp and first two pairs of legs velvety black; long hair on limbs foxy red ..... *calceata* (Fabr.).

The males of the two species known to me may be recognized by the following table:—

a. Protarsus of 1st leg with basal curvature and inferior scopular tuft; spine of palpal organ straight; patella and tibia of 4th leg shorter than of 1st leg; 4th protarsus as long as carapace, &c..... ..... *griseipes*.

b. Protarsus of 1st leg without basal curvature and without inferior scopular tuft; spine of palpal organ more curved, its apex more suddenly attenuate; patella and tibia of 4th longer than of 1st, 4th protarsus shorter than carapace ..... *brachypoda*.

Genus MONOCENTROPUS, nov.

Carapace oval, longer than wide; fovea shallow, transverse, wider than ocular tubercle; tubercle small, subcircular; eyes of anterior row somewhat strongly procurved, of posterior row recurved; clypeus very narrow.

Mandibles without external scopula; a single row of teeth below; the posterior portion of the lower surface weakly granular.

Labium a little wider than long; its border granular like the inner angle of the maxilla.

Sternum oval, longer than wide; the posterior sigilla distinctly removed from the margin.

Legs: tarsal scopulæ entire; protarsal scopulæ also undivided, except partially so on the 4th, on the 1st and 2nd legs extending practically to the base of the segment; covering about two-thirds of the segment in the 3rd leg and half in the 4th; legs unarmed except for a pair of spines at the tips of the tibiæ and protarsi beneath; length 4, 1, 2, 3; patella and tibia of 4th about equal to those of the 1st; claws unarmed. *Spinners* considerably more than half the length of the carapace.

Tibia of ♂ armed with a single spine-tipped tuberculiform process.

MONOCENTROPUS BALFOURI, sp. n. (Plate XLI. figs. 1–1 *a*.)

Colour. Carapace covered with olive-yellow pubescence, showing a pinkish tinge towards the margin; legs covered with olive-brown hairs; the base of the femora and upperside of the trochanters greyish white; the lower side of the femora clothed with whitish or yellowish-white hairs and contrasting very forcibly in colour with the chocolate-brown tint of the coxæ and of the segments on the distal side of the femora; abdomen furnished with long greyish-red hairs at the side, black beneath.

Carapace moderately convex, its cephalic area not strongly elevated; a little longer than the 4th protarsus, shorter than patella and tibia of 4th leg.

Eyes not very unequal in size; the anterior medians if anything the smallest, distinctly smaller than the anterior laterals, and separated by a space that about equals their diameter, a little nearer to the anterior laterals; a straight line touching their front borders cutting near the centres of the laterals; posterior median about as large as the posterior lateral and closer to it than to the median.

Tibia of ♂ armed with a low tuberculiform process beset with two tufts of rigid lanceolate spines; the lower surface of the anterior two pairs of femora as well as the femur of the palp furnished externally with long thickly-set hairs, tibia of palp also thickly hairy below; tarsus of palp apically thickly scopulate; the bulb globular, the lightly arcuate spine rising abruptly from its posterior portion (*see* figure).

Measurements in millimetres. Total length 34; length of carapace 16, width 13; length of 1st leg 50, of 2nd 47, of 3rd 45, of 4th 53; patella and tibia of 1st 18·8, of 2nd 16·5, of 3rd 15, of 4th 18.

Loc. Socotra. A single adult male example (*I. B. Balfour*).

Genus ANOPLOSCELUS, nov.

Carapace oval, much longer than wide; the fovea deep and transverse; ocular tubercle moderately elevated, close to edge of carapace; the anterior line of eyes very nearly straight, only slightly procurved.

Legs without spines except at the extremities of the tibiæ and protarsi; the 1st protarsus scopulate almost to the base, 2nd with

about two-thirds scopulate, about half the 3rd covered, and one-third of the 4th; all the tarsal scopulæ entire; legs 4, 1, 2, 3, patella and tibia of 4th longer than those of 1st; claws unarmed.

Tibia of ♂ not spurred.

Posterior sigilla on *sternum* remote from the margin.

Labium transversely oblong, wider than long, thickly and closely granular on its margin like the inner angle of the maxilla.

Mandible without external pad; area of maxilla between fringe and suture sparsely bristly.

ANOPLOSCELUS CELERIPES, sp. n. (Plate XLI. fig. 3.)

Colour ferruginous, the hairy clothing of the body and limbs a nearly uniform ochre-yellow; the segments of the legs with a narrow distal whitish band.

Carapace as long as the patella and tibia of the 2nd leg, shorter than those of the 1st and 4th and scarcely excelling the length of the 4th protarsus.

Anterior median eyes distinctly the largest of the set, separated by a space less than their diameter and from the anterior laterals by a space about equalling their radius; anterior laterals with their long diameter about equaling that of the medians and twice their own short diameter; the eyes themselves about twice as large as the posterior laterals, which are themselves close to and a little larger than the posterior medians.

Legs 4, 1, 2, 3; tarsus and protarsus of 1st very slightly shorter than those of 2nd, which are shorter than those of the 3rd leg; protarsus of 4th as long as tarsus and protarsus of 1st and as patella and tibia of 3rd; femur of 3rd leg very much swollen, rounded, as wide as it is high, the width as great as the area on the carapace that lies between the fovea and the hind border; tibiæ and tarsi of 1st leg in ♂ unmodified.

Papal organ with spine moderately thick, lightly curved, not twice as long as the length of the bulb, sharp and attenuate at the apex but not filiform. A feathery scopula on external surface of femur of palp.

Measurements in millimetres. Total length 27; length of carapace 13, width 10; length of 1st leg 40, of 2nd 36, of 3rd 36, of 4th 47; patella and tibia of 1st 15, of 4th 16·5.

Loc. Komboli, Lake Tanganyika. A single male example (*W. H. Nutt*).

Genus PHONEYUSA, Karsch.

Phoneyusa, Karsch, Berl. ent. Zeits. 1884, pp. 347–348. Type *P. belandana*, Karsch.

Phoneuusa, id. op. cit. 1886, p. 82.

Harpaxotheria, Simon, Act. Soc. Linn. Bord. 1889, p. 413. Type *antilope*, Sim.

As I have already pointed out (Ann. Mag. Nat. Hist. (6) xv. p. 167), the species named *belandana*, Karsch, is the type of the genus *Phoneyusa*, since it was the sole species upon which the

genus was primarily based. And since the type of *Harpaxotheria*, namely *antilope*, is admitted by Mons. Simon (*see* Hist. Nat. Araignées, i. p. 154, 1892) to be congeneric with *belandana*, it is clear that *Harpaxotheria* is a synonym of *Phoneyusa*.

PHONEYUSA GREGORII, sp. n. (Plate XLIII. figs. 6–6 *a*.)

♂.—*Colour* deep brown; the carapace and legs clothed above with bright reddish-brown hairs; hairs on the lower side of the tibia of the palp long and numerous; a long scopula of feathery hairs on the outer side of the femur of the palp; upperside of abdomen furnished with long bristles.

Carapace distinctly shorter than the patella and tibia of the 1st and 4th legs, only a little longer than the 4th protarsus; ocular tubercle moderately convex, about one-third wider than long; eyes of anterior line slightly procurved, the median a little larger than the lateral, separated by a space a little less than their diameter; posterior lateral smaller than the anterior lateral; the posterior median still smaller, closer to the posterior lateral than to the anterior median.

Legs long, 4, 1, 2, 3; patella and tibia of 4th and 1st almost equal; protarsus of 4th just equal to patella and tibia of 2nd; femur of the 3rd incrassate, nearly as thick as high, much thicker and higher than its patella; scopulæ all complete; protarsi of 1st and 2nd scopulate to base, of 3rd with more than its distal half covered, of 4th with quite its distal third covered; protarsi with at least one spine at the apex; tibiæ of 3rd and 4th with a pair of spines, of 2nd with 3 spines, two being external, of 1st with two external spines and a cluster of three on the inner side.

Palp long; patella, tibia, and tarsus as long as the carapace; unspined; spine of palpal organ distally attenuate, curved forwards, then outwards, with a strong basal keel on its outer side.

Measurements in millimetres. Total length 41; length of carapace 21·5, width 18; length of palpus 34·5, of 1st leg 63, of 2nd leg 58·5, of 3rd leg 56, of 4th leg 73; patella and tibia of 1st 23·8, of 4th 24; of 4th protarsus 20.

Loc. Kilungu, Iveti Mountains (Masailand). A single male example obtained by Dr. J. W. Gregory.

The type of this species is much larger than those of *gracilipes* and *ectypa* mentioned below, which are also males, the carapace in these measuring 11 and 12 mm. respectively. In the former, moreover, the 4th leg is more than four times as long as the carapace, and there are 8–10 spines on the lower side of the 1st tibia. *P. ectypa*, on the contrary, would seem to resemble this new form in most particulars, so far as can be judged from the description; but apart from its much smaller size there is no mention of the band of scopular hairs on the outer side of the femur of the palp[1].

[1] This character may be of generic importance, since it is found in all the species of *Hysterocrates* known to me, as well as in *Acentrocnemis*.

The following species of this group have been described. All are unknown to me :—

Phoneyusa belandana, Karsch, Berl. ent. Zeits. 1884, p. 347, 348; from Niam Niam (Central Africa).

Phoneyusa büttneri, Karsch, Berl. ent. Zeits. 1886, p. 83, from Sibangefarm (Gaboon).

Phoneyusa antilope, Simon, Act. Soc. L. Bordeaux, xlii. p. 414 (1889), from Tomby (Congo).

Phoneyusa gracilipes, id. ibid., Landana (Congo).

Phoneyusa ectypa, id. loc. cit. p. 415, from Abyssinia.

The following species also probably belongs to this genus :—

Selenocosmia nigroventris, Marx, Proc. U. S. Museum, xvi. p. 587, pl. 70. fig. 1 (1893), from the Congo.

Genus Hysterocrates, Sim.,

Hist. Nat. Araignées, i. p. 153 (= *Hysterocrates* + *Phoneyusa*, Sim. ibid.; not *Phoneyusa*, Karsch).

The examination of a longer series of forms than Mons. Simon had an opportunity of studying convinces me that the characters he relied upon to distinguish generically the two species named *greshoffi*, Sim., from the Congo, and *greefi*, Karsch, from St. Thomas in the Gulf of Guinea—regarded respectively as the types of *Hysterocrates* and *Phoneyusa*—are merely of specific rank, practically every gradation being traceable between the two. According to Simon, *Hysterocrates* might be recognized by having the 4th tibia very much swollen and the tarsus of the palp in the female not tumid above.

Hysterocrates gigas, sp. n.

♀.—*Colour* : body and limbs covered with a dense clothing of brownish or rusty-red hairs ; the bristles greyish red.

Carapace much longer than wide, its width a little greater than the length of the 4th femur, the length equalling the length of the patella and tibia of the same leg ; cephalic region rather high, defined by conspicuous grooves ; the fovea small, crescentic, the area between the horns of the crescent elevated : ocular tubercle small, a little wider than the fovea, the width equal to the length + the narrow clypeal area, which is about equal to the diameter of a median eye. *Eyes* of front series very slightly procurved, subequal in size (the median a little larger) and unequally spaced, the distance between the medians being only a little less than their diameter, that between the median and lateral about equal to the small diameter of the lateral ; the posterior line of eyes slightly recurved, the lateral noticeably smaller than the anterior lateral, the space between them about as wide as the space between anterior lateral and anterior median.

Sternum wide, narrowed between the 1st coxæ, widest between the coxæ of the 2nd legs ; the posterior impressions far removed from the edge, the distance between them about equal to the

width of the tubercle or of the labium. *Labium* almost as long as wide, densely spinulose.

Mandibles robust, the curvature of the upper and anterior surface studded amidst the hairs with a number of *smooth round jet-black granules*; the lower half of the outer surface almost naked, the inferior margin granular behind and armed internally with 11 blunt teeth.

Legs longish, robust, 4, 1, 2, 3; the 4th exceeding the 1st by a little less than the length of its tarsus; patella and tibia of 4th only slightly longer than of the 1st (26 mm.: 25·3); the patellæ of the two about equal, but the femur, tibia, and protarsus of the 4th respectively longer; the 4th leg also stouter than the 1st, its femur, patella, and tibia being noticeably thicker, the distal end of its femur a little wider than the patella, which is also wider than the tibia, the width of the patella less than half its length and about equal to its height, the width and height of the tibia about equal and just about one-third of its length, the protarsus distinctly although not very much longer than the tibia (17·5 and 15·5 mm.). The legs unarmed except for a few spines at the apices of the protarsi; the setæ on the legs are few in number and not long; there is a curious brush of hairs on the upperside of the coxa and trochanter of the 1st and 2nd legs.

Palp reaching almost to the apex of the tibia of the 1st leg; the area on the inner surface of the maxilla lying between the suture and the oral fringe normally hairy, the whole appendage unarmed; tibia and tarsus about equal in length, the tarsus longer than that of the other appendages.

Abdomen elongate, oval. *Posterior spinner* equal to length of 3rd protarsus.

♂. Carapace broader and flatter than in the ♀; legs longer; mandibles smaller but more noticeably tubercular; patella and tibia of 1st leg longer than of 4th; the legs also considerably more bristly than in the ♀, especially on the posterior tarsi and protarsi, the posterior tibiæ also relatively thicker. Length of carapace equal to that of tibia + protarsus of 3rd leg and only slightly excelling tarsus and protarsus of 2nd; its width equalling femur of 4th; in ♀ length of carapace almost equals that of tibia, protarsus, and tarsus of 3rd leg, and tarsus and protarsus + three-quarters of the tibia of the 2nd. Palp as in the following species, *H. crassipes*, except that the spine of the organ lies a little nearer the bulb and the triangular tooth is a little more prominent.

Measurements in millimetres.— ♂. Total length 47; length of carapace 21·3, width 18·8; width across cephalic sulci 11; length of 1st leg 66, of 2nd 58, of 3rd 51, of 4th 71; patella and tibia of 1st 26·5, of 4th 25·5; length of tibia of 4th 15·3, width 5.

♀. Total length 54; length of carapace 27, width 22; abdomen, length 27, width 18; length of sternum 11·5, width 10; 1st leg 65, 2nd 56, 3rd 53, 4th 73·5; patella and tibia of 1st 25, of 4th 27; length of tibia of 4th 15·3, width 5.

Loc. Cameroons. ♀ type (*J. M. C. Johnston*); ♂ (*Mr. Higgins*). The Museum also has a mutilated example, apparently of this species, from the Oil River (*H. H. Johnston*).

From *Hysterocrates greefi*, Karsch (Sitz. Ges. Nat. Marburg, 1884, p. 60), from the island of St. Thomas, this new species, as well as the others described in this paper, seems to differ in having considerably longer legs. Karsch, for instance, states that in a specimen of his species in which the carapace was 30 mm. long, the 1st leg was 62 and the last 65; whereas the measurement of the legs in *gigas* is considerably greater, though the carapace is actually shorter.

HYSTEROCRATES CRASSIPES, sp. n. (Plate XLI. fig. 4 *c*.)

♀. Allied to the preceding, but differing in the following particulars:—

Colour paler, being of a greyish yellowish-brown.

The width of the *carapace* is equal to the length of the posterior femur, and the length is distinctly less than the length of the patella and tibia of the same leg; the cephalic region is lower, the fovea shallower, and the area immediately in front of it not elevated; the ocular tubercle is a little longer, the anterior line of eyes more procurved, the posterior row more recurved. In the *mandible* the curvature of the front and upper surfaces is more abrupt.

The *legs* are not of the same relative length, the 4th exceeding the 1st by more than the length of its tarsus; the patella and tibia of 4th are very distinctly longer than those of the 1st (24 mm.: 21 mm.); the patella and tibia are as wide as the distal end of the femur; the width and height of the patella are about equal and exceed half its length; the tibia is convex above, its height and width are about equal, and considerably more than one-third of its length; the protarsus is only longer than the tibia by the merest fraction (15 mm.: 14·5 mm.). But in addition to being longer and stouter, the legs of the 4th pair differ from those of *gigas* in having their protarsi and tarsi furnished with long erect bristles.

♂. With longer, thinner legs than the ♀; mandibles smaller, but with the granules more prominent. There is no spur on the tibia of the 1st leg; the palp is short and weak, scarcely overlapping the patella of the 1st leg; the tarsus is short, truncate, and biscopulate; the bulb is remarkable, being polished and oval, with the spine, which is long, slender, and slightly curved at its distal end, rising on the outer side of the bulb, close to the base, the base of the bulb posteriorly bears also a tooth and outside this a short carina.

The width of the carapace is much less than the length of the posterior femur, and the length is much less than that of the patella and tibia of the 1st leg, which are only a little less than the corresponding segments of the 4th; the width of the 4th patella is less than half its length, and that of the tibia is about

one-third of its length; the 4th protarsus is longer than the 4th tibia.

Measurements in millimetres.—♀. Total length 47; carapace, length 23, width 19; 1st leg 56·5, 2nd 49, 3rd 45, 4th 67; patella and tibia of 1st 22, of 4th 24; tibia of 4th 14·4, width 5·8.

♂. Carapace, length 19·5, width 17; abdomen, length 19·5, width 11·5; 1st leg 57, 2nd 52·5, 3rd 46, 4th 65; patella and tibia of 1st 22, of 4th 23; length of 4th tibia 14·5, width 4·5.

Loc. Cameroons (*H. H. Johnston*).

In the thickness of its posterior legs this species approaches *H. greshoffi*, Simon (Ann. Soc. Ent. France, 1891, p. 298), the type of the genus, from the Upper Congo; but certainly differs in that the height of the tibia is less than that of the femur, and but little excels that of the patella, whereas in *greshoffi*, though the height of the tibia, as in *crassipes*, is more than one-third of its length, it is at the same time much greater than the height of the patella or femur.

From the other species described in this paper *crassipes* may be recognized by the features pointed out in the diagnosis.

HYSTEROCRATES LATICEPS, sp. n. (Plate XLI. figs. 4–4*b*.)

♂. Closely related to the male of *H. gigas*, but with the carapace noticeably broader, especially in front; the width, for example, is equal to the distance between the posterior border and the ocular tubercle, whereas in *gigas* it falls short of that distance by about 1 mm.; again, the width of the head across the cephalic sulci exceeds the distance between the fovea and the tubercle by half the length of the latter, the two distances being just equal in *H. gigas*. The posterior leg, too, is thinner (*cf.* measurements of tibia). And lastly, in the palpal organ the bulb is smaller and the spine less curved.

Measurements in millimetres. Total length 46; length of carapace 22, width 20·5; width across cephalic sulci 13; length of 1st leg 71, of 2nd 60, of 3rd 55, of 4th 74·5; patella and tibia of 1st 28, of 4th 26; tibia of 4th 16·5 in length, 4·5 in width.

Loc. Old Calabar. A single male example (*Miss Kingsley*).

A specimen which I identify as the female of this species was obtained by Dr. Alexander Smith in Old Calabar more than 20 years ago. It gives the following measurements for comparison with those of the females of *H. crassipes* and *H. gigas*:—Total length 44; length of carapace 21, width 18·6; length of 1st leg 57, of 2nd 50, of 3rd 47, of 4th 63; patella and tibia of 1st 22, of 4th 22; tibia of 4th 13, width 4.

These measurements show that the female of this species, assuming it to be rightly sexed, differs specifically from that of *H. crassipes* in its thinner hind legs, and from *H. gigas* in its much shorter carapace, the length of which is distinctly less than that of the protarsus and tarsus of the 4th, as well as the tibia and pro-

tarsus of the 1st, whereas in *H. gigas* the length of the carapace slightly exceeds both these measurements.

The foregoing species may be recognized as follows:—

Males.

a. Patella and tibia of 4th leg longer than the same segments of the 1st leg; femur of 4th considerably longer than the width of the carapace ..... *crassipes.*

b. Patella and tibia of 4th leg a little shorter than those of the 1st leg; width of carapace about equal to the length of the 4th femur.

a'. Carapace and head wider; width of carapace equal to the length from the tubercle to the posterior border; width across head from cephalic grooves equal to distance between fovea and median eyes ..... *laticeps.*

b'. Carapace and head narrower, width of former less than distance between posterior border and tubercle; and of head equal to distance between tubercle and fovea ..... *gigas.*

Females.

a. Posterior legs thicker, the tibia as wide as the patella or the distal end of the femur, its width very much exceeding a third of its length; tarsus of palp a little inflated above at the base... *crassipes.*

b. Posterior legs thinner, the tibia thinner than the distal end of the femur, its width equalling about one-third of its length; tarsus of palp not noticeably tumid above at the base.

a'. Carapace very long, the area between the tubercle and the posterior median emargination noticeably exceeding the width, its total length about equal to that of the tibia and protarsus of the 1st leg..... *gigas.*

b'. Carapace shorter, distance between tubercle and emargination not exceeding its width, its total length less than the length of the tibia and protarsus of the 1st leg ..... *laticeps.*

Genus EUMENOPHORUS, nov.

♀. Allied to *Selenogyrus* (*cf. infrà*), with the procurved fovea, and the legs long and slender, the 4th being longer than the 1st, though their patellæ and protarsi are equal; so, too, are the tarsal scopulæ entire on the 1st, 2nd, and 3rd pair of legs, and divided on the 4th. The following characters, however, point to generic differences between the two:—

(1) The legs are without spines, with the exception of a few at the apex of the protarsi.

(2) The posterior sternal sigilla are situated some distance from the margin of the plate as in *Selenocosmia*, the pair in front of them being also visibly away from the edge, the sternum itself being as broad as long. Labium nearly as long as broad, its edge, like the inner angles of the maxillæ, densely granulate.

(3) The claws of the legs are smooth and unarmed.

EUMENOPHORUS CLEMENTSII, sp. n.

Colour a uniform mouse-brown.

Carapace flattish, broad, the width equalling the distance between

the hinder border and the ocular tubercle; the radiating grooves conspicuous; tubercle small, transverse; eyes small and compact, those of the front line slightly procurved, subequal and equidistant, the distance between the medians less than a diameter; the posterior median eye less convex, but covering a larger area than the posterior lateral.

Lower surface of *mandible* armed internally with 10 strong teeth, the posterior half of this surface covered with numerous smaller granular teeth.

Legs. Patella and tibia of 4th and of 1st slightly excelling the length of the carapace; the distal segments of the 3rd and 4th pairs covered with erect curled bristles somewhat as in *Coremiocnemis*, though less thickly; the protarsal scopulæ not distally incrassate as in *Phoneyusa* and *Hysterocrates*, the scopulæ extending practically to the base of the segments in the legs of the 1st and 2nd pairs, but not covering half the segment in the 3rd, and represented by merely a small patch on the 4th; the tarsal scopulæ complete and thick on the 1st, 2nd, and 3rd, but very weak on the 4th, being intermixed with setæ, and consisting of a narrow band on each side of the middle line.

Measurements in millimetres. Total length 36; length of carapace 17, width 15; length of 1st leg 47, of 2nd 43, of 3rd 39, of 4th 52; patella and tibia of 1st 18, of 3rd 13·5, of 4th 18.

Loc. Sierra Leone. A single female example (*Surgeon-Capt. Clements*).

Some of the characters mentioned in the specific description may prove ultimately to be of generic importance as compared with *Selenogyrus* and other genera. Attention, for example, may be drawn to the scopulæ and hair-armature of the 4th leg, the size of the granular area on the lower surface of the mandible, size of the eyes, &c.

Genus Selenogyrus, nov.

Carapace oval, elongate; fovea small, linear, but strongly procurved as in *Selenocosmia*; cephalic area moderately elevated; ocular tubercle transverse, moderately large. *Eyes* with anterior row nearly straight, slightly procurved; posterior row recurved.

Mandibles without external scopula, armed below with a single row of teeth. *Maxillæ* without stridulating organ, the basal inner angle, like the labium, thickly spinulose. *Labium* transversely oblong, at least one-third wider than long.

Legs moderately long, 4, 1, 2, 3; the 4th (measured from the base of the femur) considerably longer than the 1st; tarsal and protarsal scopulæ entire on 1st, 2nd, and 3rd legs; tarsal scopula of 4th divided by a narrow band of setæ; that on the protarsus also almost entirely divided; protarsal scopulæ of 1st and 2nd legs broad only in the distal half of the segments, not extending quite to the base on the 1st, covering a little less on the 2nd, only occupying the distal half on the 3rd and the distal third on the

4th; tibiæ of legs weakly spined; protarsus of 4th strongly spined, of the 2nd much less strongly, of the 1st and 2nd scarcely spined; claws with a few small teeth (? on first leg).

Sternum oval, longer than broad; muscular scars (sigilla) marginal, the posterior deep.

Spinning mammillæ normal; the external less than half the length of the carapace, longer than the tarsi.

♂. Anterior tibia with two spurs, the external long and curved, the internal short and straight; the bulb of the palpal organ gradually narrowed below and passing without any sharp line of demarcation into the spine.

Type, *Selenogyrus cæruleus*.

SELENOGYRUS CÆRULEUS, sp. n.

♀.—*Colour*. Carapace, abdomen, and limbs covered with greyish-brown hairs, showing, especially on the limbs, strong metallic-blue reflections.

Eyes of anterior line equidistant and subequal, the diameter of the medians excelling the short diameter of the laterals, but less than their long diameter; posterior laterals smaller than anterior laterals.

Length of *carapace* about equal to length of patella and tibia of 1st leg or of 4th leg, the two being substantially equal; also about equal to the length of the protarsus and half the tarsus of the 4th.

Legs: tibiæ armed below distally with a pair of spines; tibia of 3rd with about three additional spines, of 4th with only one additional posterior spine; protarsi of 1st and 2nd with an inferior apical spine; protarsus of 3rd with a few spines on the proximal side of the scopula and a posterior series above; protarsus of 4th armed below with some 12 or 13 spines; protarsal scopula of 4th leg very distinct; tarsal scopula divided by a very narrow band of setæ; the rest of the lower surface thickly scopulate. Lower surface of *mandible* covered in its posterior third with a cluster of granules.

Measurements in millimetres. Total length 36; length of carapace 17·3, width 13·5; length of 1st leg 45, of 2nd 41, of 3rd 39, of 4th 51; patella and tibia of 1st 16·5, of 2nd 15, of 3rd 12·5, of 4th 16·3.

Loc. Sierra Leone.

A single female example (*Surgeon-Capt. Clements*).

SELENOGYRUS AUREUS, sp. n. (Plate XLI. figs. 2-2*a*.)

♂.—*Colour*. Body, limbs, and carapace covered with a coating of brownish-yellow hairs, showing a fiery golden tinge, especially on the femora of the legs.

Carapace a little broader than in the female, the width, however, less than the distance between the tubercle and the posterior margin.

Legs long and slender; patella and tibia of 1st and 4th subequal,

longer than carapace; protarsus of 4th also longer than carapace; tarsi four or five times as long as broad; femur of the 3rd leg thicker than the others; tibia of 1st armed with two inferior spines, one median and one basal; tibia of 3rd armed with about 9 spines (2nd legs absent); protarsi of 3rd and 4th copiously spined; protarsus of 1st with an inferior median apical spine.

Tibial spurs. Short spur straight, longer than broad, acuminate, armed below with a strong spine, also beset with bristles; long spur about twice the length of the other, cylindrical, curved, bristly, with a strong superior spine at its apex; also a spine at its base on the outer side.

Palp. Femur with an internal apical spine; tibia with an external apical spine; tarsus with a double scopular pad; spine of palpal organ curved forwards and inwards towards the apex, which ends with a small button-shaped tip resembling that of *Selenocosmia lanipes* but smaller.

Measurements in millimetres. Total length 27; length of carapace 11·5, width 9·5; length of 1st leg 41, of 3rd 34·5, of 4th 45·5; patella and tibia of 1st 14, of 3rd 10, of 4th 14.

Loc. Sierra Leone.

A single male example (without further history).

The male characters of the genus *Selenogyrus* have been taken from the example just described as *S. aureus*, since the latter seems to me to differ from *S. cæruleus* in features only of specific and sexual importance. In separating the two specifically, the colouring of the hairy clothing of the body has been chiefly relied upon. The difference in size, too, may be noted.

Genus Miaschistopus, nov.

♂. *Carapace* longer than wide, cephalic area moderately elevated; fovea deep and transverse; tubercle close to anterior margin. *Eyes* of anterior line a little procurved, the anterior edge of the medians in front of the centre of the laterals; medians and laterals subequal, the long diameter of the latter excelling the diameter of the medians, the short diameter less than it; distance between the medians less than their diameter, but greater than their radius, and a little greater than the distance between the medians and laterals; eyes of posterior line recurved, much smaller than those of anterior, adjacent, the laterals slightly the larger, and separated from the anterior laterals by a space almost if not quite equalling their long diameter.

Mandible armed below with an internal row of 10 teeth and a few granules behind.

Maxilla internally spinulose, scantily clothed with setæ between the suture and the oral fringe.

Labium scantily spinulose apically. *Sternum* wide, subcircular, nearly as wide as long; posterior sigilla remote from the margin, but the distance between them about four times as great as the

distance between them and the margin; the second pair also removed a small distance from the edge.

Legs 4, 1, 2, 3; tarsal scopula of 4th divided by a narrow but distinct band of setæ, of 3rd not divided, with merely a few scattered setæ along the middle line; of 2nd and 1st entire; scopula on 1st protarsus very scanty on the proximal half, not extending to the base, on 2nd covering about half the segment, on the 3rd the distal third of the segment, and the 4th represented by two narrow and scanty bands of scopulate hairs; tibiæ and protarsi of all the legs spiny, as well as the femora and patellæ in part. *Claws* furnished with a row of small teeth.

External spinners about half the length of the carapace; the internal separated by a space which is nearly equal to their length.

Tibia of 1st leg in male not spurred.

MIASCHISTOPUS RAPIDUS, sp. n. (Plate XLI. fig. 5.)

Colour. Carapace covered with yellowish-brown hairs, those on the legs browner and intermixed with blackish setæ; coxæ, sternum, and lower surface of the femora greyer; a band of whitish hairs on tip of femora, patella, tibiæ, and protarsi; abdomen covered below with brownish-yellow hairs; the upper surface naked behind, covered in front with long greyish or reddish erect setæ rising out of a greyish coating of hairs.

Carapace as long as patella and tibia of 3rd leg, excelling patella, tibia, and tarsus of palp, shorter than protarsus of 4th, but longer than the other protarsi by about half the length of their respective tarsi; width of carapace about equal to tibia of 4th, greater than the other tibiæ.

Legs. Patella and tibia of 4th a little excelling those of 1st and excelling the tarsi and protarsi of the 1st, 2nd, and 3rd pairs; patella, tibia, and tarsus of 3rd a little less than those of 1st, and just about equal to those of the 2nd; 1st leg shorter than 4th by about the length of the tarsus, 3rd shorter than 1st by almost the same amount; femora of legs with an internal apical spine, patella of 3rd and 4th with an internal (posterior) spine; tibiæ of all the legs armed with many strong spines, with always a pair and sometimes more at the apex below; protarsi of 1st and 2nd spined beneath at the base and tip of the scopula, the 1st with only one at the base, the 2nd with 2 or 3; protarsi of 3rd and 4th very strongly spined both below and above; tibia of 3rd thick, the width more than one-third of its length. *Palp* extending just past the patella of the 1st leg, its femur armed with an internal apical spine, its tibia with an internal distal cluster of about a dozen spines.

Palpal organ prominent posteriorly at the base, the bulbous part passing without any constriction into the spine, which is exceeding broad basally, where it bears a distinct posterior nodular prominence, and when viewed from the side is triangular, pointed below, the apex being in no sense filiform.

Measurements in millimetres. Total length 22; length of carapace 10, width 9; length of 1st leg 35, of 2nd 32·5, of 3rd 31, of 4th 41; patella and tibia of 1st 12·8, of 4th 13·5; protarsus of 4th 12.

Loc. W. Africa (*Keyserling coll.*). Two male examples.

These two examples are the specimens referred to by Karsch (Berl. ent. Zeits. 1884, p. 350) as the males of *Diplura longipalpis*, Karsch (Zeits. Naturwiss. (3) iv. p. 564, 1879), which was based upon a female from the same area. But the specimens belong neither to the genus *Diplura* nor yet to the family Diplurida. Moreover, the evidence that they are in reality the males of the species named *longipalpis* is to my mind somewhat slender.

[P.S., *July 30th*, 1897.—Since this paper was written and read before the Society in the middle of June, I have discovered in some of the African genera of Theraphosinæ an organ which I believe furnishes a key to their affinities of greater value than those relied upon for grouping them on p. 745. This organ is a curious system of hairs, certainly of a stridulating nature, developed on the anterior side of the upper half of the coxa and trochanter of the 1st and in a lesser degree of the 2nd leg also.

In the diagnosis of *Hysterocrates gigas* mention is made of a "curious brush of hairs on the upper side of the coxa and trochanter" of the limbs in question. When the 1st leg of this species is removed and the organ submitted to closer inspection, under a lens of low power, it will be seen that the so-called brush of hairs consists of a fringe of close-set whitish feathery hairs. On the trochanter this fringe overshadows and probably protects from dirt a number of long, erect, but apically curled stoutish spines arranged somewhat irregularly in two rows. On the coxa the hairs of the fringe become stout and spiniform where, at the base of the segment, they extend downwards towards the coxal suture, and distally some of them become isolated so as to have perfect freedom for vibration. But in addition to these whitish plumose spines there are two long, stout, black, simple spines, the larger being clavate and lying amongst if not above the fringe, the other being situated below it and not expanded at its distal end, but sharply pointed. Below the suture the bases of the upstanding bristles are very stout, black, and shining, while amongst them arise some delicate erect hairs with shining hyaline clavate tips. The large bristles that lie above the suture of the coxa are set in vibration when this segment is rubbed against the adjacent surface of the coxa of the pedipalp, the distal half of which is covered with hairs, amongst which arise a number of long, stout but pointed spines. Similarly, the spiniform bristles on the trochanter are rubbed against the posterior aspect of the trochanter of the pedipalp, which is covered with stiff straight hairs. When the spider is allowed to dry after removal from alcohol, the

stridulation may be easily produced artificially, the notes on the coxa giving rise to a distinct 'click, click' when scraped against the spines on the maxilla, while the spines and hairs on the trochanters produce a sound resembling that which results from the rubbing of silk.

An organ identical in all essential details with that described above is to be met with in all the species known to me that I refer to the following genera:—*Hysterocrates*, *Phoneyusa*, *Monocentropus*, *Anoploscelus*, *Eumenophorus*, and *Encyocrates*. I further venture to prophesy that it will be found both in *Pelinobius* and *Loxomphalia* when these genera come to be re-examined. It does not, on the contrary, exist either in the species of *Scodra* or of *Miaschistopus*, or of *Selenogyrus*: nor in any of the S. European genera examined by me (*Chætopelma*, *Ischnocolus*), nor in those that inhabit Central and South America, all of which I have above referred to the Theraphosinæ.

Taking then into consideration the fact that the genera above mentioned as possessing this organ inhabit the same geographical area—for, so far as the Spiders are concerned, Socotra and Madagascar are distinctly Ethiopian in their affinities,—and that, in addition to the stridulating-organ, they possess other characters in common: for example, the subcentral position of the posterior sternal sigilla [1], the almost total absence of spines on the legs and of teeth on the claws, the absence of tibial spurs in the male, except in *Monocentropus* where there is a small one,—these facts point strongly to the conclusion that these genera constitute a perfectly natural assemblage; an assemblage as natural, that is to say, as the Harpactirinæ, Selenocosmiinæ, or Ornithoctoninæ. I propose therefore to classify them as a subfamily which may be termed the *Eumenophorinæ*. In the table of subfamilies printed on p. 744, this new group will take its place under the heading b^2 as follows:—

b^2. Without any stridulating organ between the mandible and maxilla.	
a^3. A stridulating organ present between the posterior surface of the maxilla and the anterior surface of the coxa of the 1st leg, consisting of a series of strong spines on the distal extremity of the maxilla and on the upper side of the coxa and trochanter of the 1st leg, of a fringe of close-set feathery hairs below and amongst which are some stout, long, plumose or simple bristles constituting the vibratory notes of the organ.	Eumenophorinæ, nov. Tropical Africa, Socotra, Madagascar.
b^3. Without the stridulating organ above described.....	Theraphosinæ.

[1] Their submarginal position in the small example in the Museum referred to *Encyocrates* and mentioned on p. 747 is, I suspect, attributable to immaturity.

The African genera referred to the Theraphosinæ, included under the heading *b* of the table on p. 745 may now be reclassified as follows:—

a. Distal half of posterior surface of maxilla covered with hairs intermixed with stout spines; coxa of 1st leg furnished above the suture with a set of modified, plumose or simple bristles surmounted by a fringe of plumose hairs; a similar fringe upon the trochanter protecting a set of scattered or definitely arranged notes; posterior sternal sigilla subcentral; legs at most spined at the tips of the tibiæ and protarsi; claws untoothed; male (? *Eumenophorus*) without tibial spurs or with but one. Subfamily EUMENOPHORINÆ.

a'. Thoracic fovea forming a transversely elongate pit (see under a^6, b^6 on p. 746). *Monocentropus* and *Anoploscelus*.

b'. Thoracic fovea forming a crescentically procurved groove (see under b^7 on p. 746). *Eumenophorus, Hysterocrates, Phoneyusa*.

b. Distal end of posterior surface of maxilla mesially naked, striate, neither spinous nor hairy; no feathery fringe on upper side of coxa or trochanter of first leg, the area of the coxa above the suture furnished with simple or spiniform hairs (claws toothed, 4th tarsus divided by band of setæ, not always very distinct in *Scodra*).

a^2. Legs without spines, copiously hairy, ocular tubercle low, wide (thoracic fovea shallow, transverse, &c.) ..... *Scodra*.

b^2. Tibiæ and protarsi, especially of posterior legs, strongly spined; legs normally hairy; ocular tubercle convex; eyes compact.

a^3. Thoracic fovea crescentically procurved; sternal sigilla submarginal; anterior tibia of male without spurs ..... *Selenogyrus*.

b^3. Thoracic fovea straight, transverse; sternal sigilla removed from the margin; anterior tibia of male unarmed ..... *Miaschistopus*.

R. I. P.]

EXPLANATION OF THE PLATES.

PLATE XLI.

Fig. 1. *Monocentropus balfouri*, gen. et sp. n.: palpal [1] organ (p. 759).
1 *a*. " " " tibial spur of ♂ (p. 759).
2. *Selenogyrus aureus*, gen. et sp. n.: palpal organ (p. 768).
2 *a*. " " " tibial spurs (p. 768).
3. *Anoploscelus celeripes*, gen. et sp. n.: palpal organ (p. 760).
4. *Hysterocrates laticeps*, sp. n., ♂: carapace (p. 765).
4 *a*. " " " posterior leg, external side (p. 765).
4 *b*. " " " palpal organ (p. 765).
4 *c*. " *crassipes*, sp. n., ♀: posterior leg, external side, to compare with 4 *a* (p. 764).
5. *Miaschistopus rapidus*, gen. et sp. n.: palpal organ (p. 770).
6. *Heterothele spinipes*, sp. n.: palpal organ (p. 757).
7. *Acanthodon lacustris*, sp. n.: labium and sternum, to show sternum typical of the *Idiopinæ* (p. 731).
7 *a*. " " eyes (p. 731).
7 *b*. " " patella and tibia of 3rd leg, showing absence of excavation on tibia (p. 731).
8. *Heligmomerus somalicus*, sp. n.: eyes (p. 729).
8 *a*. " " patella and tibia of 3rd leg, showing excavation at base of tibia (p. 729).

[1] In this and all cases the palpal organ is drawn from its external aspect.

PLATE XLII.

Fig. 1. *Moggridgea whytei*, sp. n.: carapace (p. 733).
1 *a*. " " sternum and labium (p. 733).
1 *b*. " " eyes (p. 733).
2. *Stasimopus oculatus*, sp. n.: sternum, labium, and right maxilla (p. 728).
2 *a*. " " eyes (p. 728).
2 *b*. " " tuft of spines at apex of 4th protarsus beneath (p. 728).
3. *Eubrachycercus smithii*, gen. et sp. n.: eyes (p. 739).
4. *Brachionopus robustus*, gen. et sp. n.: eyes, showing much greater width of clypeus as compared with fig. 3 (p. 740).
5. *Ceratogyrus darlingii*, gen. et sp. n., ♀, nat. size (p. 754).

PLATE XLIII.

Fig. 1. *Ceratogyrus darlingii*, gen. et sp. n., ♀: carapace from above (p. 754).
1 *a*. " " " carapace from the side (p. 754).
2. " *marshalli*, sp. n., ♂: carapace from above (p. 754).
2 *a*. " " " palpal organ (p. 754).
2 *b*. " " " side view of tibia and protarsus of anterior leg to show tibial spur (p. 754).
3. *Pterinochilus vorax*, gen. et sp. n., ♂: carapace from above, to show form of fovea as compared with figs. 1 and 2 (p. 752).
3 *a*. " " " spinners (p. 752).
3 *b*. " " " eyes (p. 752).
3 *c*. " " " upper view of extremity of 1st leg, to show curvature of protarsus (p. 752).
3 *d*. " " " external aspect of mandible, to show absence of stridulating setæ on area below scopula (p. 752).
3 *e*. " " " inner surface of maxilla, to show normal hairs between suture and oral fringe (p. 752).
4. " *murinus*, ♀: eyes, showing narrow clypeus as compared with 3 *b* (p. 753).
5. *Harpactira tigrina*, Auss.: spinners, to compare with fig. 3 *a* (p. 748).
5 *a*. " *chrysogaster*, sp. n., ♂: external aspect of mandible to show stridulating setæ below scopula, to compare with 3 *d* (p. 750).
5 *b*. " " inner surface of maxilla, showing presence of feathery stridulating hairs between suture and oral fringe, to compare with 3 *e* (p. 750).
6. *Phoneyusa gregorii*, sp. n.: palpal organ (p. 761).
6 *a*. " " femur of palp, showing feathery scopula (p. 761).
7. *Scodra griseipes*, sp. n., ♂: palpal organ (p. 756).
7 *a* " " extremity of 1st leg (p. 756).
8. " *brachypoda*, sp. n., ♂: palpal organ (p. 757).
8 *a*. " " extremity of 1st leg, showing absence of tuft and of curvature on protarsus (p. 757).

NOTE.—The following species has been inadvertently omitted from the preceding pages:—*Hapalopus africanus*, Simon (Ann. Soc. Ent. France, 1887, p. 275), from Assinie, W. Africa.

Hapalopus was based upon a South-American species, with which *africanus* of Simon, with its procurved thoracic fovea, does not seem to be congeneric. Probably *africanus* will be found to be referable to the genus described above as *Selenogyrus*.

3. A List of the Lepidopterous Insects collected on the Red Sea, in the neighbourhood of Suakim, by Mr. Alfred J. Cholmley. By Emily Mary Sharpe [1].

[Received June 1, 1897.]

The present collection was made by Mr. A. J. Cholmley, who accompanied the late Mr. Theodore Bent on his expedition to the Red Sea, north of Suakim, during January, February, and March 1896.

Although there are no new species, the collection is very interesting, on account of his having obtained specimens of *Iolaus nursei*, Butler, and *Heliothis pictifascia*, Hampson, which were recently discovered by Captain Nurse.

Family Danaidæ.

1. Limnas chrysippus (Linn.), Sharpe, P. Z. S. 1896, p. 523.

a–c. ♂ ♀. Ambaia Erba, Soudan, Febr. 24, 1896.

2. Limnas alcippus (Cram.), Butler, P. Z. S. 1884, p. 481.

a, *b*. ♂. Ambaia Erba, Soudan, Febr. 24, 1896.
c. ♂. "Mahomet Ghule," Soudan, Febr. 3, 1896.

3. Limnas klugii (Butler), Sharpe, P. Z. S. 1896, p. 524.

a. ♂. "Mahomet Ghule," Soudan, Febr. 3, 1896.
b. ♀. Ambaia Erba, Soudan, Febr. 24, 1896.
c. ♀. Wadi, foot of Erba, Soudan; 2000 feet above the sea. Febr. 19, 1896.

Family Nymphalidæ.

4. Pyrameis cardui (Linn.), Sharpe, P. Z. S. 1896, p. 524.

a, *b*. Suakim Garden, Jan. 20, 1896.
c, *d*. Halaib, Red Sea, Jan. 15, 1896. "Very common."

5. Junonia cebrene, Trimen, Sharpe, P. Z. S. 1896, p. 524.

a–c. ♂. Ambaia Erba, Soudan, Febr. 24, 1896.
d. ♀. Ambaia Erba, Soudan, Febr. 24, 1896.

6. Hypolimnas misippus (Linn.), Sharpe, P. Z. S. 1896, p. 525.

a. Wadi, Ambain Erba, Soudan, Febr. 25, 1896.

Family Lycænidæ.

7. Lycæna bætica (Linn.), Sharpe, P. Z. S. 1896, p. 525.

a–g. Erba Mountain, Soudan, Febr. 7, 1896.

8. Lycæna trochilus (Frey), Sharpe, P. Z. S. 1896, p. 525.

a. Wadi, Ambaia Erba, Soudan, Febr. 25, 1896.

[1] Communicated by Dr. Bowdler Sharpe, F.Z.S.

9. Lycæna gaika, Trimen, Sharpe, P. Z. S. 1896, p. 525.
a–b. Wadi, Ambaia Erba, Soudan, Febr. 24, 1896.

10. Chloroselas esmeralda, Butler, P. Z. S. 1896, p. 251.
a. Wadi, Ambaia Erba, Soudan, Febr. 25, 1896.

11. Iolaus nursei, Butler, P. Z. S. 1896, p. 251, pl. x. fig. 16.
a–c. Wadi, Ambaia Erba, Soudan, Febr. 24, 1896.

12. Lycænisthes amarah (Lefebre), Sharpe, P. Z. S. 1896, p. 525.
a–c. ♂ ♀. Halaib, Red Sea, Jan. 1896. "Very common."
d–j. ♀. Wadi, Ambaia Erba, Soudan, Febr. 25, 1896.

Family Pieridæ.

13. Teracolus eulimene (Klug), Kirby, Syn. Cat. Diurn. Lepid. p. 503 (1871).
a–e. Ambaia Erba, Soudan, Febr. 24, 1896.

14. Teracolus phisadia (Godt.), Butler, P. Z. S. 1884, p. 488.
a. Wadi Gabait, Soudan, Febr. 16, 1896. "Only one seen."

15. Teracolus chrysonome (Klug), Sharpe, P. Z. S. 1896, p. 527.
a–g. Halaib, Red Sea, Jan. 14, 1896. "Very common."
h–i. ♂ ♀. Halaib, Red Sea, Jan. 15, 1896. "Very common."
j–m. ♂. Wadi, Ambaia Erba, Soudan, Febr. 25, 1896.
n. ♀. Wadi, Ambaia Erba, Soudan, Febr. 26, 1896.
o–p. ♂. Shelal Mountain, Soudan, Febr. 26, 1896.

16. Teracolus protomedia (Klug), Sharpe, P. Z. S. 1896, p. 527.
a–e. ♂. Shelal Mountain, Soudan, Jan. 1896.
f. ♀. Near Shelal Mountain, Soudan, Jan. 27, 1896.
g. ♂. Wadi, Ambaia Erba, Soudan, Febr. 25, 1896. "Common everywhere."

17. Teracolus daira (Klug), Kirby, *t. c.* p. 503 (1871).
a. ♀. Below Shelal Mountain, Soudan, Jan. 26, 1896.

18. Teracolus simplex, Butler, P. Z. S. 1876, p. 148.
a. ♂. Wadi, Ambaia Erba, Soudan, Febr. 25, 1896.

19. Teracolus liagore (Klug), Kirby, *t. c.* p. 503 (1871).
a, b. ♂. Halaib, Red Sea, Jan. 1896. "Common."
c, d. ♂. Shelal Mountain, Soudan, Jan. 28, 1896. "Common."

20. Teracolus dedecora (Feld.), Kirby, *t. c.* p. 502 (1871).
a. ♂. Halaib, Red Sea, Jan. 14, 1896. "Not many."
b. ♂. Shelal Mountain, Soudan, Jan. 28, 1896.
c. ♀. Suakim, Jan. 20, 1896.

d–f. ♂ ♀. Erba Mountain, Soudan, Febr. 7, 1896.
g–j. ♂ ♀. Wadi, Ambaia Erba, Soudan, Febr. 25, 1896. "Common all through the Erba Mountain."

21. TERACOLUS LEO, Butler, Sharpe, P. Z. S. 1896, p. 528.
a. ♂. Halaib, Red Sea, Jan. 15, 1896. "Only one seen."
b. ♂. Erba Mt., Soudan, Febr. 7, 1896.

22. CATOPSILIA FLORELLA (Fabr.), Sharpe, P. Z. S. 1896, p. 528.
a–c. ♂ ♀. Wadi Hamboulli, Erba Mt., Soudan, Febr. 16, 1896.

23. SYNCHLOE GLAUCONOME (Klug), Sharpe, P. Z. S. 1896, p. 528.
a–b. Halaib, Red Sea, Jan. 14, 1896. "Very common."
c. Wadi, Gabait, Soudan, Febr. 16, 1896.
d. Wadi, Ambaia Erba, Soudan, Febr. 25, 1896.

Family HESPERIDÆ.

24. SARANGESA PERTUSA (Mabille), Sharpe, P. Z. S. 1896, p. 528.
a. Wadi Harboul, Erba Mt., Soudan, Febr. 22, 1896. "This was the only specimen seen."

HETEROCERA.

Family NOCTUIDÆ.

25. HELIOTHIS PICTIFASCIA, Hampson, P. Z. S. 1896, p. 259, pl. x. fig. 8.
a. Shelal Mt., Soudan, Jan. 26, 1896.

26. HYPENA MASURIALIS (Guenée), Butler, P. Z. S. 1894, p. 590.
a. Shelal Mt., Soudan, Jan. 26, 1896.

Family LITHOSIIDÆ.

27. DEIOPEIA PULCHELLA (Linn.), Sharpe, P. Z. S. 1896, p. 529.
a–c. Halaib, Red Sea, Jan. 14, 1896. "Very common."
d. Shelal Mt., Soudan, Jan. 26, 1896.

Family GEOMETRIDÆ.

28. EUBOLIA DISPUTARIA, Guenée, Phal. ii. p. 489 (1857).
a, *b*. Wadi, Ambaia Erba, Soudan, Febr. 26, 1896.

Family PYRALIDÆ.

29. PYRALIS NUDALIS, Hübn. Europ. Schmett., Pyral. p. 14, fig. 90.
a. Suakim Garden, Febr. 1896.

4. Description of two new Species of Slugs of the Genus *Parmarion* from Borneo.

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[Received June 2, 1897.]

(Plate XLIV.)

The two new species of *Parmarion* here described were collected by Mr. A. H. Everett at Lombok, Borneo, and forwarded to Mr. Edgar A. Smith, of the British Museum, who has very kindly placed the same in my hands for identification.

The perfect specimens and dissected parts have been placed in the collection of the British Museum, South Kensington.

In 1895 I described, in conjunction with Lieut.-Col. H. H. Godwin-Austen, F.R.S.[1], a series of forms from Borneo allied to those now received, and I am very pleased to be able to examine further material from this interesting region.

In the above-mentioned paper we expressed the hope that further material would be obtained from Borneo, in order that our knowledge of the genera *Parmarion*, *Microparmarion*, *Damayantia*, &c., might be increased. One of the species here described, *P. intermedium*, may, I think, be regarded as a connecting link between the genus *Parmarion* and *Microparmarion*.

PARMARION EVERETTI, n. sp.

Hab. Lombok (2000 ft.), Borneo (*A. H. Everett*).

Shell oval in form, almost flat, amber-coloured; lines of growth well marked, apex obscure, borders membranaceous, hidden by the mantle.

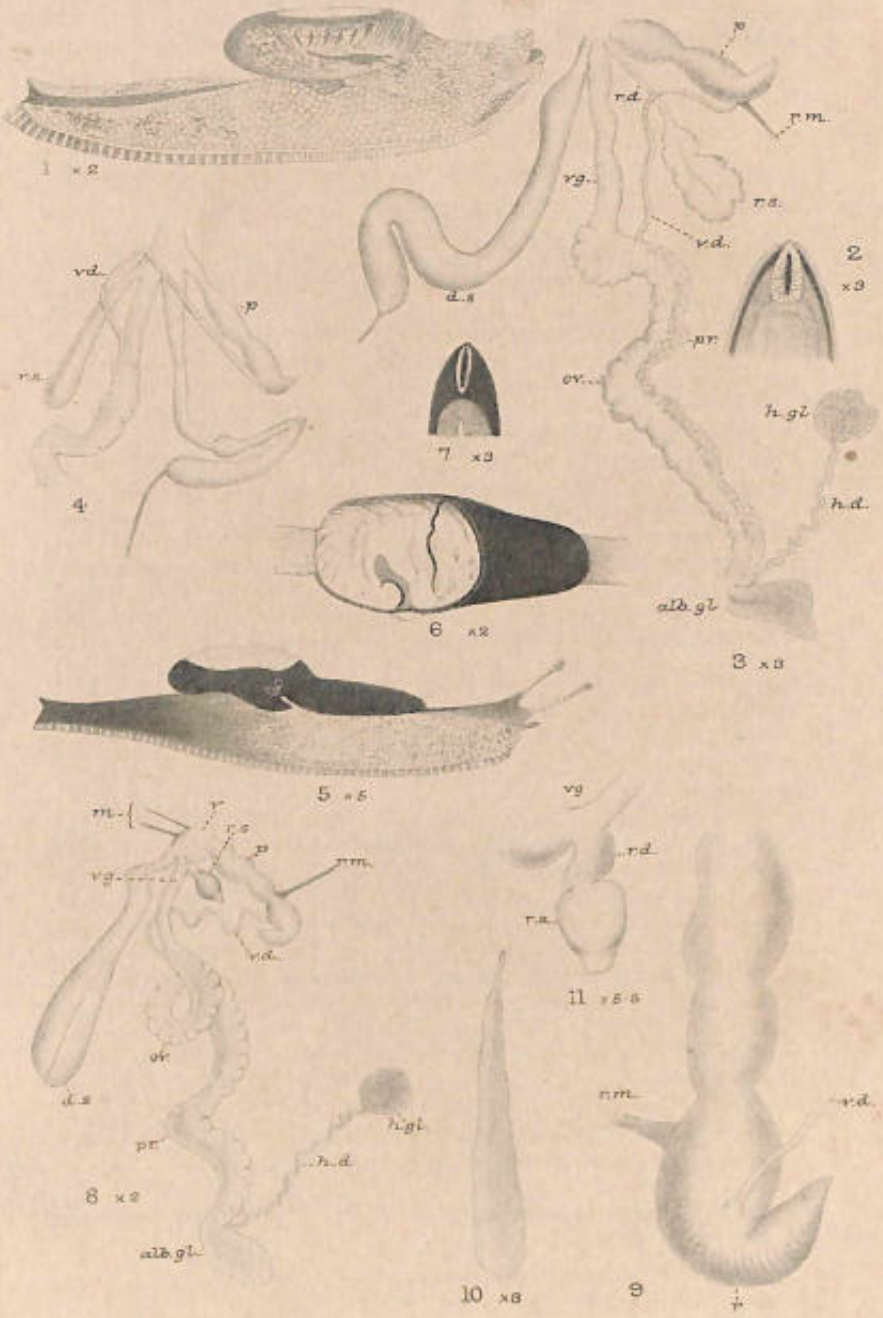
Major diam. 16 millim.; minor diam. 12 millim.

Animal (Pl. XLIV. fig. 1) greenish grey, head dark green with light brown portion in mid-dorsal line; sides of head yellow. Mantle-lobes yellowish brown, with fine dark blue speckles and blotches. Commencing beneath the visceral mass, where the dorsum is flat and very pale yellow in colour, are two dark brown bands, shading posteriorly to black, which pass backwards and slightly downwards, terminating at each side of the caudal mucous pore; posteriorly the sides of the body are speckled with black. Rugæ not prominent. Foot-fringe yellow, with somewhat broad chocolate-coloured lineoles, narrowing and becoming lighter in the anterior region. Foot-sole divided into median and lateral planes, the former yellow in colour, the latter greenish grey. Caudal mucous pore a vertical slit, not extending to the foot-sole (Pl. XLIV. fig. 2).

Length (in alcohol) 42 millim.

I have much pleasure in associating with this species the name of Mr. A. H. Everett.

[1] "On the Structure and Affinities of some new Species of Mollusca from Borneo," Proc. Zool. Soc. 1895, pp. 241–250, pls. xi.–xiv.



W.E.C. del ad nat.

West, Newman imp.

Slugs of the Genus Parmarion.

Anatomy of the Generative Organs.

The vagina is a thick-walled tube slightly constricted in its upper portion; from the lower portion the receptacular duct arises, as a narrow, somewhat long tube, enlarging into a globose receptaculum seminis; in the example examined this was empty and presented the large leaf-like appearance shown in the figure (Pl. XLIV. fig. 3 *r.s.*). The penis is short and constricted in its lower half, its upper portion being bead-like (Pl. XLIV. fig. 3 *p*), a feature common to a large number of species, the vas deferens passes off from the inner side (left-hand side) of the penis. The retractor muscle has its attachment immediately above the commencement of the vas deferens. The common duct formed by the oviducal and prostatic canals is thrown into a series of closely wound folds. The albumen-gland is somewhat ovoid in form. The hermaphrodite gland is a small oval-shaped body, attached to the thin convoluted tube, the hermaphrodite duct. The dart-sac is a comparatively short, wide tube, folded upon itself at its upper portion; unfortunately no dart was present.

Affinities.

The nearest species, as regards the internal anatomy, to this species is the *P. martensi*, Simr., in which species (*cf.* Pl. XLIV. fig. 4, reproduced from Simroth's original figure[1]) we have the elongated form of the receptaculum seminis and a similar shaped penis. *P. everetti* differs however from *P. martensi* in the altogether different shaped dart-sac; in the latter species this organ is constricted in its middle, the upper half being bent upon itself. Externally the two species are quite unlike.

PARMARION INTERMEDIUM, n. sp.

Hab. Lombok (1500 ft.), Borneo (*A. H. Everett*).

Shell oval in form, convex, membranaceous borders larger than in *P. everetti*, and covered by the mantle, amber-coloured; lines of growth well marked, apex obscure.

Major diam. 18·5 millim.; minor diam. 12·5 millim.

Animal (Pl. XLIV. figs. 5 & 6) very dark green, almost black, lighter beneath the mantle; sides of the body greenish brown; posterior region of the body very dark green, almost black, becoming lighter anteriorly. Mantle-lobes black. Rugæ not very prominent, elongated in the posterior region. Foot-fringe nearly black, with fine yellow lineoles. Foot-sole divided into median and lateral planes, the former yellow in colour, the latter almost black. Caudal mucous pore a deep vertical slit, not extending to the foot-sole, the sides of the pore are white (Pl. XLIV. fig. 7).

Length (in alcohol) 43 millim.

Anatomy of the Generative Organs.

The vestibule commences as a wide pouch-like cavity, from

[1] Zool. Ergebnisse einer Reise in Niederländisch Ost-Indien, 1893, pl. viii. fig. 20.

which the vagina opens as a thick-walled tube; at the junction of the tube-like portion with the wider cavity, a very short receptacular duct opens, which leads into a large, somewhat pyriform-shaped receptaculum seminis (Pl. XLIV. figs. 8 & 11). The penis is short, though rather longer than that in *P. everetti*; the surface of its distal end is thrown into a series of ridges (Pl. XLIV. fig. 9 *r*): these are more conspicuous on the ventral side. The vas deferens passes off from the ventral side, as shown in fig. 9. The retractor muscle has its attachment much lower than in *P. everetti* (Pl. XLIV. figs. 3 & 8, *r.m.*), being below the vas deferens as in *P. pupillaris*, Humb. The common duct, consisting of the oviduct and prostate, is wound round upon itself and closely folded. There is a comparatively small albumen-gland. The hermaphrodite gland is a small oval-shaped body, attached to a densely convoluted tube, the hermaphrodite duct. The dart-sac is a large, thick muscular-walled organ, slightly twisted at its lower end. The dart (Pl. XLIV. fig. 10) is an irregular shaped body, solid throughout, non-calcareous, broad at its base and tapering at its free end.

Affinities.

The shape and size of the dart-sac and dart, the short receptacular duct, the position of the opening of the vas deferens into the penis, and the minor differences in the form of the penis and vagina, separate *P. intermedium* from any other known species of this genus. I am inclined to regard it, as I have hinted by its name, as an intermediate form connecting the genera *Parmarion* and *Microparmarion*. The receptacular duct is considerably shorter than that in *P. pupillaris*, Humb., figured and described by Simroth[1]. *P. pupillaris* is undoubtedly its nearest ally, but it differs from this species in the shorter length of the receptacular duct, the large and pyriform-shaped receptaculum seminis, the position which the duct opens into the vagina, the shape and size of the dart-sac and dart (*cf.* Simroth, *op. cit.* pl. viii. fig. 17), and the minor differences, such as the position which the vas deferens opens into the penis, the shape of this latter organ and the albumen-gland, &c.

The characters of these two genera are described by Simroth[2] as follows:—"*Parmarion* s.s.: Die Mantelkante springt stark vor. Die Schale ist eine zarte Kalkplatte, ähnlich wie bei *Limax*, mit einer kräftigen glänzenden Epidermis, die sich rechts und links über den Rand fortsetzt. Der Liebespfeil ist am Ende in schrägem Schlitz geöffnet. Der Penis ist gerade gestreckt, sein Lumen entspricht in der Form seinem äusseren Umfange. Receptaculum gestielt.

"*Microparmarion*: Die Mantelkante verwischt sich. Die dünne, von glänzender Epidermis überzogene Schalenplatte hat (z. T.)

[1] *Op. cit.* p. 106, pl. viii. fig. 16.
[2] *Op. cit.* p. 104.

an der Unterseite noch einen Rest von Gewinde. Der Liebespfeil hat eine solide Kalkspitze. Der Penis ist ein dünner, in der geraden Scheide mehrfach zusammengekrümmter Schlauch, so dass das innere Lumen dem äusseren Umfange durchaus unähnlich ist. Receptaculum sitzend."

After a careful perusal of the literature on these and allied genera, and a comparison of Simroth's figures with the material from Borneo, I fail to see where the line can be drawn between *Parmarion* and *Microparmarion*. In both genera the shell is variable. In the latter genus Simroth says the dart has a solid calcareous point, whereas in the former he describes it as being open at the end in the form of an oblique slit. In *Parmarion intermedium, the dart is solid, non-calcareous, and there is no opening of any description*. In *Parmarion* he describes the penis as being long and straight, whereas in *Microparmarion* it is thinner and constricted; but I would point out that in *Microparmarion pollonerai*, Cllge. & G.-A.[1], there is a long and straight penis. The value of the sessile receptaculum seminis is lessened by the condition which obtains in *P. pupillaris*, Humb., and more so by that in *P. intermedium*.

From the above facts it will be seen that the two genera, as well as allied genera, are as yet but ill-defined, and that satisfactory characters are yet wanting to define the precise limits of each genus. I therefore sincerely hope that further material may be forthcoming from Borneo and elsewhere whereby sound generic characters may be established for these very interesting molluscs.

EXPLANATION OF PLATE XLIV.

Fig. 1. *Parmarion everetti*, n. sp. View from right side, × 2 (p. 778).
2. Caudal mucous pore, × 3 (p. 778).
3. Generative organs, × 3 (pp. 779, 780).
4. Parts of the generative organs of *Parmarion martensi*, Simr. (after Simroth), (p. 779).
5. *Parmarion intermedium*, n. sp. View from right side, × ·5 (p. 779).
6. Visceral mass, showing spiral fold, × 2 (p. 779).
7. Caudal mucous pore, × 3 (p. 779).
8. Generative organs, × 2 (p. 780).
9. Enlarged figure of penis, showing ventral side (p. 780).
10. Dart, × 3 (p. 780).
11. Receptaculum seminis and duct, × 5·5 (p. 780).

Lettering.

alb.gl. Albumen gland.
d.s. Dart-sac.
h.d. Hermaphrodite duct.
h.gl. Hermaphrodite gland.
m. Muscles attached to vagina.
ov. Oviduct.
p. Penis.
pr. Prostate.
r.m. Retractor muscle.
r.d. Receptacular duct.
r.s. Receptaculum seminis.
v. Vestibule.
v.d. Vas deferens.
vg. Vagina.

[1] Proc. Zool. Soc. 1895, pl. xiii. figs. 22-23.

5. Remarques sur certains Oiseaux supposés nouveaux. Par le Dr. Alph. Dubois, Conservateur au Musée roy. d'Hist. nat. de Belgique, C.M.Z.S.

[Received June 4, 1897.]

1. Tiga borneonensis, sp. nov.

Mas. *Proxima* T. everetti, *sed collo postico et dorso summo nigerrimis.*

Fœm. *Mari simillima, sed cristâ nigrâ sine rubro; fronte longitudinaliter fulvo-striolato.*

Hab. Bornéo.

Ce Pic tient à la fois du *T. javanensis*, par la coloration de toutes ses parties supérieures, et du *T. everetti*, par les bandes noires transversales des parties inférieures. Mais la femelle diffère, surtout de celle du *T. everetti*, par l'absence de rouge à l'extrémité des plumes occipitales, par sa nuque noire et par la présence de stries fauves sur le devant de la tête[1]. Ces caractères distinctifs permettent de reconnaître facilement le *T. borneonensis* des espèces voisines.

Mâle adulte. Dessus de la tête, huppe occipitale, bas du dos et croupion d'un rouge vif; sommet du dos et nuque noirs; manteau et couvertures des ailes d'un vert olive, toutes les plumes bordées de jaune orangé; rémiges primaires d'un brun noirâtre avec de grandes taches ovalaires blanches sur la barbe interne; les secondaires ont leur barbe externe d'un jaune olive, l'interne brune ornée également de taches ovalaires blanches; couvertures de la queue olivâtres bordées de rouge, les plus longues brunes; queue noire; côtés de la tête et du cou blancs, mais divisés, de chaque côté, par deux bandes noires: l'une partant derrière l'œil et se confondant dans le noir de la nuque, l'autre, tachetée de blanc, descendant de la commissure du bec et se terminant sur les côtés du cou en formant un large croissant; gorge blanche avec des taches noires sur la ligne médiane; les autres parties inférieures blanches, lavées de roussâtre et barrées transversalement de noir. Bec d'un gris brunâtre; pattes grises.

Femelle adulte. Diffère du mâle en ce qu'elle n'a pas de rouge sur la tête; celle-ci, de même que la huppe occipitale, est d'un noir profond, avec une strie fauve au centre des plumes du devant de la tête; plumes près des narines d'un fauve presque uniforme.

Long. totale	200	millim.
„ aile	122	„
„ queue	71	„
„ bec	26	„
„ tarse	23	„

[1] Je ne connais pas en nature le *T. everetti*, et je fais ma comparaison d'après la description du Marquis de Tweeddale et de la planche qui l'accompagne. Cet auteur dit en effet de la femelle: "Differs from the male in having the top of the head dark uniform brown, almost black, the crest-plumes being *terminated with crimson*." (Proc. Zool. Soc. 1878, p. 613, pl. xxxvii.)

Les deux sexes ainsi décrits font partie des collections du Musée de Bruxelles et proviennent de Bornéo, mais j'ignore de quelle partie de l'île.

2. MELANERPES sp. inc.

Le Musée d'Histoire naturelle de Belgique possède un mâle de provenance inconnue (no. 535 du Cat.) qui diffère du vrai *M. cruentatus* par l'absence de raie sourcilière blanche, cette partie étant noire, mais il possède la bande nucale jaune.

J'attire l'attention des ornithologistes sur cette forme, qui est peut-être une espèce distincte, ou tout au moins une race géographique confondue avec le *M. cruentatus* ou avec le *M. rubrifrons*.

Voici les caractères distinctifs des trois formes appartenant à ce groupe :

a.	Avec une bande nucale jaune :	
a'.	Avec une raie sourcilière blanche	*cruentatus*.
b'.	Sans raie sourcilière blanche	sp.? (Mus. Brux.).
b.	Sans bande nucale jaune et sans raie sourcilière blanche.	*rubrifrons*.

3. MESOPICUS POLIOCEPHALUS (Cuv.).

Dendrobates poicephalus, Sw.—*M. goertan* (part.), auct. plurim. nec Gm.

Cet oiseau a été admis tantôt comme espèce distincte, tantôt comme synonyme du *M. goertan*. Le Dr. G. Hartlaub dit que c'est bien à tort que Bonaparte, Pucheran et Malherbe l'ont réuni à ce dernier, vu que la coloration des rectrices les différencie suffisamment, et que le *poliocephalus* est d'ailleurs sensiblement plus petit[1]. Mais plus récemment M. Edw. Hargitt réunit également les deux formes[2]. Je pense cependant que M. Hartlaub a raison, à en juger par un spécimen du Musée de Bruxelles.

La question de coloration n'y est cependant pour rien, car chez le *goertan* comme chez le *poliocephalus* on voit des individus chez qui les taches blanches des rectrices latérales sont fortement ou faiblement accentuées ; il en est de même de la teinte jaune ou rougeâtre des parties abdominales, qui est parfois complètement absente chez des individus des deux formes.

Le seul caractère réside donc dans la taille, mais celui-ci est très appréciable. Voici les mesures comparatives des deux formes:—

	M. goertan.	*M. poliocephalus*.
Long. totale	160 millim.	139 millim.
„ ailes	109 „	85 „
„ queue	66 „	50 „
„ bec	25 „	18 „
„ tarse	22 „	19 „

Comme on le voit, la différence de taille est assez considérable et suffisante pour admettre le *M. poliocephalus* comme variété ou sous-espèce.

[1] Hartlaub, 'Ornith. Westafrica's,' p. 179.
[2] 'Cat. Birds Brit. Mus.' xviii. p. 368.

4. VINAGO SALVADORII, subsp. nov.

Treron crassirostris, Dub. (nec Fras.), Bull. Mus. roy. Hist. nat. Belg. iv. p. 149 (1886).

Treron nudirostris (part.), Reichenow, Journ. f. Orn. 1892, p. 16.

Vinago calva (part.), Salvad. Cat. B. Br. Mus. xxi. p. 20 (1893).

Vinago nudirostris, Rchw. (nec Sw.), Vög. Deutsch-Ost-Afr. p. 72 (1894).

V. calvæ *similis, sed colore viridi flaviore distinguenda.*

Hab. Afrique tropicale orientale et centrale.

En comparant des sujets du *V. calva* du Tanganyka à ceux de l'Afrique occidentale, mon attention fut attirée par la différence de coloration des parties vertes, beaucoup plus jaunes que chez ces derniers. Cette différence de teinte rapproche le Pigeon en question du *V. wakefieldi*, dont il ne paraît se distinguer que par la coloration de la queue.

Dans sa monographie des Pigeons[1], M. le Comte Salvadori dit au sujet du *V. calva*: "Those from Central Africa and from Kilimanjaro are brighter, having the head, neck, and both under and upper parts yellower, and the grey band at the apical portion of the tail lighter." Ceci se rapporte bien à mes oiseaux du Tanganyka; mais, pour plus de certitude, j'ai envoyé l'un d'eux à notre savant confrère de Turin, et voici ce qu'il me répond par rapport à ce Pigeon:—

". . . Votre exemplaire appartient à l'espèce nommée *calva* dans le 'Cat. Birds Brit. Mus.' Mais il est possible que sous ce nom j'ai compris deux espèces: la vraie *calva* et une espèce peut-être pas encore nommée, à laquelle le Dr. Reichenow donne le nom de *V. nudirostris*; mais selon moi, il y a là une erreur, parce que la *nudirostris*, Sw., est du Sénégal et ne diffère pas des sujets du Loango et d'Angola."

La différence de coloration étant constante entre les sujets du *V. calva* de l'Afrique occidentale et ceux de l'Afrique orientale et centrale, mais cette différence n'étant pas suffisante pour ériger en espèce cette forme orientale, je propose de la distinguer du type spécifique comme variété géographique, que je dédie à notre savant confrère, M. le Comte T. Salvadori.

6. Contributions to the Non-Marine Fauna of Spitsbergen. Part I. Preliminary Notes, and Reports on the Rhizopoda, Tardigrada, Entomostraca, &c. By D. J. SCOURFIELD[2].

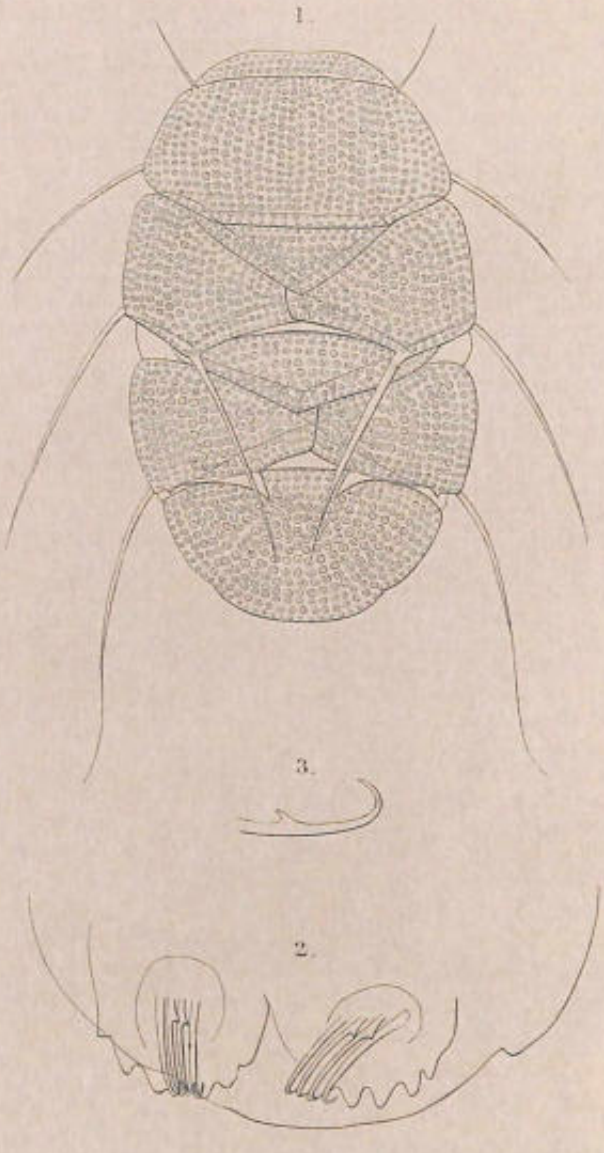
[Received June 10, 1897.]

(Plate XLV.)

During the expedition to Spitsbergen under Sir W. Martin Conway in the summer of 1896, Dr. J. W. Gregory made several collections

[1] "Cat. Birds Brit. Mus." xxi. p. 22.

[2] Communicated by Dr. J. W. GREGORY, F.Z.S.



D.J.Scourfield del. Mintern Bros. lith.

ECHINISCUS SPITSBERGENSIS.

of Mosses in the neighbourhood of Advent Bay, Ice Fiord, which he very kindly allowed me to examine for microscopic organisms. Contrary to what might have been anticipated perhaps, it was found that these mosses harboured a very considerable fauna and flora, and as very little information has hitherto been available relating to the land-fauna of Spitsbergen, it has been thought desirable to bring together in the present paper the notes made during the examination, notwithstanding the fact that the different groups of organisms have been very unequally studied.

So far as concerns the essentially microscopic forms, we owe the earliest contribution on the subject to Dr. A. von Goes, who in 1862 published a short note ("Om Tardigrader, Anguillulæ m.m. från Spetsbergen," Öfver. K. Vet.-Akad. Förh. 1862, p. 18), in which he recorded the occurrence of 1 Tardigrade, 4 Nematoids, 2 Rotifers, and about 50 kinds of Diatoms, in mosses from Spitsbergen. But we are mainly indebted for the little already known to that indefatigable worker and prince of microscopists, C. G. Ehrenberg, who, in 1874, published a paper on "Das unsichtbar wirkende Leben der Nord-polarzone" (Die zweite deutsche Nord-polarfahrt in 1869–70, Band ii. Leipzig, pp. 437–467, 4 Plates), in which it is recorded that during the first German Polar Expedition in 1867 some mosses and moss-like plants were collected from Spitsbergen, and that these were found to contain, when examined in 1869, nearly a score of species of microscopic animals and plants, viz., 5 Diatoms, 2 (possibly 3) Rhizopods, 6 Infusorians, 2 Nematoids, 1 Rotifer (and the egg of another), and 1 Mite. Further allusion will be made to some of these under the different groups to which they belong. So far as I have been able to ascertain, nothing else has been published in connection with the smaller non-marine forms, but there exist papers or at least notes on Acaroids from Spitsbergen, by T. Thorell ("Om Arachnider från Spetsbergen och Beeren-Eiland," Öfversigt af Kongl. Vetenskaps-Akad. Förhandlingar 1871, Stockholm, pp. 683–701), and by E. Trouessart ("Note sur les Acariens recueillis au Spitzberg &c.," Nouvelles Archives des missions scientifiques, v., Paris 1893, p. 255); on Entomostraca (*Apus glacialis* only) by Lilljeborg; and on Insects by Malmgren, Holmgren, and many others.

The mosses brought home by Dr. Gregory represented fourteen different collections, thirteen of which were simply enclosed in tin boxes, whilst the remaining collection, which also contained algæ, was preserved in spirit. The mosses comprised many different species, and Mr. W. E. Nicholson of Lewes, who very kindly examined specimens of the commoner forms, was able to identify the following:—*Aulacomnium turgidum*, *Cynodontium wahlenbergii*, *Hypnum trifarium*, *H. stellatum*, *H. uncinatum*, *Polytrichum juniperinum* and *P. sexangulare*. Strangely enough there was no Sphagnum, and in fact Dr. Gregory tells me that this moss is comparatively scarce and local in Spitsbergen. As regards condition, the mosses were very varied, some being wet and clean, others drier and loaded

with earth, so that the samples may probably be considered as fairly typical.

Before passing to the detailed notes upon the various groups of animals represented in the mosses, a few words on two of the more general results of the examination may not be out of place. First as regards the relative importance of the different groups from the point of view of their abundance. In this connection it may be remarked that although the micro-plants were not systematically looked for, one could not help being struck with the comparative abundance and variety of the Diatoms, whilst on the other hand the paucity of the Desmids was equally noticeable. The latter were in fact confined to a few individuals of one or two small species of *Cosmarium*. Of the animals, the dominant groups were undoubtedly the Rhizopoda and Nematoda, the former being, however, by far the most abundant. Next in order of importance came the Rotifera, Collembola, Infusoria, Chætopoda, and Tardigrada. The remaining groups, namely the Gastrotricha, Acarina, Entomostraca, and Insect larvæ, were only represented by a few solitary specimens here and there. The other result to be mentioned, and the one of most general significance, is that, so far as can be judged from the evidence now collected, the micro-fauna of Spitsbergen includes very few peculiar species. With but two or three exceptions, the most certain being, moreover, in a group (Tardigrada) which has been much neglected by naturalists, all the forms seen appear to have been previously found in Europe and North America. We have here, therefore, still further evidence of the enormous geographical range of many species of the lower forms of animal life, especially of the fresh-water forms, and of the really remarkable variations in external conditions under which they can not only exist but even thrive.

Rhizopoda.

Animals belonging to this class formed a very large proportion of the organisms found in the mosses. As will be seen from the detailed list, about twenty-one species in all were noted, and although some of these cannot be referred to named forms, it is almost certain that none of them are new to science. They are practically the same forms as one could find in damp mosses almost anywhere in England, on the Continent, or in North America. In fact, with the exception of abnormal specimens, almost every individual Rhizopod from these Spitsbergen mosses could be matched by a figure in Leidy's 'Fresh-water Rhizopods of North America' (Washington, 1879).

One point that deserves mention is the large number of specimens seen presenting abnormalities in the shape of the shell. This was especially noticeable with *Euglypha ciliata*, but also occurred in *Nebela collaris* and other species. It is tempting to refer this back to the influence of the severe climatic conditions under which the animals live in Spitsbergen, but with the exception of two

specimens of *Cyclops*, to be referred to later, none of the animals belonging to other groups presented any striking malformations.

Ehrenberg, in the paper already referred to, records the following species from Spitsbergen: *Arcella* —?, *Difflugia areolata* and possibly *Difflugia microstoma*, which could not, however, be found upon a second search. It is not quite certain which species are intended by these names, but it is at least very probable that the "*Arcella* —?" was not an *Arcella* in the modern restricted sense, but very likely a *Difflugia*, perhaps a variety of *D. constricta*. The *Difflugia areolata* was almost certainly *Euglypha alveolata*, and *D. microstoma* probably *Assulina seminulum*.

The following is a complete list of the species observed. The nomenclature adopted by Leidy has been adhered to as far as possible, and in the few cases where he differs from Blochmann ('Mikroscopische Thierwelt des Süsswassers,' Hamburg 1895), the names used by the latter have been added in brackets.

Amœba verrucosa, Ehrbg.

This was the commonest of the three species of naked lobose Rhizopods seen, and occurred in both the adult and young stages (= *A. quadrilineata*, Carter).

Amœba radiosa, Ehrbg. (= *Dactylosphærium vitreum*, H. & L.).

Only noticed in one collection. It was the "*vitreum*" form and not typical *A. radiosa*.

? Pelomyxa villosa, Leidy (= ? *P. palustris*, Greeff).

The specimens seen, which were not very numerous, were all like the little form figured in the 'Fresh-water Rhizopods of N. America,' pl. v. fig. 9, and they measured about $\frac{1}{250}$ of an inch in length.

Difflugia globulosa, Duj.

Not very common.

Difflugia pyriformis, Perty.

The larger and more typical forms of this species were decidedly rare. A very small variety measuring $\frac{1}{300}''-\frac{1}{300}''$, with the test often somewhat compressed and the sand grains but loosely joined, was, however, much more frequent, although not abundant.

Difflugia constricta, Ehrbg.

On the whole the commonest of all the Rhizopods. It occurred in all the collections without exception, which was not the case with any other species.

Nebela collaris, Ehrbg.

A rather common species. Many specimens exhibited curious malformations, and a few had their shells pitted in the same way as *Hyalosphenia elegans* as shown by Leidy (Rhiz. N. America, pl. xx.). A few examples of the type figured by Leidy (*l. c.* pl. xxiv. fig. 12) were also observed.

NEBELA BARBATA, Leidy.

This was the form destitute of spines considered by Leidy to be a variety of *N. barbata* intermediate between the typical *N. barbata* and *N. collaris*. It is figured by him on plate xxiv. of the 'Rhiz. of N. America,' figs. 18 & 19. In the Spitsbergen mosses this species was not rare, but much less common than the foregoing.

? HELEOPERA PETRICOLA, Leidy.

In two of the collections specimens of a *Heleopera* were seen which were covered with flat but irregularly-shaped sand grains and were moreover slightly tinged with violet. I have found the same form in England, even the colour being the same; and I have regarded it as a variety of *H. petricola*, although it may possibly be a distinct species.

PSEUDOCHLAMYS PATELLA, C. & L.

Considerable numbers of the empty tests of this minute Arcella-like Rhizopod were seen, but very few living animals.

ARCELLA ARTOCREA, Leidy.

The absence of Arcellas from the collections was a very striking characteristic, and it was not until the examination was nearly finished that a single empty shell of an undoubted *Arcella* was found. It agreed very well with *A. artocrea* in most respects, but the ring of minute tubercles round the mouth could not be made out, and its diameter was barely $\frac{1}{250}''$.

EUGLYPHA ALVEOLATA, Duj.

A few specimens of the spineless form of this species were obtained from three of the collections.

EUGLYPHA CILIATA, Ehrbg. (= ? *E. ampullacea*, H. & L., and *E. compressa*, Carter).

In point of numbers this species was as common as *Difflugia constricta*, but it was not quite so constant, being apparently absent from three of the fourteen collections. The great majority of the specimens were destitute of "cils," only a small number being of the typical ciliated form. The amount of variation in size, outline, shell-structure, and amount of compression was very great indeed, and in addition to this many examples presented curious malformations, such as an oblique mouth, notched fundus, &c.

EUGLYPHA CRISTATA, Leidy.

A rare species, only detected in three of the collections.

ASSULINA SEMINULUM, Ehrbg.

Another rare species, only seen in two collections. In one of these the animals were quite characteristic, even possessing the peculiar brown colour so well shown by Leidy. The specimen

from the other collection, however, was colourless and appeared like fig. 26, on plate 37, of Leidy's 'Rhizopods of N. America.'

TRINEMA ENCHELYS, Ehrbg.

About as common as *Euglypha ciliata* and found in the same number of collections, namely eleven. The specimens exhibited a very considerable amount of variation. In a few collections a form was seen which was larger than any of the ordinary specimens, being $\frac{1}{100}$", and characterized by the great development of the shell around the oral aperture. Leidy gives figures of forms probably identical with this (*l. c.* plate 39. figs. 41, 61, & 63 inferior views, and fig. 54 lateral view). It is probably also the same as *Arcella disphœra*, Ehrbg.

ACTINOPHRYS SOL, Ehrbg.

Specimens of this well-known Heliozoan occurred sparingly in three of the collections.

ACANTHOCYSTIS sp.

This was a very small species, $\frac{1}{1200}$", with numerous delicate simple spines and a few long pseudopods. It was very similar to the drawing of an unnamed species given by Leidy (*l. c.* plate 43. f. 10), but was destitute of the envelope of granular protoplasm shown in that figure. According to the key given by F. Schaudinn (Heliozoa in 'Das Tierreich,' Berlin 1896), it comes nearest to *A. spinifera*, Greeff. This form was represented in three collections by a few specimens.

CLATHRULINA ELEGANS, Cienk.

Only a single detached capsule of this beautiful species was found. It was of a deep yellow colour, $\frac{1}{500}$" in diameter, not quite spherical and with slightly irregular openings. It contained two encysted individuals.

GROMIA sp.

A specimen of a species of *Gromia* was seen by Mr. Bryce whilst searching for Rotifers, but no further specimens could be obtained, and the species remains uncertain.

In addition to the foregoing, a minute testaceous Rhizopod was seen in two or three of the collections which may possibly have been *Chlamydophrys stercorea*, Cienk. In outline, size ($\frac{1}{700}$"), and absence of evident shell-structure it was about the same as the species named, but no pseudopods were seen, and it is therefore impossible to be sure even of the group to which it belonged.

INFUSORIA.

A fair number of Infusorians were noticed, but the group was not specially studied and no detailed account of it can be given. It may be noted, however, that the commonest form was either identical with or very similar to *Uroleptus piscis*, Müll. Ehrenberg,

in the paper previously quoted, records the following species from Spitsbergen :—

Kolpoda cucullus (=? *Oxytricha pellionella*); *Stylonichia pustulata*; *Trichodina tentaculata* (=? *Gyrocoris oxyura*); *Vorticella microstoma*; and *Monas*.

Gastrotricha.

The few examples seen belonging to this group were all representatives of the genus *Chætonotus*, but the species was not determined in any case.

Rotifera.

This important group was carefully studied by Mr. D. Bryce, who has given so much attention to the subject of the moss-dwelling Rotifers. It will be seen from his report following this paper that twenty-six species were observed, half of them belonging to the genus *Callidina*. One species is described for the first time, although it is not peculiar to Spitsbergen, having been previously found in England.

Nematoda.

The Spitsbergen mosses appear to offer very favourable conditions for the existence of Nematoids, as specimens of these animals were found, usually abundantly, in nearly all the mosses examined. No attempt was made, however, to determine the species. Of the four species seen by Dr. Goes, as previously mentioned, one was thought by him to be new, whilst the others came nearest to *Anguillula mucronata*, *A. ecauda*, and *Amblyura serpentulus* respectively. Ehrenberg's two species were *Anguillula longicauda* and *A. brevicauda*.

Chætopoda.

Several of the collections contained numbers of Chætopod worms, but no special attention was given to them.

Tardigrada.

When first examined the Spitsbergen mosses contained a moderate number of Water-bears, but afterwards they almost entirely disappeared. Unfortunately proper attention was not given to these animals when they were most abundant, and the notes about two or three of the species are therefore very imperfect. The following is a list of the forms seen.

Macrobiotus hufelandii, C. Schultze.

This well-known species was by far the most abundant, occurring in nearly all the mosses examined. Examples in all stages of development were seen ($\frac{1}{100}''-\frac{1}{40}''$), and occasionally eggs. The latter were covered with little conical projections (sharp-pointed, not blunt as figured by L. Plate, "Beiträge zur Naturgeschichte der Tardigraden," Zool. Jahrbücher, Bd. iii. Morph. Abt. Taf. xxii.

fig. 28), and were always free, never within the cast skin of the mother.

Macrobiotus tuberculatus, L. Plate.

Only two specimens of this form were seen. They agreed very well with the original description ("Beiträge," &c. *l. c.* p. 536) in most particulars, but they were very small, being only $\frac{1}{140}$".

Echiniscus arctomys, Ehrbg.

Specimens of this pretty little species were seen in several of the collections. It may be interesting to note that Ehrenberg first found this species in moss from Monte Rosa, collected at a height of over 11,000 ft. (Weissthor Pass), where the conditions of existence would be not unlike those prevailing in Spitsbergen.

Echiniscus spitsbergensis, n. sp. (Plate XLV.)

This new species was only seen in one collection, and unfortunately only empty skins were obtained, so that the following description is somewhat incomplete.

The back is covered with a series of nine hardened plates, the arrangement of which is in general the same as in other species of *Echiniscus*. The details of arrangement can best be seen by reference to the accompanying drawing (Pl. XLV. fig. 1). All the plates are strongly tuberculated, the tubercles being largest in the central portions of each plate, but becoming smaller towards the margins. There are four pairs of lateral filaments originating from the posterior angles of head, first, second, and third body-segments respectively. In addition to these there are two long filaments springing from the posterior margin of the second body-segment, each of which is situated about halfway between the lateral filament and the mid-dorsal line. The posterior margin of the third body-segment is provided with four broad spines—two large, rather closely approximated to the median line, and two very minute, one just above each lateral filament. The two middle claws of the four on each foot are each provided with a little hook near the base (figs. 2 & 3), as occurs also in *E. spinulosus*, Doy, and *E. granulatus*, Doy. Length of specimens seen, nearly $\frac{1}{100}$". Living animals would undoubtedly be somewhat longer, and would therefore appear more elongated than might be supposed from the drawing.

Two further species of Tardigrades were also seen during the early part of the examination of the mosses, but the notes taken were not sufficient for specific determination and the animals were not found a second time. Both were probably species of *Macrobiotus*. One of them was a form somewhat similar to *M. tuberculatus*, but each of the little tubercles on the back was furnished with two minute prickles. The length was only $\frac{1}{150}$". The other was a moderately large form, being $\frac{1}{60}$", and possessed the striking peculiarity of having a pharynx nearly three times as long as broad.

The Water-bear found by Dr. Goes in 1862 was considered by him to be most closely allied to *Macrobiotus dujardini*, Doy.

Acarina.

A few very much damaged specimens of Oribatidæ were found and submitted to Mr. A. D. Michael, who very kindly examined them. He says that although, owing to the imperfect preservation, he cannot be absolutely certain about the species, he feels pretty sure that they belong to *Scutovertex bilineatus* and *Nothrus invenustus*. If these determinations are correct, both of these forms are new to the known fauna of Spitsbergen.

Entomostraca.

Two species of Copepoda were found, representing the two families Harpacticidæ and Cyclopidæ. Of the former, unluckily, only a single damaged specimen was seen. It was very minute, measuring in its shrunken state $\frac{1}{90}''$, and was probably a male, but this could not be definitely determined as the first pair of antennæ had been torn off. Although apparently a new species, a proper account of it cannot be given, owing to the imperfect condition of the specimen.

The other Copepods belonged to the genus *Cyclops*. Four individuals in all were observed, from as many different collections, three by myself and one by Mr. Bryce. Of the former, two were adult males of *Cyclops bisetosus*, Rehberg (as defined by Schmeil, "Deutschlands freilebende Süsswasser Copepoden," Theil i. 1892), and the other a young individual with 10-jointed antennæ, and without much doubt also a male of the same species. The most peculiar feature in connection with the two adult specimens was, that although undoubtedly *C. bisetosus*, both of them exhibited malformations. Thus in one example both of the fifth pair of feet were abnormal, and also differed considerably from one another. In the other specimen the feet of the fifth pair were quite normal, but the two largest tail setæ were unusually thickened near the base, and at a point on the protopodites of the fourth pair of feet, where there should be one thick spine, there were two on the right foot and none on the left. It may be useful to note that *C. bisetosus* is usually found in this country in little temporary pools with a thick growth of amphibious grasses and other vegetation, but I have also found it occasionally by washing damp mosses.

Insecta.

The only adult Insects found were Collembola or Spring-tails. Numerous specimens of a perfectly white species were present in some of the collections, and also a few examples of a black species, but they have not yet been determined. In addition to these, two or three Dipterous larvæ were obtained.

EXPLANATION OF PLATE XLV. (p. 791).

Fig. 1. *Echiniscus spitsbergensis*, n. sp. Dorsal view of an empty skin. ×300.
Fig. 2. „ „ Ventral view of posterior body-segment, showing fourth pair of feet. ×600.
Fig. 3. „ „ One of the two median claws, showing small accessory hook. × 800.

7. Contributions to the Non-Marine Fauna of Spitsbergen.—Part II. Report on the Rotifera. By David Bryce.[1]

[Received June 10, 1897.]

The material received for examination was contained in 13 tins, and when handed to me had already been encased for some months, yet without much prejudice to the vitality of the various micro-organisms hidden within it. It consisted of Mosses, apparently of such species as usually grow in wet places (for species see *ante*, p. 785), and was still abundantly moist. In many cases, however, the moss-plants were so encumbered with soil and decayed fragments of preceding generations as to render their examination for the purpose in view an exceedingly difficult and a lengthy matter. Repeated attempts were made to ascertain the presence of Rotifera in the contents of each tin, with the result that 5 tins were found to contain from 4 to 15 species each, 2 tins one or two individuals only, and 6 tins none at all. In every case the dirt-laden material was quite unproductive, and some of the cleaner mosses were equally disappointing, whilst in none were the individuals more than moderately numerous.

As was to be expected from mosses, the Bdelloid Rotifera were by far the most numerous, both as to number of species represented and as to number of individuals seen. Among the Bdelloida, again, the genus *Callidina* was prominent, claiming no less than 13 of the whole 26 species on the list. But besides these 13 species, which were capable of recognition, I found various isolated examples which I could not with any satisfaction refer to any species described or even known to me, and it is likely that if examples had been more numerous I should have been justified in giving specific names to these forms. All the 26 species have been already met with either in England or in Germany, and it would seem that, so far as regards the actual species of moss-dwelling Rotifera, there is little to distinguish the fauna of Spitsbergen from that of these countries.

The interest of the list is, however, less in the number of species enumerated than in the evidence afforded of the vitality and endurance of these minute yet highly organized animals under such exceedingly trying conditions of life as those obtaining on the island of Spitsbergen. For under the most favourable conditions none of these creatures can have there a continuously active existence of more than three months. In more temperate countries the moss-dwelling Rotifera are called upon to endure recurring periods of temporary drought, but such periods occur rarely except in summer, and are even then mitigated by nightly dews or occasional rainfall. For the greater part of the year, autumn, winter and spring, there is moisture sufficient for their wants, and, so long as the temperature does not fall below freezing-point, life goes on merrily and generation succeeds generation, whilst periods

[1] Communicated by Dr. J. W. Gregory, F.Z.S.

of cold, when the moss is frost-bound, are rarely of long duration. In the far north latitude of Spitsbergen, *circa* 78°, the frozen state is the rule, the moist the brief exception, and an individual *Callidina* (whose average existence may be reckoned as comprising at least some three months of active life) may quite possibly live during several summers, expending its three months in annual instalments. This capacity for the endurance of long periods of cold was already known from Ehrenberg's (4) discovery of certain forms on the Swiss Alps at a great elevation. The few species noted by him all belong to the Bdelloida, so that whilst the present list widens the record as regards that group, it extends it to at least 7 species of the Ploïma.

There appear to be but two previous records of Rotifera at so high a latitude.

In 1862 A. von Goes recorded two species of *Callidina*, which he had found in some moss; the species were not, however, determined ("Om Tardigrader, Anguillulæ m.m. från Spetsbergen," Öfvers. K. Vet.-Akad. Förh. 1862, p. 18).

In 1869 Ehrenberg (5) had brought to him some material which had been collected in Spitsbergen in 1867. This material included some mosses, and in these he found one Rotifer, *Callidina alpium*, and an "egg of a Rotifer" unknown, among several forms belonging to other orders. This statement occurs in a Report upon the results afforded by material collected by the Second German North Polar Expedition of 1869 and 1870.

For the rather lower latitudes of Greenland, several lists have already been published, the most important being contained in the treatise by Bergendal (1), in which are enumerated and discussed some 82 species collected by the author at various localities between the parallels of 66° and 70° N. during the summer of 1890. At first sight it appears curious that, with but three exceptions, none of the forms found by him in Greenland have occurred in the Spitsbergen material. Bergendal, however, devoted his attention chiefly to the ordinary water-dwelling Rotifera, and seems to have rarely examined mosses. Nor does he seem to have been cognisant of the fact that moss-dwelling Rotifera can be secured and studied at leisure months after collection, as was done by Ehrenberg and as has been done in the present case. There is therefore no real ground for comparison between his list and that hereto appended. It may be mentioned that, of the eleven species of the Bdelloida included by him, one only has been found in the course of this investigation.

Notwithstanding their Arctic nativity, many of the species were kept alive for weeks in small cells, whilst others seem at this date (April 1897) to have permanently established themselves in a jar of water, into which I have from time to time thrown moss which I had washed, as well as washings after final examination.

The majority of the species have already been sufficiently described, and in these cases I have merely indicated their comparative abundance in the five tins which yielded positive results.

Some few remarks are added on the most interesting details relative to the rarer forms, whilst brief descriptions are furnished for one species, not hitherto described, but which I had previously seen in England, and for one other which it has been necessary to rename.

Order BDELLOIDA.

1. PHILODINA ERYTHROPHTHALMA, Ehr.

It is with some little doubt that I refer to this species a form which is very closely related to *Philodina citrina*, and differs from it principally in the size of the mastax (rami, 0·022 mm. long) and in the shape of the egg (oval, symmetrical and smooth). The species is included in Bergendal's list, but it is impossible to affirm that the form seen by him is identical with that now found, for, although described by Ehrenberg as the commonest of the genus, the species is at the best an unsatisfactory one, the original description being exceedingly meagre. Gosse has given fuller details of a form which he thought he could refer to it, but these have not been found useful to establish the identity even of the subject of his description. The species has been noted again and again in local lists, but never with any attempt at better definition of its identity. On the other hand, Janson (6), when he wrote his paper on the *Philodinæa*, had failed to discover any form which he could assign to it, and he rejected it as invalid, and hitherto neither I nor several experienced correspondents have been more successful.

It would however appear, from the very meagreness of Ehrenberg's description, that the species should be closely related either to *P. citrina* or to *P. roseola*, and this postulate is fulfilled by the Spitsbergen examples, which when adult might easily be passed over as *P. citrina*, varying from the type in lacking the distinctive colour of that species. Closer examination, however, reveals several structural differences (minute, but constant in many examples), of which those mentioned above are themselves sufficient to establish specific rank. In young examples the corona is barely wider than the collar, and has a rather smothered appearance, which disappears as the animal approaches maturity. In habits it resembles *P. roseola*, being decidedly restless, and even when feeding it is incessantly changing its position. From its behaviour in the trough I judge it to be a "bottom-feeder," and to prefer feeding from a swinging base (as from a mucus thread) rather than from a firm one.

2. PHILODINA sp.

Some specimens with very coarse skin with prominent skin-folds, whose ridges were broken and wrinkled, were referred to a form recently discovered by Forstmeister L. Bilfinger of Stuttgart, and to be described in a paper now in preparation.

3. ROTIFER TARDUS, Ehr.

A single specimen.

4. Callidina alpium, Ehr.

Ehrenberg's solitary species from Spitsbergen, previously found by him on the Swiss Alps. This confirms my identification with his species of the form found by me on the South Coast of England. Two or three specimens only.

5. Callidina constricta, Duj.

In moderate numbers.

6. Callidina tetraodon, Ehr.

A few specimens.

7. Callidina musculosa, Milne.

A very few examples.

8. Callidina venusta, n. sp.

(=*Macrotrachela elegans*, Milne (7).)

(Inasmuch as the genus *Macrotrachela*, proposed by Milne, has fallen to the ground, the various species described by him have to be redistributed. *M. elegans* would thus become *Callidina elegans*, but that name had already been employed by Ehrenberg for a very different form. I take this opportunity of renaming a well-marked species, which, from the unfortunate choice of specific name, has lately been overlooked.)

Sp. Ch.—Rather slender, of medium length: corona very narrow (0·030 mm.), about equal to collar, a fourth wider than neck (0·023 mm.); disks separated by deep notch. Upper lip slightly convex. Dorsal antenna equal to or exceeding neck thickness. Head, neck, and trunk rather parallel-sided in dorsal view. Foot very short, of four joints rapidly tapering; spurs partly hidden, two short acute cones, held nearly parallel. Mastax scutelliform. Rami (0·016 mm.) long, formula 6/6 to 10/10. Food moulded into pellets. Maximum length 0·250 mm.

The present specimens vary from the type in having only about 6 teeth on each ramus, a variety already noticed in the London district. This species is rarely found in moss growing in positions usually dry. I have elsewhere noted its *quasi*-tube-making habits (2).

9. Callidina russeola, Zelinka.

This bulky species was present in some numbers.

10. Callidina lata, Bryce.

Two specimens occurred in one washing.

11. Callidina aspera, Bryce.

One living and one dead example.

12. Callidina plicata, Bryce.

The most numerous species.

13. Callidina pusilla, Bryce.

Some individuals with a very large jelly-like case, mostly whitish but sometimes tinged with brown, seemed structurally to be inseparable from the above species, the type form of which, as repeatedly found in England, constructs a very small and meagre tube. My correspondent Forstmeister L. Bilfinger mentioned to me some years back that he had found a variety with a large case and had provisionally named it "*textrix*," a name which may well be adopted for it as rather more than usually appropriate.

The case was flask-shaped, sometimes flattened on the ventral side, nearly twice as long as the feeding rotifer, and swelling up above and behind the trunk. The young individual will sometimes settle down on the side of another case, and thus several may come to form a single mass.

14. Callidina cornigera, Bryce.

Many species of *Callidina* so closely resemble each other in the normal or extended position, that it is necessary for identification to isolate every doubtful specimen and wait until it is sufficiently re-assured to feed whilst under observation, for it is only in the feeding position that the most distinctive features of such forms can be seen. Many, and especially the rarer forms, are exceedingly timid, and with such it is commonly useless to look at them again for several hours after isolation. One such doubtful specimen had been thus set aside for a week before I saw it feeding, when it showed itself to belong to this very abnormal species, which I originally described from a single specimen found at Bognor in Sussex. Some years later a second specimen was met with in moss collected in Buckinghamshire. The present is the third specimen found, and proves that the species, if rare, is at all events widely distributed. The creature lodged itself among débris and squatted in a most irregular manner, so that no sketch could be obtained. The figure already published gives a fair idea of the distinctive 'horns,' a structural peculiarity not approached by any other species yet known.

When extended, this specimen measured 0·347 mm., and the mastax formula was 2/2. I again found the rostral lamellæ unusually large and conspicuous.

15. Callidina papillosa, Thompson.

Some half dozen examples.

16. Callidina habita, Bryce.

Three specimens.

17. Adineta vaga, Davis.

A few examples of the form I (3) have named var. *minor*, having the face narrower than long. This form, which in my experience is the more common, is, I understand from Mr. Davis, the type as known to him. The var. *major* was not represented.

18. Adineta barbata, Janson.

This well-marked species was seen several times.

19. Adineta gracilis, Janson.

Two or three small and slender examples seemed to belong to this species, but the form is difficult to distinguish from young specimens of *A. vaga* var. *minor*, unless a very good definition of the rostrum can be obtained.

Order PLOÏMA.

I. Illoricata.

20. Proales decipiens, Ehr.

Two or three examples only.

21. Furcularia gracilis, Ehr.

One specimen.

22. Diglena permollis, Gosse.

This species occurs rather frequently in mosses and even in such as grow in positions usually dry. It would thus seem to be able, like so many of the Bdelloida, to protect itself against the fatal lack of moisture. For although some writers have loosely ascribed this protective faculty to the Rotifera in general, I believe it to be in the main confined to the Bdelloida, and even there not universal. In the mosses now examined this species was not infrequent.

II. Loricata.

23. Stephanops stylatus, Milne (7).

A few examples enabled me to verify the general accuracy of Milne's description, and particularly of the mastax as figured by him.

24. Stephanops tenellus, n. sp.

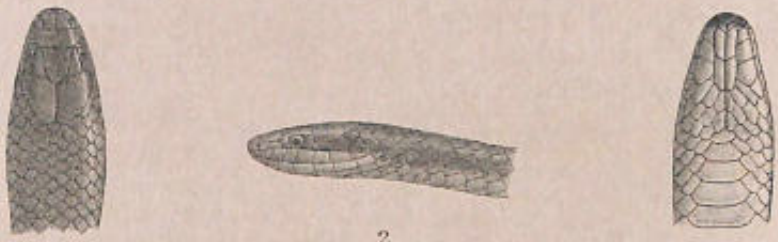
Sp. Ch. Lorica delicate, yielding, laterally overlapping the very slender body; posteriorly broadly and roundly truncate; head-plate prominent, subsquare, decurved. Face prone, with several uncinate and one pair (at least) of long straight styles. Mastax twice as long as broad. Foot slender, retractile; toes two, nearly parallel, decurved, about $\frac{1}{3}$ of foot. Maximum length about 0·080 mm. or barely $\frac{1}{300}$ inch.

One of the very smallest Rotifera known and of exceedingly delicate structure. In general form, if not in size, in structural details, in habit of life, and in its most characteristic movements, it is almost the counterpart of *S. stylatus*, and indeed when I first met with it in 1891 in company with *Distyla agilis* I took it to be simply the very young form of its congener, which when adult is fully twice as long. In the present instance I had isolated a specimen to make certain that it was not *D. agilis*, when it almost



1.





2.



3.



4.

R.Mintern del et lith.

Mintern Bros. imp.

1.LYGOSOMA JOHNSTONI. 2.GLYPHOLYCUS WHYTII.
3.ARTHROLEPTIS WHYTII. 4.HYLAMBATES JOHNSTONI.

immediately extruded an egg; and this first led me to suspect that the form was not an immature *S. stylatus*, but the adult of a distinct species. On closer examination the mastax was distinctly seen to be twice as long as broad, whereas in the larger species it it rather broader than long.

Whilst under the one-inch power the fleshy parts alone are visible, and the animal appears to be extremely slender with an almost pointed head; and it is only when high powers are brought to bear upon it, that its full resemblance to *S. stylatus* can be appreciated. The lorica proves to be proportionately as ample as in that species, and of much the same outline, but is more deflexed to cover the sides. It is exceedingly delicate and yields to every movement. In the trough the animal is only to be detected by its vivacity; when still, it is scarcely to be distinguished even when its position is known. It runs along very quickly with a series of dashes, and if alarmed, either remains motionless or throws itself into the most violent contortions.

Of this interesting form I saw some 15 to 20 examples, but they were exceedingly difficult to catch, and as difficult to deal with after isolation. I quite failed to get any sketch, but the particulars given above are amply sufficient for its identification.

25. Colurus caudatus, Ehr.

A few examples seemed to agree best with Gosse's particulars of this species.

26. Metopidia lepadella, Ehr.

Two examples.

The following works are specially referred to by figures after names of authors.

1. Bergendal, D.—"Zur Rotatorienfauna Grönlands." Kongl. Fysiografiska Sälskapets Handlingar. Ny Följd 1891–2, iii. Sep. ed., Lund, 1892.
2. Bryce, David.—"On the Macrotrachelous Callidinæ." Journ. Quekett Micr. Club, v. (1892) p. 15.
3. Bryce, David.—"On the Adinetadæ." Journ. Quek. Micr. Club, v. (1893) p. 146.
4. Ehrenberg, C. G.—"Das organische kleinste Leben über dem ewigen Schnee der höchsten Centralalpen." Monatsberichte der Berl. Akad. der Wiss. p. 314 (1853).
5. Ehrenberg, C. G.—Das unsichtbar wirkende Leben der Nordpolarzone: Die Zweite Deutsche Nordpolarfahrt in den Jahren 1869 und 1870. Band ii. Leipzig, 1874.
6. Janson, Otto.—"Versuch einer Uebersicht über die Rotatorienfamilie der Philodinaeen." Beilage zum XII. Bande der Abhandl. des Naturwiss. Vereins zu Bremen, 1893.
7. Milne, W.—"On the Defectiveness of the Eyespot as a means of generic distinction in the Philodinæa." Proc. Phil. Soc. Glasgow, 1886.

8. A List of the Reptiles and Batrachians collected in Northern Nyasaland by Mr. Alex. Whyte, F.Z.S., and presented to the British Museum by Sir Harry H. Johnston, K.C.B.; with Descriptions of new Species. By G. A. Boulenger, F.R.S.

[Received June 12, 1897.]

(Plate XLVI.)

The collection with which this report deals was made by Mr. Whyte during his expedition to Northern Nyasaland in 1896. The localities are indicated by crosses in the six columns of the list of species, viz.:—

1. West Coast of Lake Nyasa, from Nkata Bay to Ruarwe.
2. N.W. Nyasa, from Kondowe to Karonga.
3. Nyika district.
4. Nyika Plateau, 6000–7000 ft.
5. Masuku Mts. and Plateau, 6000–7000 ft.
6. Fort Hill, Masuku district, 4000 ft.

REPTILIA.	1.	2.	3.	4.	5.	6.
EMYDOSAURIA.						
1. Crocodilus niloticus, *Laur.*[1]						
LACERTILIA.						
2. Hemidactylus mabuia, *Mor.*	...	+	...	+		
3. Lygodactylus angularis, *Gthr.*	...	...	...	+	+	
4. Agama armata, *Ptrs.*	...	...	...	+	+	
5. Zonurus cordylus, *L.*	...	...	...	+	+	+
6. Varanus niloticus, *L.*	+	+				
7. Nucras tessellata, *Smith*	...	...	...	+	+	
8. Ichnotropis squamulata, *Ptrs.*	...	...	...	...	...	+
9. Gerrhosaurus flavigularis, *Wiegm.*	+	...	+	+	...	+
10. Mabuia quinquetæniata, *Licht.*	+	...	+			
11. „ varia, *Ptrs.*	+	+	+	+	+	
12. „ striata, *Ptrs.*	+	+	+	+	...	+
13. Lygosoma johnstoni, sp. n.	...	...	+			
14. Ablepharus carsoni, *Blgr.*	...	...	...	+		
RHIPTOGLOSSA.						
15. Chamæleon dilepis, *Leach*	+	+	+	+	+	+
OPHIDIA.						
16. Typhlops mucruso, *Ptrs.*	+					
17. Glauconia distanti, *Blgr.*	...	...	...	...	...	+
18. Python sebæ, *Gm.*	...	+				
19. Tropidonotus olivaceus, *Ptrs.*	+	+	...	+	...	+
20. Glypholycus whytii, sp. n.	...	...	...	...	...	+

[1] No locality.

Ophidia (*continued*).	1.	2.	3.	4.	5.	6.
21. Boodon lineatus, *D. & B.*	...	+	...	+	...	+
22. Chlorophis irregularis, *Leach*	...	+	...	+	...	+
23. Philothamnus semivariegatus, *Smith*	...	+	...	+	...	+
24. Dasypeltis scabra, *L.*	+	...	...	+	...	+
25. Turbophis semiannulatus, *Smith*	+	+	...	+		
26. Leptodira hotamboeia, *Laur.*	...	+	+	+	...	+
27. Amplorhinus nototænia, *Gthr.*	...	...	...	+	...	+
28. Trimerorhinus tritæniatus, *Gthr.*	...	+	...	+	...	+
29. Dromophis lineatus, *D. & B.*	...	+	...	+		
30. Psammophis subtæniatus, *Ptrs.*	+	...	...	+	...	+
31. „ sibilans, *L.*	+	+	...	...	...	+
32. „ angolensis, *Bocage*	...	...	...	...	...	+
33. Thelotornis kirtlandii, *Hallow.*	...	...	...	+		
34. Dispholidus typus, *Smith*	...	...	...	+		
35. Naia nigricollis, *Reink.*	...	+				
36. Causus rhombeatus, *Licht.*	...	...	...	+		
37. Bitis arietans, *Merr.*	...	...	...	+		
BATRACHIA.						
1. Rana fuscigula, *D. & B.*	...	...	...	+		
2. „ angolensis, *Bocage*	...	...	...	...	...	+
3. „ mascareniensis, *D. & B.*	...	+	...	+		
4. „ oxyrhynchus, *Smd.*	...	+	...	+		
5. Phrynobatrachus acridoides, *Cope*	...	...	...	+	+	
6. Arthroleptis whytii, sp. n.	...	+	...	+	+	
7. Rappia marmorata, *Rapp*	...	+				
8. „ fulvovittata, *Cope*	...	...	...	+		
9. „ argus, *Ptrs.*	...	...	...	+		
10. Megalixalus fornasinii, *Bianc.*	...	+	...	+		
11. Hylambates johnstoni, sp. n.	...	+	...	+		
12. Phrynomantis bifasciata, *Smith*	...	...	...	+		
13. Breviceps mossambicus, *Ptrs.*	...	...	...	...	+	+
14. Bufo regularis, *Reuss*	+	+	+	+	...	+
15. Xenopus muelleri, *Ptrs.*	...	+	...	+	...	+

Lygosoma johnstoni, sp. n. (Plate XLVI. fig. 1.)

Section *Riopa*, Gray. Body much elongate, anguiform; limbs minute, anterior monodactyle, posterior didactyle. Snout moderate, obtuse. Lower eyelid with an undivided transparent disk. Supranasals present, in contact behind the rostral; fronto-nasal much broader than long; præfrontals forming a median suture; frontal nearly twice as long as broad, as long as its distance from the nuchals, in contact with the first, second, and third supraoculars; four supraoculars; six supraciliaries; frontoparietals and interparietal distinct, subequal in size; parietals in contact behind the interparietal; a pair of nuchals; fifth upper labial below the centre of the eye. Ear-opening large, oval, with two projecting lobules anteriorly. 22 smooth scales round the body. Fore limb half as long as the posterior; digits minute, with short blunt claws. Tail long, tapering to a fine point. Dark olive above, greenish white

beneath ; a series of small blackish, white-edged spots on each side of the head, from the nostril to the ear.

Total length 658 millim. ; head 20 ; width of head 13 ; fore limb 7 ; hind limb 15 ; tail 395.

A single specimen from the Nyika Plateau.

This new species is closely related to Bocage's *Eumecia anchietæ* from Angola, and represents a further step in the degradational series of the section *Riopa*.

GLYPHOLYCUS WHYTII, sp. n. (Plate XLVI. fig. 2.)

Head small, scarcely distinct from neck ; eye rather small. Rostral twice as broad as deep, hardly visible from above ; internasals a little longer than broad, a little shorter than the præfrontals, narrowed in front ; frontal bell-shaped, once and one third as long as broad, as long as its distance from the end of the snout, shorter than the parietals ; nasal divided ; loreal longer than deep ; præocular single or divided, not reaching the frontal ; two postoculars ; temporals 1+2, anterior narrowly in contact with lower postocular ; eight upper labials, fourth and fifth entering the eye ; two pairs of equal chin-shields, the anterior in contact with four lower labials. Scales in 19 rows. Ventrals 163 ; anal entire ; subcaudals 47. Uniform dark olive-grey above, yellowish white beneath and on the outer series of scales.

Total length 565 millim. ; tail 100.

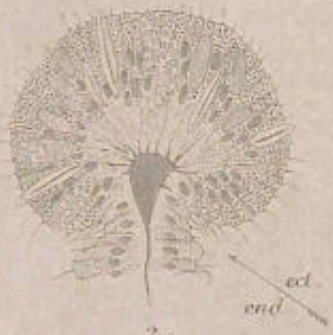
A single specimen from Fort Hill.

ARTHROLEPTIS WHYTII, sp. n. (Plate XLVI. fig. 3.)

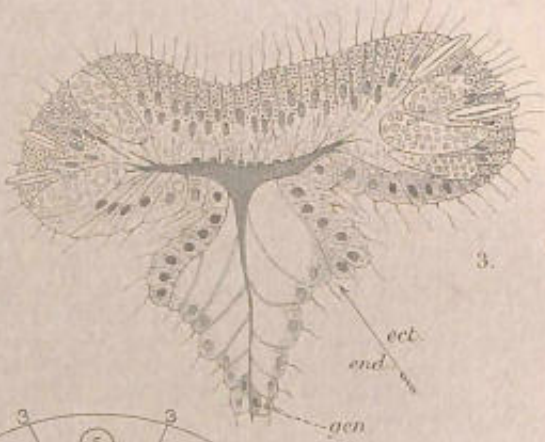
Tongue with a conical median papilla. Head moderate, broader than long ; snout rounded, as long as the eye, with obtuse canthus ; nostril a little nearer the end of the snout than the eye ; interorbital space broader than the upper eyelid ; tympanum very distinct, two thirds the diameter of the eye. First and second fingers equal, more than half as long as third ; toes free ; tips of fingers and toes slightly swollen ; subarticular tubercles well developed ; a very large, compressed, sharp-edged, crescentic inner metatarsal tubercle. The tibio-tarsal articulation reaches the tympanum or the posterior border of the eye. Skin smooth, granulate on the flanks and belly. Grey or pale brown above, with or without a dark, festooned median dorsal band or a fine light vertebral line ; a blackish-brown band on the canthus rostralis and temple ; lips with small black and white spots ; a small dark brown lumbar spot may be present ; limbs with or without rather indistinct dark cross-bars ; lower parts uniform white.

From snout to vent 40 millim.

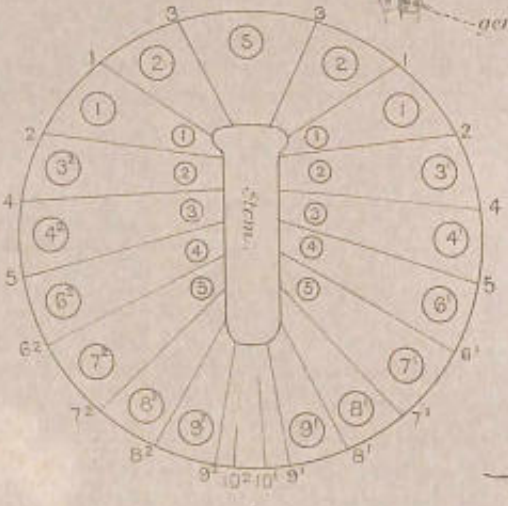
Five specimens : Kondowe to Karonga, Nyika Plateau, Masuku Mts.



2.



3.



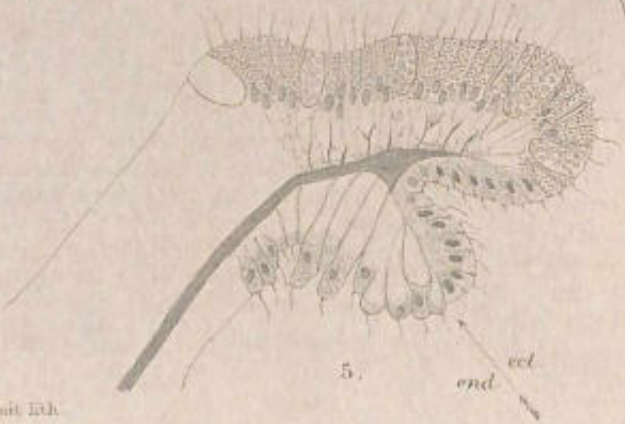
1.



4.



6.



5.

G.H.F. del. J. Smit lith. Mintern Bros. imp.

PLANKTON OF THE FAEROE CHANNEL.

HYLAMBATES JOHNSTONI, sp. n. (Plate XLVI. fig. 4.)

Vomerine teeth in two small groups between the choanæ. Head much broader than long; snout rounded, as long as the diameter of the eye; interorbital space as broad as the upper eyelid; tympanum two thirds the diameter of the eye. Fingers with a slight rudiment of web; toes half-webbed; disks well developed; inner metatarsal tubercle large, compressed, crescentic, very prominent. The tibio-tarsal articulation reaches the eye. Skin smooth above, granulate on the throat, belly, and lower surface of thighs. Purplish or brown above, with a more or less distinct dark triangular marking on the back, the apex reaching the occiput; white dots usually scattered on the back; limbs with very indistinct dark cross-bars; a white streak borders the upper lip, the outer side of the forearm and hand, the anal region, the heel, and the outer side of the foot; hinder side of thighs dark brown; lower parts white.

From snout to vent 42 millim.

Closely allied to *H. anchietæ*, Bocage, from Angola.

Three specimens from Kondowe-Karonga, and one from the Nyika Plateau.

EXPLANATION OF PLATE XLVI.

Fig. 1. *Lygosoma johnstoni*, Blgr. Side views of head and anterior portion of body and pelvic region, and upper view of head (p. 801).
2. *Glyphoglycus whytii*, Blgr. Upper, lower, and side views of head (p. 802).
3. *Arthroleptis whytii*, Blgr (p. 802).
4. *Hylambates johnstoni*, Blgr (p. 803).

9. Contributions to our Knowledge of the Plankton of the Faeroe Channel.—No. III.[1] The Later Development of *Arachnactis albida* (M. Sars), with Notes on *Arachnactis bournei* (sp. n.). By G. HERBERT FOWLER, B.A., Ph.D., Assistant Professor of Zoology, University College, London.

[Received June 15, 1897.]

(Plate XLVII.)

ARACHNACTIS ALBIDA (M. Sars).

This beautiful floating Actinian was originally described by Michael Sars in 1846 (*loc. cit. infrà*); it has since been taken on several occasions, and has received quite a large amount of attention.

The recorded occurrences and the references to descriptions are most simply put in tabular form. They all refer to surface captures, often in company with shoals of *Salpæ*.

[1] For Part I. see P. Z. S. 1896, p. 991; Part II. *antea*, p. 523.

Arachnactis albida, M. Sars.

M. Sars, Fauna littor. Norveg. i. p. 28.	Off Floroe Island.	Autumn & winter, 1846.	Original description of the species.
Forbes & Goodsir, Tr. Roy. Soc. Edin. xx. 307.	The Minch.	Aug. 1850.	Refer to Dr. Balfour having taken it in 1841.
Vogt, Archives de Biologie, viii. p. 1.	56° 35′ N., 20° 19′ W.	Sept. 1861.	In strong current from N.E.
" " "	Rockall to Hebrides ('Holsatia').	July 1885.	
Boveri, Zeit. wiss. Zool. xlix. p. 459.	Faeroe Channel ('Triton').	Aug. 1882.	
Vanhöffen, Bibliotheca Zoologica, Hft. xx.	60° N., 7° W.	Sept. 1893.	
" " "	? Rockall to Hebrides ('National').	1889.	German Plankton Exped.
" " "	North Sea, near Brit. coasts.	Feb. to April, 1895.	? *A. bournei*.
Browne (unpublished).	Valentia Island.	Mar. 1895.	
Fowler	Faeroe Channel ('Research').	Aug. 1896. July 1897.	

All recent observers of *Arachnactis* are agreed that it is to be referred to the *Cerianthidæ*. As regards the early development of this group, Kowalewsky [1] traced it from the gastrulation to the formation of two pairs of tentacles and one pair of mesenteries; but unfortunately obscured his information by writing in Russian. Van Beneden [2], beginning where Kowalevsky left off (and giving a short abstract of his work), traced the development of an *Arachnactis* (apparently not *A. albida*, although described under that name) from a stage with two pairs of tentacles and one of mesenteries up to a stage with seven tentacles and four pairs of mesenteries. On the later development we have also two papers: Boveri [3] began with 8 tentacles and five pairs of mesenteries, and carried it to a stage with 21 tentacles and 14 oral tentacles; Vanhöffen [4] made sections of, and described in detail, a stage with 19 mesenteries.

As regards these two last papers, I am glad to say that my observations bear out those of Boveri, but regret that they are far from agreement with those of Vanhöffen. The latter author has been drawn into a series of mistakes by an initial error, which is best given in his own words:—"Die Reihenfolge in der Bildung der Septen ergiebt sich aus der Verfolgung der Schnitte von unten nach oben"; that is to say, he imagines that the order of development of the mesenteries can be inferred from a comparison of their absolute length at a late stage: and it is hardly necessary to say, not only that this assumption is quite unjustifiable, but that the order of development which he consequently assigns to the mesenteries proves to be absolutely erroneous when tested by successive stages. As Vanhöffen is the latest writer on *Arachnactis*,

[1] Nachrichten d. Ges. d. Freunde d. Naturerkenntniss u. s. w., Moscow, 1873.
[2] Archives de Biologie, xi. p. 115. [3] *Op. cit. supra.* [4] *Op. cit. supra.*

it seemed to me worth while to study all the stages in my power, and to endeavour to put the matter straight again.

The following stages have been drawn from 'Research' specimens and cut into microscopic sections:—

Stage.	Tentacles.	Mesenteries.	Oral tentacles.
A	6	10	0
B	7	11	4
Appearance of the unpaired tentacle (5).			
C	9	12	4
D	9	12	4
E	10	14	6
F	11	16	8
G	12	16	8
H	13	18	8
I	?	19	10
(First appearance of generative cells.)			

A few older stages have also been studied.

This table, taken together with the diagram (Pl. XLVII. fig. 1), sufficiently shows the successive development of the various structures, and their position in the oldest specimens. As regards this diagram, the order of succession of the first four pairs of mesenteries is taken from van Beneden's account of an allied species, and that of the first two pairs of tentacles is inferred from his drawings and descriptions. The facts implied by the remainder of the diagram I have myself checked, and they will be found to differ entirely from those given by Vanhöffen, and to agree with those of Boveri on all points with which we both deal. The developmental order of the first four pairs of mesenteries, as described by van Beneden (*c*, *a*, *b*, *d*), appeared at first to contradict the lettering attached to the same mesenteries by Boveri (*d*, *a*, *b*, *c*), but the latter author courteously informs me that he did not intend by these letters to indicate a developmental succession: van Beneden's observed order may therefore be taken to hold good for this species also, in default of direct evidence.

ARACHNACTIS BOURNEI, sp. n.

There can be no doubt that the specimens from the English Channel, first recorded by Bourne, and described by van Beneden, under the name of *Arachnactis albida*, belong to another and an unnamed species. Not only are the form and proportions of the animal quite different from those of *albida*, both in van Beneden's drawings and in a few specimens which I received from the Marine Biological Station at Plymouth in 1893, but also the rate at which different sets of organs are developed is not the same in the two species. This is at once apparent on a comparison of my table of *albida* stages (given above) with the following:—

	Tentacles.	Mesenteries.	Oral tentacles.
Van Beneden's oldest larva ..	7	8	0
Plymouth specimens (1893)..	9	10	2

and while the Plymouth specimens acquire the characteristic terminal pore at a stage of between 7 and 9 tentacles, it does not become perforated in *albida* until a stage of about 8 mm. in length provided with 12 oral tentacles, or, according to Boveri, 17 marginal tentacles.

Until this Channel form be traced to a known adult Cerianthid (?*C. lloydii*, Gosse), I propose to distinguish it from *A. albida* by associating with it the name of my friend Mr. G. C. Bourne, the first Director of the Plymouth Station, under the style of *Arachnactis bournei*; for although I admit that the christening of larvæ by specific names is a reprehensible practice, still so much townetting is now carried out every summer all round our coasts that it is advantageous that well-marked species of even larval forms should have a name under which their occurrences may be chronicled.

Arachnactis bournei, sp. n.

Bourne, J. Mar. Biol. Assoc. (n. s.) i. p. 321.	Plymouth area.	Annually[1].	Described anatomically by van Beneden, Arch. Biol. xi. p. 115.
" " "	Entrance to English Channel.	July 1889.	
McIntosh, Ann. Mag. Nat. Hist. (6) v. p. 306.	St. Andrew's Bay.	June 1890.	Single specimen recorded only.
Vallentin, Rep. R. Cornwall Polyt. Soc. lix.	Falmouth.	Summer, 1890.	(Not seen for some years now.—R. V.)
Browne (unpublished).	Port Erin, Isle of Man.	Jan. 1895.	
" " "	Valentia Island.	March 1896.	

[1] According to Garstang, March and April are the chief months for *Arachnactis* at Plymouth.

From *A. albida*, which is slender and tapers markedly in late stages, *A. bournei* is recognizable by its fat cylindrical body and sharply rounded end; further, whereas in *A. albida* the union of the swollen bases of the tentacles produces an "oral disk" much greater in diameter than the body (a point better brought out by Sars' than by Vanhöffen's figure), and the tentacles are often many times the length of the body, in *A. bournei* oral disk and body have about the same diameter, and the tentacles are very short. As regards the colouring, my friend Mr. E. T. Browne informs me that he has taken this form on several occasions, and that in colour it is yellowish or brownish all over: it thus presents a great contrast to *A. albida*, which is of a transparent bluish-white, except for the yellowish-brown tips of the tentacles; in older specimens of *albida* the body may also assume a brown tint, but the tentacles remain transparent even in my oldest stages. The mesenteries, in all specimens of *A. bournei* which I have been able to examine, have an extremely short course, extending only about $\frac{1}{4}$ to $\frac{1}{3}$ of the length of the body below the free end of the stomodæum; in *A. albida* they extend to $\frac{1}{2}$ or $\frac{1}{3}$ of this distance even in young specimens, and in older ones some stretch for nearly the whole body-

length. The oldest specimens of this species at present known appear to be the Plymouth specimens with 9 tentacles.

The only other forms referable to the genus at present are (1) *Arachnactis brachiolata*, A. Agassiz[1], obviously a different species from either of the two already described; (2) the larvæ observed by Haime[2] in the cœlenteric cavity of *Cerianthus*, which do not quite resemble either *A. albida* or *A. bournei*; with these latter larvæ may perhaps be identical the forms discovered by Joh. Müller and described by Busch[3] from Trieste under the name of *Dianthea nobilis*, which have been suggested by van Beneden to be Cerianthidan.

Origin of the Mesenterial Filament.

A study of the developing mesenteries of *A. albida* has confirmed me in the belief, advocated elsewhere by myself and by others before me on histological grounds, that the thickening at the free edge of the mesentery, commonly known as the mesenterial filament, is ectodermal in origin. The mesenteries in *Cerianthidæ*, as has long been known from the researches of A. von Heider[4], are of two kinds—fertile (generative) and digestive, which generally alternate one with another, and, as he mentions very briefly, carry two different kinds of filaments, which become differentiated about stage G of my specimens.

The filament of a digestive mesentery (fig. 2) is of a type familiar to all students of Anthozoa: it consists of densely packed gland-cells of at least two kinds, among which lie nematocysts in all stages of development; this tissue abuts, quite sharply and without transition, on the undoubtedly endoderm-cells of the mesentery, and agrees exactly in histological detail with the ectoderm of all the stomodæum except that of the sulcus, which has small nematocysts, if any.

The filament of a fertile mesentery (fig. 3) is different from the foregoing both in shape and in histological detail. There is a central groove (often deeper than in the figure) consisting of finely granular gland-cells with very strong cilia; these cells are practically identical with the ectoderm of the sulcus. The groove is flanked by wings containing large gland-cells and nematocysts; next to these come three sets of simpler cells, the nuclei of the first and third set staining very strongly. The last of these three sets lies "unconformably" upon the vacuolated endoderm-cells.

I venture to repeat the suggestion (due first, I believe, to von Heider) that both types of filament are ectodermal downgrowths from the stomodæum along the free edge of the mesentery, on the following grounds:—

1. The histological structure of the chief part of both filaments is

[1] Journ. Bost. Soc. N. H. vii. p. 525 (1863).
[2] Ann. Sciences naturelles, (4) i. p. 341 (1854).
[3] Beob. üb. Anat. u. Entwickl. einiger wirbellosen Seethiere, p. 122: Berlin, 1851, 4to.
[4] Sitzungsber. d. k.-k. Akad. Wiss. Wien, lxxix. (Math.-nat. Cl.) p. 204.

practically identical with that of the ectoderm of the stomodæum; even the ectodermal pigment granules, very distinct in borax-carmine preparations on the body and stomodæum, are uniformly present on the filaments, but are not found in the undoubted endoderm.

2. Young mesenteries, which have not yet become united with the stomodæum as far down as its lower free edge, carry only a thickening of obviously endoderm-cells (fig. 4) on their free margins.

3. Mesenteries which have become united with the stomodæum as far down as its lower free edge (except the "directive" mesenteries) carry one or other of the two types of mesenterial filament above described for some distance, but below this filament they show a simple thickening of vacuolated endoderm-cells, of the same character as they carried before they reached the lower edge of the stomodæum (fig. 4); as I interpret it, the ectoderm has grown down along their free margins for some distance, but not as yet for their whole length.

4. The sulcus runs very much further down into the cœlenteron than does any other part of the stomodæum, forming a long groove of the shape indicated in fig. 6. At the point where the ectoderm of the sulcus becomes continuous laterally with the endoderm, the histological structure is practically the same as in the filament of a fertile mesentery (fig. 5).

The only evidence, of which I know, in favour of an endodermal origin of the filament is as follows:—(1) E. B. Wilson[1], in his studies on the development of numerous Alcyonaria, claimed to have shown that the axial (dorsal) filaments were of ectodermal, the remaining six filaments of endodermal, origin. To this one may reply that Alcyonaria are not Actiniaria, although closely allied to them, and that the differentiation of function, with which Wilson showed that the different mesenteries were correlated, does not hold good in the same shape for Actiniaria. (2) The brothers Hertwig[2] refuse to accept von Heider's suggestion of an ectodermal origin in *Cerianthus* on the ground that in *Sagartia parasitica* the incomplete mesenteries, which do not yet touch on the stomodæum, are provided with a filament similar to that of the complete mesenteries. This is certainly not the case in young *Arachnactis*, and, I may add, the filament of *Sagartia parasitica* seems to be in many respects of an unusual character among Actiniaria. Neither the argument from Alcyonaria nor that from *Sagartia* appears to me to be strong enough to unseat the evidence given above. If these filaments are indeed ectodermal, the boundary between ectoderm and endoderm is obvious enough in the digestive type of mesentery; but in the fertile type, is probably at the commencement of the vacuolated endoderm-cells, as there occurs at this point what I can only describe, by borrowing a phrase from geology, as an unconformability of strata.

[1] Mittheil. zool. Stat. Neapel, v. 1.

[2] Die Actinien. Jena, 1879, 8vo. (Jen. Zeitschrift, xiii.)

With regard to the distribution of the two types of mesenteries and filaments in *Arachnactis*, the "directive" pair practically carry no filament; for a very few sections below the end of the sulcus they have a slight thickening resembling the type of a fertile mesentery, but almost immediately assume the appearance indicated in fig. 4. The mesenteries next to them are of the fertile type, and the next ensuing of the digestive type; from that point onwards the alternation is apparently regular:—

Fertile: 3, 1, 4, 6, 8, &c. } Numbered in order of
Digestive: 2, 5, 7, 9, 11, &c. } successive development.

The differentiation of the filaments of the two kinds of mesenteries in the adult *Cerianthus* is apparently not mentioned by the brothers Hertwig[1]; their figure 3, pl. viii., practically unites the main features of my figures 2 and 3. Unfortunately, the specimens of *Cerianthus* at my disposal are not very well preserved, but even in them it is obvious that there is a differentiation of the two filaments, of the same kind as, although not precisely identical with, that which I have described above for *Arachnactis*. Very young germ-cells are recognizable in both types of mesentery in the adult.

I have seen nothing in *Arachnactis* of the small "directive" mesenteries, not attached to the stomodæum, which are mentioned by von Heider as occurring in *Cerianthus*.

Note.—Since the MS. left my hands, I have received a letter from my friend Prof. Karl Brandt of Kiel, which informs me that Prof. van Beneden has a paper in the press dealing with the *Arachnactis* of the Plankton and other German expeditions; this will doubtless throw more light on the distribution of the various species. Prof. Brandt informs me that the genus appears to have been widely taken in the North Atlantic ('National') and in the North Sea ('Holsatia' 1885, Nordsee Expedition 1895).

EXPLANATION OF PLATE XLVII.

Arachnactis albida, M. Sars.

Fig. 1. Diagram showing the order of development of mesenteries, marginal tentacles, and oral tentacles (p. 805).
2. Section of the filament of a digestive mesentery, ×600 (p. 807).
3. Section of the filament of a fertile mesentery, ×600 (p. 807).
4. Section of the thickened edge, presented both by a mesentery which has not touched the ectoderm at the lower edge of the stomodæum, and by a mesentery in the lowest part of its length, ×600 (p. 808).
5. Section of the edge of the sulcus, ×600 (p. 808).
6. Outline of the sulcus in transverse section below the level of the rest of the stomodæum; the azygos tentacle (5) and the directive mesenteries (3) are indicated also (p. 808).

In Figs. 2, 3, and 5, the arrow indicates the supposed junction of ectoderm and endoderm.

[1] *Op. cit. supra.*

November 16, 1897.

Dr. A. Günther, F.R.S., Vice-President, in the Chair.

The Secretary read the following reports on the additions made to the Society's Menagerie during the months of June, July, August, September, and October, 1897 :—

The registered additions to the Society's Menagerie during the month of June were 178 in number. Of these 132 were acquired by presentation, 15 by purchase, 14 were received on deposit, 13 were bred in the Gardens, and 4 were received in exchange. The total number of departures during the same period, by death and removals, was 137.

Amongst the additions the following are worthy of notice :—

1. Two fine adult King Penguins (*Aptenodytes pennanti*), purchased out of a lot of five offered for sale by a dealer, on June 23rd.

2. A young female Orang-outang (*Simia satyrus*), brought home from Sumatra and presented by Dr. H. Dohrn, C.M.Z.S., on June 30th.

The registered additions to the Society's Menagerie during the month of July were 102 in number. Of these 34 were acquired by presentation, 17 by purchase, 14 were received on deposit, and 37 were bred in the Gardens. The total number of departures during the same period, by death and removals, was 143.

Amongst the additions attention may be specially called to :—

1. A young pair of Babirussas (*Babirussa alfurus*), from Celebes, presented by H.G. The Duke of Bedford, F.Z.S., July 3rd.

2. An example of the Thick-billed Penguin (*Eudyptes pachyrhynchus*), from Stewart Island, New Zealand, deposited by the Hon. Walter Rothschild, F.Z.S., July 5th.

3. A very large example of Daudin's Tortoise (*Testudo daudini*), deposited by the Hon. Walter Rothschild on July 21st. This Tortoise, no doubt originally from the Aldabra Islands, is said to have been kept in captivity in Mauritius for about 150 years, and is believed to be the largest Land-Tortoise now living in the world. It is about 4 ft. 7 inches in length, 2 ft. 10 inches in breadth, and weighs about 5 cwt.

The registered additions to the Society's Menagerie during the month of August were 132 in number; of these 91 were acquired by presentation, 7 by purchase, 15 were received on deposit, 18 were bred in the Gardens, and 1 was received in exchange. The total number of departures during the same period, by death and removals, was 128.

Amongst the additions attention may be specially called to :—

1. A male and two females of a large Deer from the Altai Mountains, probably referable to *Cervus eustephanus*, Blanford, received on deposit on August 10th, and apparently different in species from any Deer previously exhibited in the Society's series.

2. A young male of the Caucasian Wild Goat (*Capra caucasica*), received in exchange on August 12th. There was already an adult female of this species living in the collection, presented by H. H. P. Deasey, Esq., in November 1893 [1], so that there is now a pair of this scarce bovine animal in the Society's Gardens.

The registered additions to the Society's Menagerie during the month of September were 194 in number. Of these 49 were acquired by presentation, 13 by purchase, 130 were received on deposit, and 2 were bred in the Gardens. The total number of departures during the same period, by death and removals, was 121.

The registered additions to the Society's Menagerie during the month of October were 109 in number. Of these 71 were acquired by presentation, 17 by purchase, 5 in exchange, 9 were received on deposit, and 7 were bred in the Gardens. The total number of departures during the same period, by death and removals, was 112.

The Secretary took this opportunity of calling attention to the Glossy Ibises living in the Society's Gardens, and made the following remarks:—

"In January 1893 we purchased seven examples of a species of Glossy Ibis, stated, I believe quite correctly, to have been received from South America. These birds were entered on the register as 'White-faced Ibises, *Plegadis guarauna* (Linn.),' of which I supposed them to be the young. In August of the same year we received as a present from the late Lord Lilford twelve examples of the European Glossy Ibis (*Plegadis falcinellus*) from Spain. These were turned into the large Aviary along with the former lot. They mixed themselves together, and it seemed quite impossible to distinguish the two supposed species, in the plumage which they then bore. I called Mr. Thomson's special attention to the subject, and supposed that when the birds became fully adult we should be able to see the differences that have been pointed out between these forms by the American ornithologists (see Ridgw. Man. N. A. B. ed. 2, p. 124). Mr. Thomson has supplied me with the following notes on this subject:—

"*Notes on the Breeding of the Glossy Ibises.*

"*July 23rd*, 1897.—The Glossy Ibises bred for the first time in 1895, when three were hatched. I cannot now remember how many birds 'paired,' but only three young birds lived long, others were killed by falling out of the nest and by neglect of the parent birds. The average number of eggs was three, of which generally only two were hatched. At the present time there are three young ones living, hatched this year, about three weeks old.

[1] See P. Z. S. 1893, p. 729.

In this case, four eggs were laid, but only three of them were hatched. Two of these (living) young ones are about as large again as the third one. The young birds are fed by the parent in the same manner as Pigeons feed their young. The period of incubation is about three weeks.

"The question as to whether the Glossy Ibises we have are really of two distinct species is rather a puzzling one. In the winter it is, I think, quite impossible to tell which are the American and which are the European birds. At the present time there are three or four birds that may well bear the name of 'White-faced Ibis.'

"In the supposed *P. guarauna* the white on the forehead is broader and passes round the back of the eye and under the chin. The cere is red, the eyes, I believe, are claret-coloured. The beak is reddish and the knees are red.

"In the true *P. falcinellus* the margin of white on the forehead is very narrow and does not pass behind the eye, and there is no white under the chin. The cere is lead-coloured, the eyes are black, and the beak and legs blackish. The Ibis that bred the three young ones is one of these. I think that the white-faced Ibises are distinct from the European bird, but that the difference can only be seen in adult birds in breeding-plumage.

"*Oct.* 1897.—In the early part of this month (Oct. 1897) the whole of the Glossy Ibises were caught up to be put in the Eastern Aviary for the winter. I took this opportunity to examine each bird, and so far as plumage is concerned it was almost impossible to tell one bird from another. I found *three* birds with claret-red eyes. *Two* of these have reddish knees and pinkish ceres, and are, no doubt, the two that had white faces in the summer. The third (red-eyed) bird has no reddish knees nor pink cere. All the other birds have smoky-black eyes."

Mr. Sclater stated that during the past summer he had visited the Zoological Gardens of Cologne, St. Petersburg, Moscow, and Berlin, and made some remarks on the principal animals he had observed in those establishments.

At Cologne were fine specimens of *Canis jubatus* and *Canis lateralis* of West Africa, also a group of six specimens of the Arabian Gazelle (*Gazella arabica*), which Herr Reiche (of Alfeld), who had imported them, had informed him were received from the Arabian Port of Hodeidah, near which this Gazelle was found on the littoral strip. The family of five Sea-lions (*Otaria californica*) was still thriving, and lived in harmony in the large basin provided for them with four Cormorants. An example of *Haliaëtus branickii* at Cologne, of about the same age as that in the Society's collection (see P. Z. S. 1896, p. 784, pl. xxxvii.), was now getting slightly white in the tail.

In the Zoological Garden of St. Petersburg, which was mainly resorted to as a place of public amusement, was a fine adult pair

of *Hippopotamus amphibius*, which were remarkable as being sufficiently tame to allow the keeper to ride on their backs and thus placed to feed them from his hand.

The most noticeable Mammals in the Zoological Garden of Moscow were a fine adult female of the Persian Deer (*Cervus maral*), accompanied by a young fawn, very distinctly spotted on the back (see Trans. Zool. Soc. vol. vii. p. 336, pl. xxix.). There was also a young male of this beautiful Deer, and a young female Saiga Antelope (*Saiga tatarica*).

In the renowned Zoological Garden of Berlin there was, as always, much to be inspected and admired. The Garden was fortunate in possessing one of the few pairs of the old stock of Nubian Giraffes, *Giraffa camelopardalis*, still existing in European menageries. These animals were fifteen or sixteen years old, but still in excellent form and condition. The male showed the median horn very prominently (*cf.* de Winton, P. Z. S. 1897, p. 276); in the female it was barely observable. Amongst the Antelopes, Mr. Sclater had noticed fine examples of *Gazella cuvieri* ♀, *Cephalophus harveyi* from German East Africa, *Bubalis lichtensteini*, and *Cobus unctuosus* (♂, ♀ et vit.). The new Bird-house contained a large series of examples of Passerine and other birds, many of which Mr. Sclater had not seen alive before. Amongst these were *Oriolus trailli*, *O. melanocephalus*, *Crateropus squamiceps*, *Ruticilla leucocephala*, *Artamus sordidus*, and *Poocephalus versteri*. There were also many fine Cranes, Storks, and Herons to be seen (*Ardea sibilatrix*, *Ardea gularis*, &c.), for which a new House was in preparation. The series of the larger Birds of Prey comprised fine examples of *Spizaëtus coronatus* and *S. bellicosus*, and two quite adult examples of *Haliaëtus branickii* with perfectly white tails. In the same compartment as the last was a nearly adult specimen of *H. pelagicus*, showing at a glance the striking diversities of these two large-billed Sea-eagles.

Mr. Sclater exhibited an egg of the Cariama (*Cariama cristata*) laid in the Society's Gardens on the 18th of August last, and remarked that it was not so pointed and not so much spotted as those described and figured by Prof. Newton in 1889[1], but otherwise agreed with them in its characters.

Mr. Sclater read the subjoined notes from Mr. Arthur Thomson, the Head-Keeper, on this subject:—

"Two Cariamas which were thought to be a pair were put together during the past summer in the large cage at the west end of the Eastern Avairy, where a large flat basket had been fixed in one corner as a suitable nesting-place. Birch-twigs &c. were scattered about the cage and the birds (which proved to be a pair) soon began to carry them into the basket. The female laid two eggs in July and commenced to sit on the 21st. Both birds took turns on the nest, and I have seen the female drive the male on to the

[1] See P. Z. S. 1889, p. 25, pl. i.

nest. On the 18th of August one young was hatched, which the parent bird immediately proceeded to eat. The other egg (exhibited herewith) was addled. The period of incubation was exactly 28 days. The only observable difference between the male and female Cariama is that the female is rather the largest."

In reference to their communication on the Dentition of the Manatee [1], Messrs. Thomas and Lydekker desired to draw attention to a memoir on the same subject by Dr. Clemens Hartlaub, published in 1886 [2]. This paper, mainly on account of its title, had been overlooked, the references in the 'Zoological Record' being so worded as to make it appear that it referred chiefly or entirely to the distinction and geographical distribution of the species, rather than to any more general question.

So far as the number of teeth in the Manatee was concerned, Dr. Hartlaub had come to very much the same conclusions as Messrs. Thomas and Lydekker, and on nearly similar grounds, but he had ventured to go even further in the estimate of the number of molars which it might be possible for the animal to develop in the course of its life.

Since this part of Dr. Hartlaub's admirable paper had, at least in England, by no means attracted the attention it deserved, the present authors, while regretting the omission of reference and credit to Dr. Hartlaub, felt at the same time it was no disadvantage to science that the wonderful dentition of the Manatee had been described afresh in a publication so widely read and quoted as the Society's 'Proceedings.' They would likewise take the opportunity of expressing their gratification that the conclusions reached by themselves, startling and improbable as these at first sight seemed, had been independently attained by so competent a judge as Dr. Hartlaub.

Some of the palæontological points advanced by the present authors, and the bearing that a knowledge of the Manatee's dentition would have on the homologies of other Mammalian teeth, had not been discussed in Dr. Hartlaub's paper.

Mr. Lydekker exhibited on behalf of the Hon. A. E. Gathorne-Hardy a flat skin of *Ursus pruinosus*, collected by Mr. Neil Malcolm in Tibet. Although differing considerably in coloration from the specimen figured in plate xxvii. of the present volume (P. Z. S. 1897, p. 412) of the Society's 'Proceedings,' there could be no doubt that the new specimen belonged to the same species—this being especially shown by the bases of all the hairs being black. Much less white on the head and shoulders was exhibited by the new specimen, in which the ears were black instead of white. There was also a rufous band down the middle of the back, not observable in

[1] Above, p. 595.
[2] Zool. Jahrb. i. p. 1 (1886).

the previous specimen. In fact the new example seemed to differ as much from the latter, if not more so, than did the Kashmir Snow-Bear from the Brown Bear of Europe; and thus supported the author's view as to the Blue Bear forming a species distinct from all the other living members of the *U. arctus* group, which he regarded as subspecies of one variable species. Whether these differences were merely individual, or due to season or age, or, on the other hand, indicated subspecific forms, it was difficult to determine. Tibet was a large country, which might well contain districts suitable for the habitat of Bears more or less completely separated by physical barriers from one another. And it was certain that the differences between the two specimens considered were much greater, so far as coloration was concerned, than those between the various N. American Grizzlies. But if two subspecies were indicated, which was to be regarded as the typical race of the species?

Mr. Lydekker also exhibited a coloured sketch of the Deer described by Mr. Blanford as *Cervus eustephanus*, but of which the proper name appeared to be *C. canadensis asiaticus*. The specimen, in company with several others of the same race, was living in the menagerie at Woburn Abbey, and came from the Altai. It indicated a very distinct race of the Wapiti, in which the entire animal was smaller than the American Wapiti, although the antlers were absolutely larger. Mr. Lydekker likewise mentioned that the Stag he had described under the provisional name of *C. bedfordianus* (P. Z. S. 1896, p. 932) had recently died, after developing the antlers of the third year. These seemed to indicate that it was identical with *C. xanthopygus* and that the figure of the type of the latter (Milne-Edw. Recherches Mammif. pl. xxi.) was very incorrect, the tail being drawn much too long, whereas it is really as short as in the Wapiti.

Mr. G. P. Mudge read a preliminary paper on the Myology of the Tongue of Parrots. Species of *Ara*, *Brotogerys*, *Chrysotis*, and *Lorius* had been examined, and the detailed relationships of the individual muscles to the "*parahyal arch*" of Mivart had been worked out. Muscles termed the *mesoglossus*, *mylo-para-hyoideus*, and *ceratoglossus* were described as new.

Special interest was shown to attach to the inferior ceratoglossus muscle. In respect to it *Ara* and *Chrysotis* were found to be structurally similar, and to present a condition markedly distinct from that occurring in the Loriidæ; but while in the general characters of their lingual musculature the Loriidæ were found to stand alone (as had been concluded by Mivart from the study of their skeleton), as concerning the inferior ceratoglossus *Brotogerys* had been found to present a condition intermediate between that occurring in them and the other Psittacidæ thus far examined.

The following papers were read:—

1. On British Medusæ. By Edward T. Browne, B.A., F.Z.S., Zoological Laboratory, University College, London.

[Received June 10, 1897.]

(Plates XLVIII. & XLIX.)

The present communication is in continuation of a previous paper read before the Society in March 1896, and published in the 'Proceedings' for that year (P. Z. S. 1896, p. 459).

Dipurena halterata (Forbes). (Plate XLIX. figs. 2, 2*a*, 2*b*.)

Slabberia halterata, Forbes (1848); Allman (1867).
Dipurena halterata, Haeckel (1879); Browne (1896).

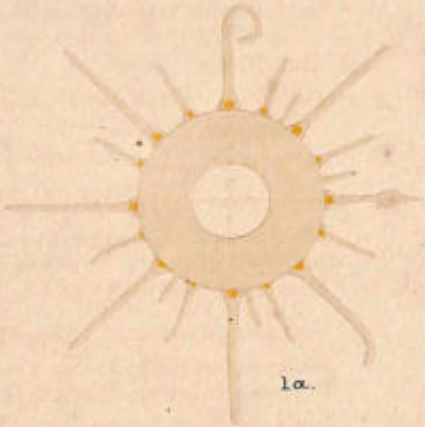
I had the good fortune to capture a fine adult specimen of this species in Valencia Harbour on the 27th of July, 1896. I had occasionally taken young specimens, but never had seen the adult. Before describing the specimen it is best to review the literature relating to the species in order to make clear a most interesting point.

Forbes first found this species in August, 1836, in Mount's Bay, Cornwall, where great numbers were taken, and he described the species in his celebrated Monograph as follows:—"Umbrella deeply campanulate, smooth, colourless; sub-umbrella large, divided into equal parts by four simple vessels, which open into a circular marginal vessel. On the upper third of the sub-umbrella are seen in the course of the vessels four linear ovaries or reproductive glands, pointed at each end. The tentacula are strong, four in number, and colourless, except at their bases and tips. The bulbs at their bases are more or less triangular, coloured above with bright verdigris-green, and across the centre with a band of deep orange, below which, on the root as it were of the tentacle, is seen a conspicuous and rather large jet-black ocellus. The extremity of each tentacle is likewise swollen into a bulb, which is of a rich orange hue. From the centre of the sub-umbrella hangs a long and highly extensile peduncle or stomach, capable of being contracted entirely within the general cavity, but more usually elongated beyond the length of the tentacula. It is of a denser tissue than the other parts, and terminates in a circular orifice. The diameter of the disk does not exceed one-eighth of an inch. The position and form of its ovaries indicate a relationship with *Thaumantias*, whilst the peduncle is that of a *Sarsia*. It thus links together genera which, were it not for such a connecting form, would seem to be far apart."

In 1878 Haeckel captured a specimen at Jersey, which he has described in his 'System der Medusen.' He states that the generative cells are upon the manubrium in three spindle-shaped masses, and he expresses an opinion that the "ovaries" described



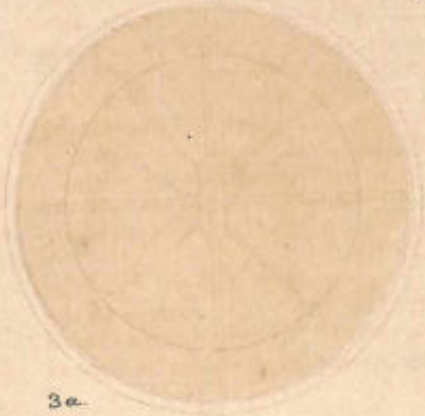
1



1a.



3



3a.

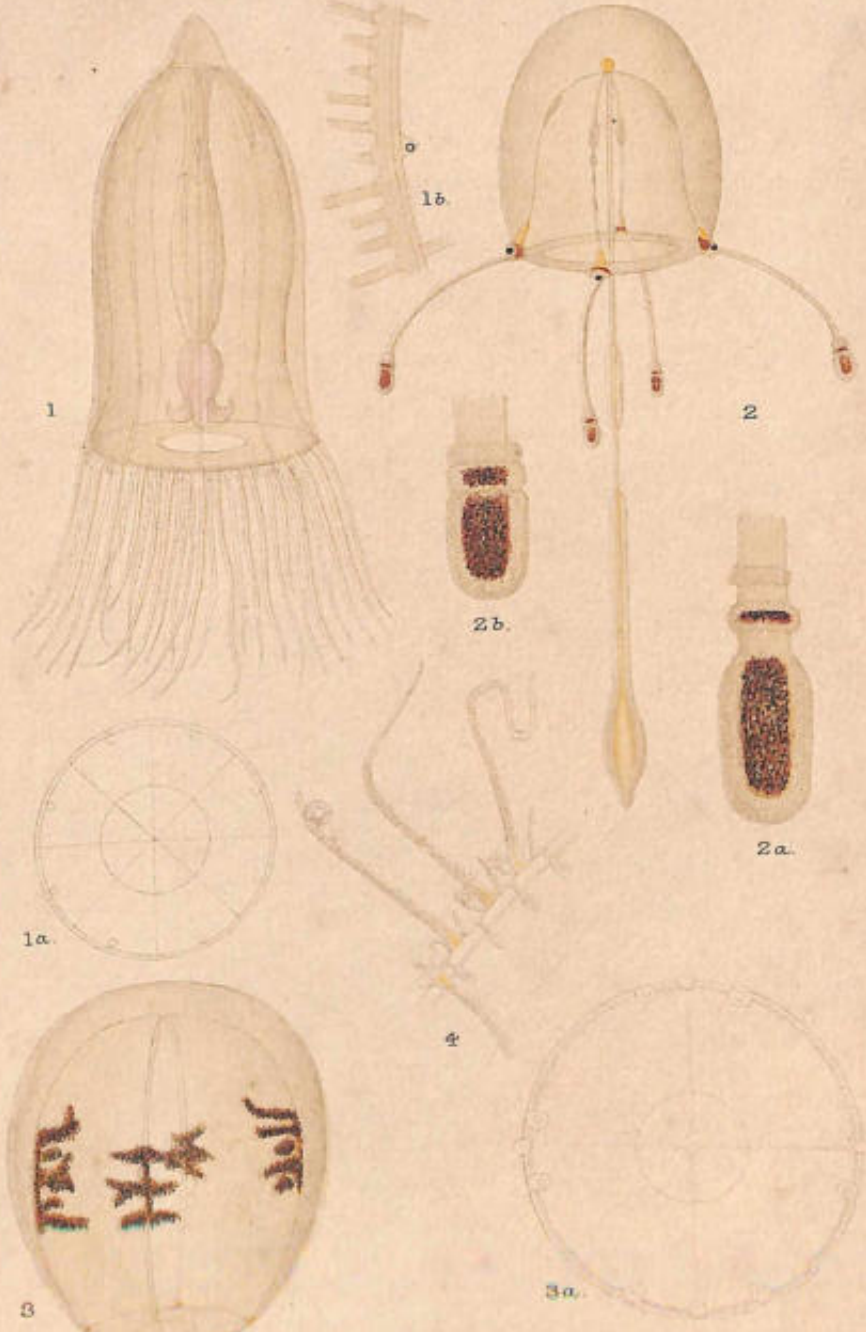


2

E.T.B. ad. nat. del.
M.P. Parker lith.

West, Newman imp.

British Medusae.



E.T.B. ad nat. del.
M.P. Parker lith.

West, Newman imp.

British Medusae.

by Forbes upon the radial canals may possibly be parasitic *Distoma*.

The specimen which I captured at Valencia helps to clear up these conflicting statements. It has generative cells upon the manubrium, as described by Haeckel, and it has also the linear swellings upon the radial canals, as described and figured by Forbes. There can be no doubt about the swellings upon the manubrium being formed of generative cells, but I am not able to make a definite statement with regard to the swellings upon the radial canals. Sections show that the swelling is formed by a considerable enlargement of the endoderm cells, which are crowded with small nuclei. In general appearance the swelling resembles an immature gonad, as usually seen upon the radial canal of a *Leptomedusa*, but more specimens must be examined to settle the question whether there are generative cells among endoderm cells of the swellings or not. I have a few small specimens in my collection which have again been examined, and I have found in all of them traces of the swellings upon the radial canals. These specimens were preserved before examination and by a method not suitable for histological work.

As the Valencia specimen does not agree exactly with the descriptions given by Forbes and Haeckel, I think it is best to describe it and give a figure of it, especially as Forbes has figured an immature stage:—Umbrella bell-shaped, about 8 mm. in length and 6 mm. in width. Manubrium, when expanded, very slender, about twice the length of the umbrella, with a small apical knob. At the end of each of the four tentacles there are large batteries of nematocysts, forming a large terminal knob when the tentacle is contracted (fig. 2 *b*); but when expanded (fig. 2 *a*) the terminal knob is seen to be composed of three distinct clusters of nematocysts. The basal bulb of the tentacle is of a dark reddish brown, with a large black ocellus. Two masses of spermatozoa surround the manubrium, one extending from the mouth along the stomach, and occupying about one third the length of the manubrium, the other starting a short distance away and occupying another third of the manubrium. On each of the four radial canals, at about one third of the distance from the stomach to the ring-canal, is a small linear swelling, which Forbes regarded as an ovary, but that statement still needs confirmation.

? CYTÆANDRA AREOLATA, Haeckel. (Plate XLVIII. figs. 1, 1 *a*, and 2.)

In my Report on the Medusæ of the Isle of Man (Trans. Liverpool Biol. Soc. 1895), I have described under the name of *Cytæandra areolata* several stages of a medusa which has not yet been figured. I erred somewhat in using the name *Cytæandra areolata* for this medusa. It is Haeckel's name for the medusa budded off from the hydroid *Podocoryne areolata* (Alder), but up to the present there is not the slightest proof that my specimens are derived from that hydroid. I have but little doubt that eventually they will

become connected with the genus *Podocoryne* and then the correct name can be assigned to them. I have tried to rear the medusæ budded from *Podocoryne carnea*, but have failed to keep them alive long enough to witness any further development. The specimens of *P. carnea* taken in the tow-net always had eight tentacles and showed no signs whatever of possessing any reproductive organs, so that they may be regarded as quite early stages. The earliest stage taken of the medusa which I have called *Cytæandra areolata* has sixteen tentacles, which correspond to the number of tentacles possessed by the medusæ liberated from *Podocoryne areolata*. At present I have no reason for doubting that *P. carnea* and *P. areolata* are two distinct species, and therefore expect to find two distinct adult medusæ, but have only seen one.

I give the description of an early stage (Plate XLVIII. fig. 1):—Umbrella about 1 mm. in length and in width, with scattered nematocysts upon the ex-umbrella. Manubrium about two-thirds the length of the umbrella-cavity, and the mouth with four simple oral tentacles terminating with a cluster of nematocysts. Sixteen large tentacles (4 perradial, 4 interradial, and 8 adradial), with brownish basal bulbs; and four slender tentacles which are evidently at an early stage of growth.

I add the description of a late stage (Plate XLVIII. fig. 2):—Umbrella about 4 mm. in width and slightly less in length. Compared with an early stage it shows a change in shape owing to the increase in the mass of mesogloea above the umbrella-cavity. The oral tentacles are bifurcated and have the usual terminal clusters of nematocysts. The number of tentacles in the specimen figured is 25, but 30 tentacles were counted in another specimen. The basal bulbs of the tentacles are very conspicuous, of a rich reddish-brown colour.

I saw ova surrounding the stomach of a specimen of this medusa taken in Valencia Harbour on 22nd April, 1895. The specimen was about 5 mm. in diameter and possessed 24 tentacles.

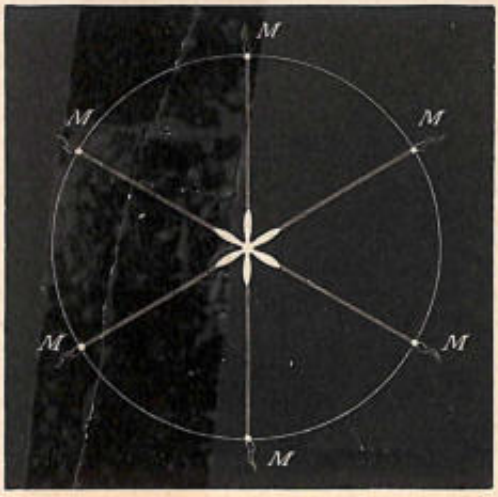
LAR SABELLARUM, Gosse.

In my previous paper on British Medusæ (P. Z. S. 1896, p. 468), I showed that the medusa *Willsia stellata*, Forbes, was the adult form of the medusa liberated from the hydroid *Lar sabellarum*, Gosse, and a description was given of the different stages in development. In that paper I described wrongly the branching of the radial canals in the adult, and was led into the error by having seen only one specimen, which has since proved to be an abnormal one. I stated that the third branch of the radial canal was an offshoot of the second branch, but in most specimens the third branch comes off from the first branch. The diagrams (1, 2, 3, 4, pp. 819, 820) show the normal development of the radial canals.

During my visit to Valencia in 1896, I was able to collect a large number of specimens, especially of the later stages, and found some remarkable variations in the branching of the radial canals. Two of these are illustrated by diagrams (5, 6, p. 821). In other

Diagrams to show development of the branches of the radial canals. Aboral view. *M*, main canal. 1, first branch. 2, second branch. 3, third branch.

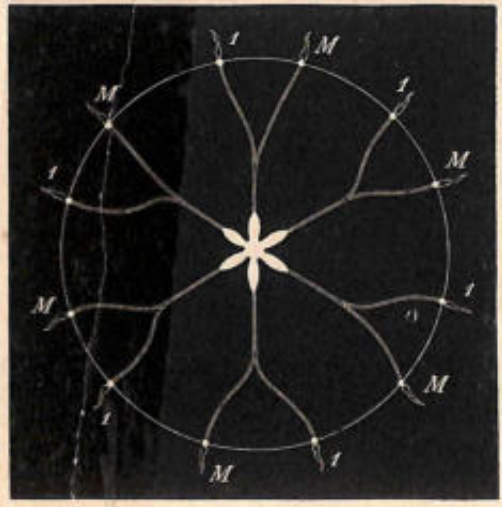
Fig. 1.



Lar sabellarum.

First stage. Six canals without branches.

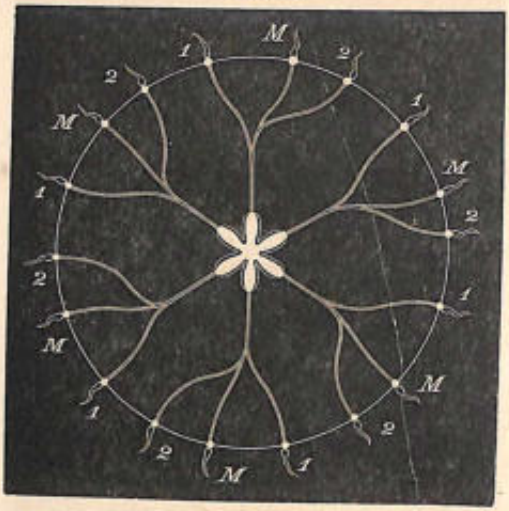
Fig. 2.



Lar sabellarum.

Second stage. Each canal with one branch.

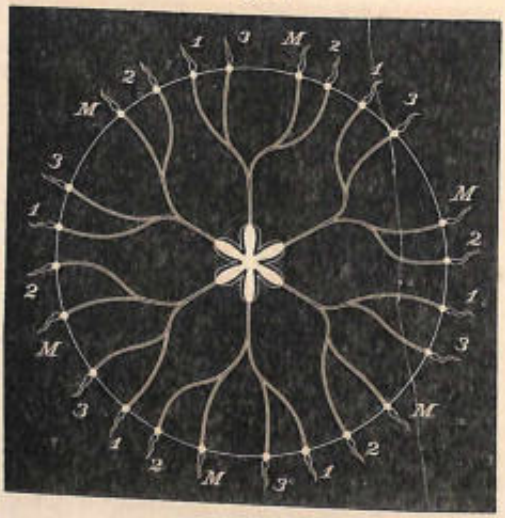
Fig. 3.



Lar sabellarum.

Third stage. Each canal with two branches.

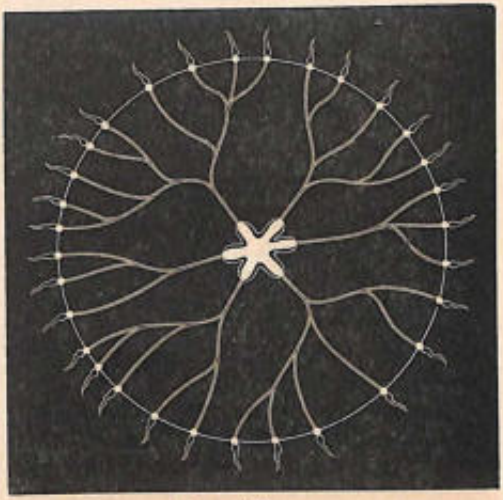
Fig. 4.



Lar sabellarum.

Adult stage. Each canal with three branches.

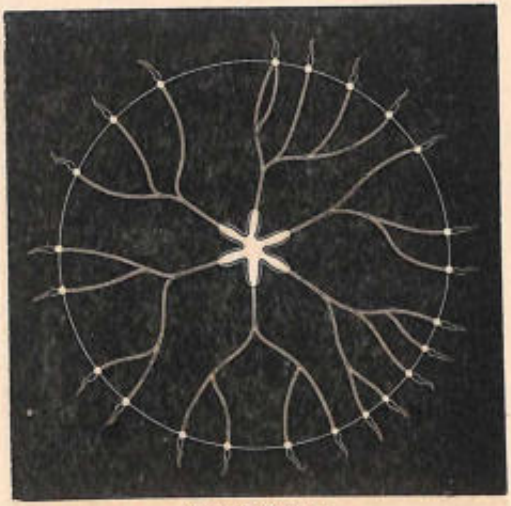
Fig. 5.



Lar sabellarum.

Diagram showing variation in the branching of the radial canals.

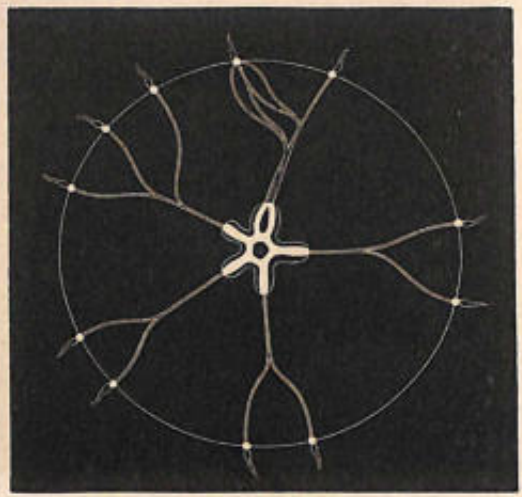
Fig. 6.



Lar sabellarum.

Diagram showing variation in the branching of the radial canals.

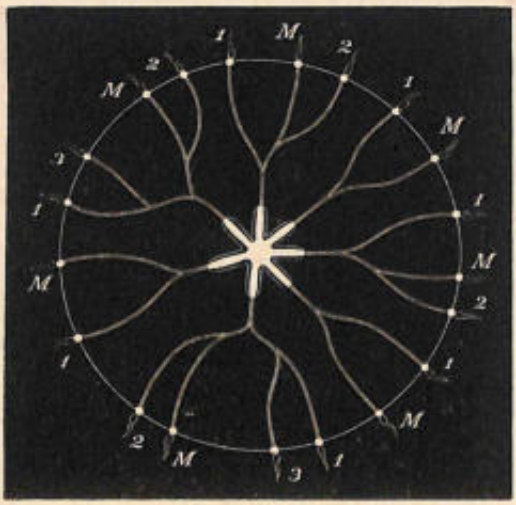
Fig. 7.



Lar sabellarum.

Diagram showing variation in the branching of the radial canals.

Fig. 8.



Lar sabellarum.

Diagram of a specimen with seven main canals.

Fig. 9.



Lar sabellarum.

Diagram showing an irregular arrangement of the lobes of the stomach and of the radial canals.

specimens a variation occurred in the number of the canals which leave the stomach; normally six are present. Two specimens possessed five canals: one belonged to the first stage and had five tentacles; the other belonged to the second stage and possessed ten tentacles.

Another specimen showed the union of two lobes of the stomach to form one canal (fig. 7, p. 822), with an abnormal branching of the canal near the margin of the umbrella.

A specimen with seven canals showed that some of the canals had less than the normal number of branches (fig. 8, p. 822). A curious variation of the normal star-shaped stomach is shown in fig. 9 (p. 823).

LAODICE CALCARATA. (Plate XLIX. fig. 4.)

Laodice calcarata, L. Agassiz (1862); Haeckel (1879); Brooks (1895); Browne (1895).

Lafoea calcarata, A. Agassiz (1865).

According to Haeckel there are four species belonging to the genus *Laodice*, viz. *L. cruciata*, *L. ulothrix*, *L. calcarata*, and *L. salinarum*.

I have already briefly criticised (see P. Z. S. 1896, p. 482) the numerous synonyms and references placed under the name of *Laodice cruciata* by Haeckel, and think that *Medusa cruciata* of Forskål, and the references connected with it, may be safely placed on an obsolete list, as neither the descriptions nor the figures are of any use for even determining correctly the genus to which they really belong.

Some of the other synonyms refer to medusæ which do not belong to the genus *Laodice*, but two of them clearly do, viz., *Thaumantias mediterranea*, Gegenbaur (1856), and *Cosmetria punctata*, Haeckel (1864). Haeckel, however, in his monograph (1879), rightly considers that his species is identical with that of Gegenbaur, and therefore may be regarded as a synonym of it.

It is a matter of considerable difficulty with our present knowledge of the genus to fix upon characters which may be regarded as sufficiently permanent to distinguish one form from another. Although I obtained last year several dozen fine specimens in Valencia Harbour, yet I am not able to determine for a certainty to which species they belong.

I first used the specific name *L. calcarata* for a specimen taken off the Isle of Man in 1894, and at that time had not investigated the literature connected with *Laodice cruciata* of Haeckel. As I do not wish to change again the specific name of the British specimens the name is still retained for the Irish specimens, which would fairly well agree with any of the four species mentioned, except in coloration, which, amongst medusæ, is not usually a good character for the determination of species.

The Valencia specimens ranged from 3 mm. to 27 mm. in diameter and show various stages in development.

The umbrella is changeable in shape, and cannot be relied upon as a specific character. In the smallest specimen the umbrella is bell-shaped, about as long as broad, but it broadens as it grows, as the following measurements show:—9 mm. wide, 7 mm. long; 20 mm. wide, 12 mm. long; 25 mm. wide, 13 mm. long. Amongst the larger specimens, 20–25 mm. in width, the shape of the umbrella is very variable, from bowl-shaped to watchglass-shaped. The velum increases in width along with the growth of the umbrella, measuring 2–2½ mm. in specimens from 20–25 mm. in diameter. The mouth in the smallest specimen has four lips with a slightly folded margin. The size of the lips and the folds of the margin increase with the size of the medusa. In the largest specimens the lips are 2–4 mm. in length and have a beautifully folded margin. The mouth opens direct into a flat stomach, out of which run the four radial canals.

The generative cells develop in the wall of the radial canals, and the ova in the adult are visible, extending nearly from the stomach to within a short distance of the ring-canal. The smallest specimen (3 mm. in diameter) just shows the commencement of the formation of the gonads, by an increase in the size of the wall of the canals, forming a short fold which extends from the stomach and just arches over the top of the umbrella-cavity. It gives to the stomach the appearance of possessing four short lobes. The growth of the gonad continues along the radial canal until it nearly reaches the ring-canal. As the generative cells increase in size, the wall of the canal also increases in size, until it forms a large hollow tube with crumpled sides. In each of the specimens examined there was a short portion of the radial canal, next the ring-canal, free

from generative cells. The gonads in all the specimens were quite colourless.

The margin of the umbrella is thickly beset with long tentacles, the number varying according to the size of the umbrella, as shown by the following examples :—

3 mm.	diameter	About 30	tentacles.	
6 mm.	„	„ 60	„	
9 mm.	„	„ 100	„	
11 mm.	„	„ 120	„	
17 mm.	„	„ 230	„	
26 mm.	„	„ 300	„	or more.

The tentacles first make their appearance as bulbs on the inner side of the margin, which is fairly broad. The bulb apparently grows outwards across the margin, and the tentacles develop from the outer end of the bulb. The tentacle gradually tapers from the bulb; it is at least 25 mm. in length, when expanded, and covered with nematocysts. The attachment of the tentacle to the umbrella is further strengthened by an outgrowth which extends from the base of the tentacle for a short distance along the exumbrella. The outgrowth is usually triangular in shape and consists of large cells. This outgrowth or "spur" appears after the development of the tentacle, and is absent or scarcely visible in young stages.

When the medusa is motionless in an aquarium, the tentacles are arranged in two positions. The basal portion of one tentacle points upwards, and that of the adjacent one slopes slightly downwards; the basal portion is stiff and straight, the outer portion gracefully curves over, with the free end hanging down and tapering out to an almost invisible thread. On the inner side of the basal bulbs of the tentacles, and just below the ring-canal, there is usually situated a black ocellus. The ocelli show a considerable amount of variation in number. As a rule there is not one opposite every tentacle, but every alternate tentacle. In the same individual several adjacent tentacles may each have an ocellus at their base, then an alternating series, one with, and the next without an ocellus; and followed by two or three adjacent tentacles without ocelli. In one large specimen I counted 228 tentacles, but only 88 ocelli, and in another large specimen I noticed an ocellus opposite nearly every tentacle.

On the inner side of the margin of the umbrella are situated the curious sensory clubs or cordyli—one about midway beween every two tentacles; they usually point inwards, and lie close to and below the velum. Brooks has recently given a description and figures of these organs.

In addition to the tentacles and cordyli there are also long filiform cirri, armed with nematocysts: usually one between every two tentacles, but often two are present, and are situated close to the bulb of the tentacle. In a few specimens I noticed that a

filiform cirrus was situated on the outer side of a tentacle-bulb, or upon the "spur." The cause of this abnormal position I was able to trace from the early stages. The tentacles do not all occupy exactly the same position on the margin; some develop very close to the inner side of the margin. The filiform cirri are close to the outer side of the margin, and, consequently, when a tentacle-bulb makes its appearance close to the inner margin and opposite a cirrus, in its subsequent growth it carries the cirrus in an outward direction.

All the Valencia specimens were quite colourless to the naked eye, but under the microscope a narrow band of a yellowish-brown colour is seen at the base of the ring-canal, and a narrow streak of the same colour is also visible in the basal bulbs of the tentacles.

DIPLEUROSOMA HEMISPHÆRICUM (Allman). (Plate XLVIII. figs. 3, 3*a*.)

Ametrangia hemisphærica, Allman (1873).
Dipleurosoma irregulare, Haeckel (1879); Haddon (1885).

During my visits to Valencia in 1895 and 1896 I found a few specimens of this species.

Allman, in the description of the species, states that there are three main radial canals with branches; some of the branches enter the ring-canal and others terminate blindly.

Haeckel found some specimens at Brighton, one of which agreed with Allman's description, and the others showed considerable variation in the arrangement of the canal-system.

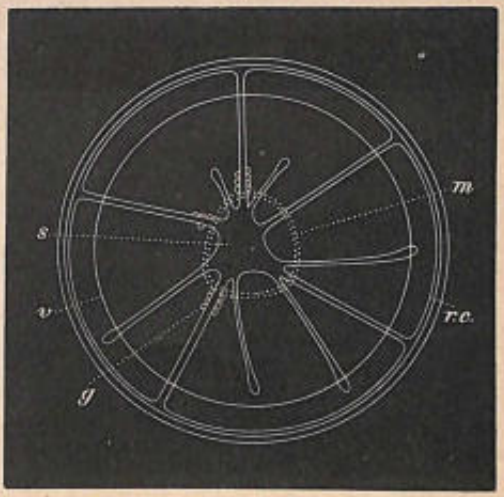
The Valencia specimens also show that the canal-system, which I now only intend to describe, is very variable.

The specimen which approaches nearest to Allman's description has three large radial canals, with lateral branches, and also two smaller canals leading from the stomach to the ring-canal (fig. 10, p. 827). The umbrella of this specimen measures 8 mm. in diameter, and the ova are just visible upon four of the canals.

Another specimen, of which I have given a figure (Plate XLVIII. figs. 3, 3*a*) shows another type of canal-system. There are four large canals, which divide the umbrella into four equal parts, and four smaller canals, interradially situated, one of which has reached the ring-canal and the other three terminate not far off. The gonads have not yet commenced to develop. The umbrella is about 8 mm. in width and 4 mm. in length.

A very irregular system of canals is shown in another specimen (fig. 11, p. 827). This has eight radial canals leaving the stomach and joining the ring-canal, and some of these canals have short lateral branches, which probably by further growth finally reach the ring-canal. In a damaged specimen I have counted as many as eleven canals entering the ring-canal. A slightly damaged specimen of a male shows that the generative cells form a large oval mass, on, at least, five of the radial canals, and that the

Fig. 10.

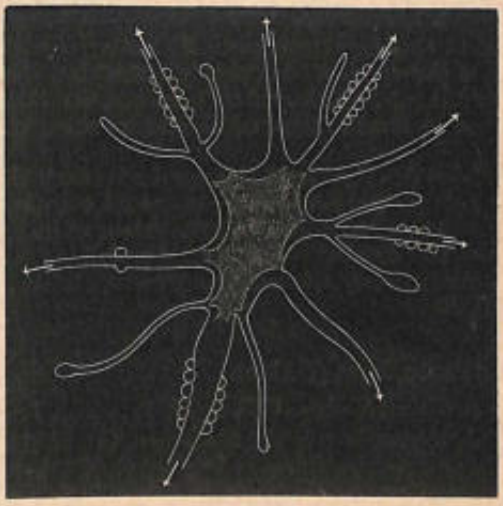


Dipleurosoma hemisphæricum.

Diagram of the radial canal-system. Oral view.

g, gonad; *m*, mouth expanded; *r.c.*, ring-canal; *s*, stomach; *v*, velum.

Fig. 11.

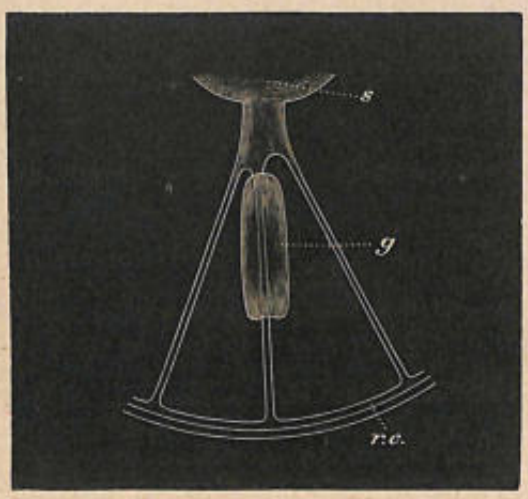


Dipleurosoma hemisphæricum.

Diagram showing the radial canals leaving the stomach. Oral view. The canals marked with an arrow enter the ring-canal.

branches of the canals leave the main canal between the generative organs and the stomach (see fig. 12, p. 828).

Fig. 12.



Dipleurosoma hemisphæricum.

Diagram showing the position of the gonad upon the radial canal.

It is evident that these specimens do not agree with Allman's description of the species. He clearly states that there are only three primary canals, which give off branches, and that the generative cells are confined to these canals and are situated close to the stomach.

I think a fresh description of this species is required, and that a large number of specimens ought to be examined, so as to find out the normal plan of the canal-system and the extent of its variations.

Distribution. England—Brighton, *Haeckel.*

Ireland—South Coast, *Allman.* Kingstown, *Haddon.* Valencia Island, *E. T. B.*

Polycanna forskalea (Forbes).

Æquorea forskalea, Forbes, P. Z. S. 1851, p. 272, Rad. pl. iv.

On the 5th September, 1896, five specimens of this beautiful medusa were captured in Valencia Harbour, and others were seen swimming at too great a depth to be taken in a hand-net. On the previous day a large one had been taken by the Misses Delap. All the specimens were in splendid condition, and fortunately belonged to different stages, which are described in the order of their size

No. 1. Umbrella 25 mm. in diameter.

The stomach is very broad at the base, which is slightly convex in shape, and about 13 mm. in diameter. The mouth has about 55 simple folds, and, when expanded, is 7 mm. in diameter. No less than 140 radial canals leave the stomach, and out of these 45 enter the ring-canal, the remainder showing various stages in development. At this stage the generative cells are just visible upon some of the canals. Upon the margin of the umbrella there are four large tentacles, when expanded about 20 mm. in length, situated at about equal distance apart, and there is also a small tentacle, about midway between the large tentacles, in three of the quadrants. The fourth tentacle, to make this series complete, has not yet begun to grow. In addition to the tentacles there are about 100 marginal bulbs, varying in size, from which tentacles develop in the later stages.

The marginal vesicles are very numerous, but not constant in number and position, generally two between every two bulbs.

No. 2. Umbrella 30 mm. in diameter.

This specimen shows a later stage in development as there are 8 large tentacles, but the numbers of marginal bulbs and vesicles are about the same as in the first specimen. The radial canals are not nearly so numerous, only 114 present. About half enter the ring-canal, the others show various stages of growth and usually alternate with the former. In one place on the umbrella there is a union of four adjacent canals, which again branch into three canals.

No. 3. Umbrella 55 mm. in diameter.

The base of the stomach shows a well-marked convexity, 26 mm. in diameter, which is formed by a thick mass of mesogloea. There are 16 tentacles present, which may be divided into three sets—four very long, four moderately long, and eight very short. Nearly all the radial canals (145 in number) unite with the ring-canal. The gonads, owing to their increase in size, are conspicuous, and the marginal bulbs and vesicles are very numerous, as in the preceding specimens.

No. 4. Umbrella 60 mm. in diameter.

The base of the stomach measures 33 mm. in diameter and has a conspicuous convexity. The stomach itself, though very broad, is very short, and the mouth measures 17 mm. in diameter when expanded. There are 28 tentacles, varying in length, eight of which are very long, and about 40 marginal bulbs. The radial canals, about 180, nearly all unite with the ring-canal. One canal on leaving the stomach divides into three branches, and another into two branches. The generative cells show a further stage in development.

No. 5. Umbrella 135 mm. in diameter.

The first four specimens show a gradual increase in size and in development, but there is a slight gap in the series between this specimen and the last one. The umbrella is very flat on the top and about four times as broad as high. The growth of the stomach,

55 mm. in diameter, keeps pace with the growth of the umbrella and becomes longer and more funnel-shaped. The mouth, as in all these specimens, has a considerable number of folds and is capable of considerable expansion (35 mm. in diameter when expanded). There are 43 tentacles of various sizes, and between every two tentacles usually one large and two small marginal bulbs, and between the latter several marginal vesicles. The radial canals (153 in number) nearly all enter the ring-canal. The genital bands are very conspicuous. The velum is about 4 mm. broad.

No. 6. Umbrella 160 mm. in diameter.

This is the largest specimen of the series, and to judge from the immature condition of the ova the medusa has not yet reached its full development and probably grows to a larger size. The diameter of the stomach is 53 mm., and the mouth has a very large number of folds. There are 56 tentacles, and between every pair of tentacles usually one large and two small bulbs, which may develop tentacles later on. The radial canals are only 88 in number and nearly all join the ring-canal, and nearly all have generative cells in different stages of development.

The following is a general description of the different organs of the specimens above described :—

The Stomach and Mouth.

The stomach is remarkable on account of its size; the upper part, as already stated, is circular and convex in shape; the convexity is more marked in the larger specimens. In shape, the stomach is like a short, broad funnel with the side marked by longitudinal lines, like frosted glass, which alternate with the openings of the radial canals. The lines extend from the base of the stomach up to the edge of the mouth. The closing of the mouth is effected by the wall of the stomach becoming spirally twisted. When the mouth is closed the stomach becomes more elongated and the twisted portion forms a kind of œsophagus ("Schlundrohr" of Haeckel), just as in *Polycanna fungina*, Haeckel (Taf. xiv. fig. 4). The mouth does not always hang in the centre of the umbrella-cavity, but at times moves very slowly round and round the margin of the stomach. The edge of the mouth, in the smallest specimen, has simple folds, which become more complex in the larger specimens.

The Radial Canals and Generative Organs.

Allman gives in his Monograph (p. 79) an excellent diagram showing the development of the radial canals of an *Æquorea* (probably *Æquorea forskalea*, Forbes). The specimens taken at Valencia show that the radial canals do not develop in any definite order. In the smallest specimen about one-third join the ring-canal, and the remainder show various stages of growth—some of them are only just leaving the stomach. The number of canals appears to be very variable, as the largest specimen has only 88 canals, and

the younger ones vary between 114 and 180. In the smallest specimen the generative cells are just beginning to make their appearance along some of the radial canals. The generative cells are situated in the wall of the canal, and as they develop in size the wall of the canal extends downwards, so that in the largest specimens the wall hangs down as a large fold, about 4 mm. wide, and of a purplish colour. The generative cells extend from the stomach nearly to the ring-canal, terminating in the largest specimens about 2 to 3 mm. from the margin. In this short portion the canal is very broad, several times broader than the parts bearing the gonads.

Haeckel states that *Polycanna fungina* has alternating sterile and fertile radial canals. The Valencia specimens have generative cells on almost every canal, occasionally a sterile canal occurs in one or two places on the umbrella. As the canals are of different ages of growth, so are the generative cells, and consequently the generative folds vary in size.

Strethill Wright was successful in rearing the ova of *Polycanna vitrina* (Gosse), and showed that an alternation of generations existed, but the hydroids died at too early a stage for a satisfactory determination of their generic position.

The Tentacles and Marginal Vesicles.

The smallest specimen shows that the medusa probably starts its free-swimming life with four tentacles, and later on has eight and then sixteen, which correspond to the perradial, interradial, and adradial sets, as in *Phialidium*. After sixteen are present the tentacles develop in an irregular manner until the maximum number, which is not yet known, has been reached. The largest of the Valencia specimens has 56 tentacles and about 150 marginal bulbs; if the latter develop tentacles, a full-grown specimen would have about 200 tentacles. The first appearance of a tentacle is marked by a very small bulb upon the margin of the umbrella, and the bulb grows to a considerable size before the tentacle begins to grow out from it. The bulbs increase in number as the umbrella increases in size, and consequently, in the later stages, the bulbs and tentacles show various stages in development. A bulb carrying a full-grown tentacle is very large and marked externally with four or more longitudinal ridges. As the wall of the bulb is very thin, there is a large internal cavity which communicates with the ring-canal through a narrow opening. The bulbs and the tentacles are of a light purplish colour. The arrangement of the tentacles on the margin of the umbrella does not coincide with the arrangement of the radial canals.

The marginal vesicles are exceedingly numerous and irregular in position; there are usually two vesicles between every two marginal bulbs, and the number varies between one and three. Each vesicle usually contains four otoliths, but the number varies from two to six. The arrangement of the otoliths inside the

vesicle shows considerable variation; they are usually placed in nearly a straight line, but often form a semicircle, and are occasionally arranged in opposite pairs, as described by Haeckel in *Polycanna fungina*.

Literature.—A search into the literature relating to the genera *Æquorea* and *Polycanna* led me to a paper published by Forbes in the 'Proceedings' of this Society for 1851, "On a Species of *Æquorea* inhabiting the British Seas," taken in the Outer Hebrides. The medusæ taken at Valencia closely correspond to the description and figures given by Forbes, who, after a careful investigation of the early literature, decided that his specimens belonged to the species known as *Æquorea forskalea* (Péron). I have examined the earlier references relating to this kind of medusa, and believe that it is not possible to recognize with certainty the species described by the early naturalists.

Haeckel (1879) brings together all the early references relating to *Æquorea forskalea* (Péron), but has omitted Forbes's *Æquorea*.

Claus (1881) describes specimens of *Æquorea forskalea* taken at Trieste, and criticizes Haeckel's classification of the Æquoreidæ.

Hartlaub (1894) describes specimens from Heligoland under the name of *Æquorea forskalea* (Péron).

Our present knowledge of this interesting group is certainly not in a very satisfactory condition. Probably, when more is known about them, there will be a considerable reduction in the number of species and Claus's views confirmed.

For the present I think it is best to leave the Valencia specimens under the name of *Polycanna forskalea* (Forbes).

A Leptomedusa (gen.? sp.?). (Plate XLIX. figs. 3, 3 *a*.)

This is an interesting little medusa which I have found only in Valencia Harbour: a single specimen in May 1895, and three in August 1896.

Description.—Umbrella egg-shaped, about 1 mm. in length and width. Stomach and mouth absent. Four radial canals. Four brownish tentacle-bulbs, without tentacles. Eight marginal vesicles, each with a single otolith. About halfway down each radial canal there are three pairs of dark brownish, irregular lobes, which project into the umbrella-cavity. Velum very broad.

The absence of the stomach and mouth and of the tentacles, and the presence of lobes on the radial canals, were noticed in all the specimens.

Gonads probably develop upon the lobes of the canals, but none were visible in these specimens.

I do not believe that this medusa has been described, and refrain from giving it a name. Most likely it comes from a Calyptoblastic hydroid which has probably already received a name; if so, let it receive its hydroid name[1].

[1] Since this paper was read Dr. C. Hartlaub has published a description of this medusa from examples taken off Heligoland. It is named *Agastra mira* (sp. et gen. nov.). (Arbeiten biol. Anstalt Helgoland, 1897, Bd. ii. p. 504.)

AGLANTHA ROSEA (Forbes). (Plate XLIX. figs. 1, 1 *a*, 1 *b*.)

Circe rosea, Forbes (1848); M'Intosh (1890); Crawford (1891).
Aglantha digitalis, Hartlaub (1894).

Towards the end of April and during May 1895, I found in Valencia Harbour about a dozen specimens of an *Aglantha* with eight marginal vesicles.

The specimens agreed fairly well with the description given by Forbes of *Circe rosea*, but Forbes has omitted, as usual, the marginal vesicles in the description. During my second visit to Valencia in 1896 I again met with examples of the same species.

Haeckel has placed *Circe rosea*, Forbes, as a synonym of *Aglantha digitalis*, a species first briefly described by Müller (1766) under the name of *Medusa digitale*. Haeckel has again described the species and has stated clearly that there are always four marginal vesicles ("Hörkölbchen") present. The umbrella is 30–40 mm. in length and 10–20 mm. in width.

Maas (1893) has also described *Aglantha digitalis*, taken by the German Plankton-Expedition, with four marginal vesicles.

Hartlaub found in 1894, off Heligoland, specimens of a small *Aglantha* with eight marginal vesicles, which he briefly describes under the name of *Aglantha digitalis* (Müller), and gives *Circe rosea*, Forbes, as a synonym.

I do not think that these small medusæ, about 12–14 mm. in length, with gonads and with eight marginal vesicles, are the young forms of the large medusa with four marginal vesicles described by Haeckel as *Aglantha digitalis*. I believe there are two distinct species, and that Forbes's description corresponds to the smaller one with eight marginal vesicles. I think that the name *Aglantha rosea* (Forbes) ought to be retained for the forms with eight marginal vesicles, and *Aglantha digitalis* for the forms with four vesicles.

Notes on Specimens taken at Valencia.

The smallest specimen was taken on 22nd July, 1896, about $1\frac{1}{2}$ mm. in length and nearly as wide. It had four marginal vesicles, the only specimen seen with four vesicles, and the tentacles, contracted, were of a bright red colour. The other specimens measured from 5 to 11 mm. in length, and all possessed eight marginal vesicles. The gonads in most of the specimens were just making their appearance and none exceeded 2 mm. in length; all were immature. Several of the specimens possessed tentacles of a reddish colour, and in some the stomach and the lips of the mouth were of a pinkish colour; but most specimens were quite colourless. The tentacles varied in number according to the size of the umbrella, about 60–80 present in the largest specimens.

The description of a specimen taken on 22nd May, 1895:—

Umbrella cylindrical with a cone-shaped summit, 11 mm. long and 5 mm. wide. The manubrium reaches down nearly to the velum, and a slight constriction marks the boundary between the

peduncle and the stomach; mouth with four lips. The stomach and mouth of a delicate pinkish colour. Eight radial canals lead from the stomach, along the peduncle and down the sub-umbrella, to the ring-canal. Upon each radial canal, at the summit of the umbrella-cavity and close to the peduncle, the gonad originates, first as a small oval swelling and at a later stage hangs freely down in the umbrella-cavity. The margin of the umbrella is lined with tentacles, about 80 present, colourless when fully expanded, but slightly reddish when contracted. On the inner side of the ring-canal, near the velum, the marginal vesicles are situated, eight in number, alternating, about midway, with the radial canals. The velum is broad.

An abnormal specimen was taken on 25th April, 1895. It had seven radial canals, seven gonads, and seven marginal vesicles.

Distribution. Heligoland, *Hartlaub*.

Scotland—Shetland Islands, *Forbes*; St. Andrews, *M'Intosh*, *Crawford*.

Ireland—Valencia Island, *E. T. B.*

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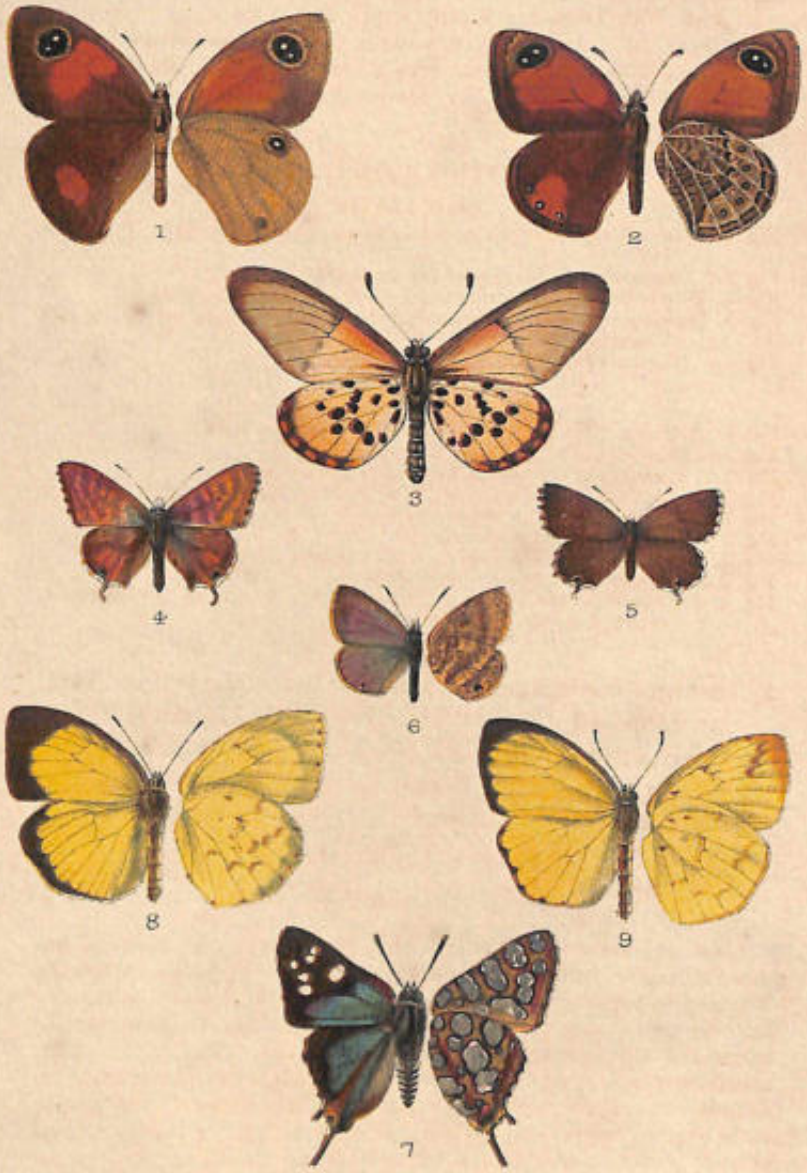
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EXPLANATION OF THE PLATES.

Plate XLVIII.

Fig. 1. *Cytæandra areolata* (sp. ?), an early stage, × 30; p. 817. Plymouth, 1893.
Fig. 1 *a*. Diagram of the margin of the umbrella.
Fig. 2. *Cytæandra areolata*, adult, × 10; p. 818. Port Erin, 1894.
Fig. 3. *Dipleurosoma hemisphæricum*, an intermediate stage, × 10; p. 826. Valencia, 1896.
Fig. 3 *a*. Diagram of the margin of the umbrella.

Plate XLIX.

Fig. 1. *Aglantha rosea*, adult, × 5; p. 833. Valencia, 1895.
Fig. 1 *a*. Diagram of the margin of the umbrella.
Fig. 1 *b*. A portion of the margin between two radial canals.
Fig. 2. *Dipurena halterata*, adult ♂, × 4; p. 816. Valencia, 1896.
Fig. 2 *a*. Terminal bulb of a tentacle expanded.
Fig. 2 *b*. Terminal bulb of a tentacle contracted.
Fig. 3. A Leptomedusa (gen. ? sp. ?), × 35; p. 832. Valencia, 1896.
Fig. 3 *a*. Diagram of the margin of the umbrella.
Fig. 4. *Laodice calcarata* (sp. ?), a portion of the margin of the umbrella, enlarged, p. 823. Valencia, 1896.

2. On three consignments of Butterflies collected in Natal in 1896 and 1897 by Mr. Guy A. K. Marshall, F.Z.S.

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[Received July 26, 1897.]

(Plate L.)

Since his return to South Africa, Mr. Guy A. K. Marshall has most liberally fulfilled a promise which he made me when in England to collect Lepidoptera for the Museum: indeed, so rapidly has one consignment followed another that it has been impossible to mount the specimens so fast as received. The notes which accompany many of the species are of considerable interest to Lepidopterists generally: therefore, as the first three consignments, consisting of 667 examples, are now all set, I think it best to deal at once with these, leaving a further consignment just received for a supplementary paper.

Mr. Marshall is an admirable and indefatigable collector, and knows the South-African Butterflies so well that he has been able to add many desiderata to the National Collection, some of them

being, as my friend Mr. Trimen assures me, of considerable rarity, and one or two either only recently added or new to the known fauna of South Africa.

Referring to his first consignment, Mr. Marshall writes (Estcourt, Natal, 20th October 1896):—"I am forwarding you by this mail a small sample of the butterflies that I have been taking since my arrival in Natal, and I hope you will find some useful and interesting specimens among them.

"Butterflies have not been by any means plentiful so far, as I only arrived just in time to get the fag-end of the winter broods, and the summer forms are only just beginning to put in an occasional appearance—October being an essentially 'intermediate' month in this particular locality. Estcourt is not a strikingly rich place, but we get some rare local species here. However, to-morrow I am off for a fortnight's collecting on the Tugela River in the 'thorn' district, which is a good locality, especially for *Pieridæ*, and I hope I shall be able to send you a few nice intermediate seasonal specimens before long." Then follow notes on many of the species. "I shall be glad to see how far you agree or disagree with my nomenclature of the specimens sent."

In a letter dated "14th December, 1896," he writes:—"I am sending you by this mail a second small instalment of butterflies, some of which I expect you will be glad to have. My trip to the Tugela was somewhat of a disappointment, as insects were unusually scarce down there owing to the prolonged drought. However, I managed to get a good number of the commoner *Pieridæ*, and, what is more, I succeeded in breeding *Teracolus auxo* from eggs laid by an indubitable *T. topha*, which decidedly settles, in my opinion, the seasonal dimorphism question in the South-African species of that genus." [The remainder of this letter consists of field-notes.]

In my opinion the description of *T. topha* refers to an intermediate form between the wet-season form *T. auxo* and the dry-season form *T. keiskamma*, having almost the outline of the former but approaching the latter in the coloration and marking of the under surface. Mr. Marshall's practical experiment proves the truth of the opinion expressed by Mr. Mansel Weale in 1877, based upon the fact that both *T. auxo* and *T. keiskamma* deposited their eggs in the same manner upon the same bush and were produced from exactly similar larvæ at different times of the year.

In a letter dated from Malvern, 17th April, Mr. Marshall writes:—"I am sending you to-day two small boxes of butterflies, one of which also contains a few moths. I was glad to be able to get you a specimen of what I consider to be the dry-season form of *Acræa anacreon*[1], as I was afraid I should be too early for them at the Karkloof; but, as you will notice, the dry-season forms in that locality appear a good month or six weeks before they do down here, though the seasons are to all appearance precisely the

[1] Not included, however, in this consignment.—A. G. B.

same—the Karkloof being if anything rather more humid. I would also call your attention to the dry-season examples of *A. induna*, *A. caldarena*, and *A. asema*."

I shall now proceed to give a list of the Butterflies included in these three consignments, with the dates of their capture and other notes of interest, either taken from the envelopes in which they were forwarded or from Mr. Marshall's letters. The complete references to original descriptions and figures in Mr. Trimen's valuable work 'The Butterflies of South Africa' render it unnecessary, in most cases, to repeat them in the present paper.

1. Amauris echeria, Koll.

One typical specimen and four of the prevalent Natal form *A. albimaculata*. Malvern, 800 feet, 11th to 16th August [1].

2. Limnas chrysippus, Linn.

♀ ♀ Malvern, 10th and 15th August; Estcourt, 4000 feet, 28th September, ♂ ♂ 29th September, 13th October; Tugela River, 2500 feet, 27th October, ♀ 5th November, 1896.

3. Samanta perspicua, Trimen.

Malvern, 10th August, 1896 (dry-season form).

The single example forwarded does not bear out Mr. Marshall's view that *S. simonsi* is the dry form, for it does not differ on the upperside from the typical wet-season form; Mr. Marshall, however, remarks:—"This specimen is an example of the dry form which prevails along the S.E. coast, the dry form of the interior plateaux being, as I have told you, your *S. simonsi*. I have seen dry specimens from the Shiré River which are inseparable from the latter on the underside, but retain the brown upperside as in the southern form."

This is all very well, and I will not dispute the probable identity of the two species; but the fact that some dry-season examples of *S. perspicua* nearly resemble *S. simonsi* on the underside does not explain the fact that the latter has the upper surface bright ochre-yellow as in *S. eliasis* of Western Africa (which is undoubtedly a wet-season form!).

4. Ypthima doleta.

Ypthima doleta, Kirby, Proc. Roy. Dubl. Soc. (2) ii. p. 336 (1880).

Ypthima asterope, Trimen (not Klug), South African Butterflies, i. p. 66 (1887).

Estcourt, 4000 feet, 1st and 6th September; Tugela River near Weenen, 2500 feet, 5th and 9th November, 1896.

Very great confusion has been made with respect to *Y. asterope* by many Lepidopterists. It is an insect strictly confined to Arabia; for, in my opinion, the small examples from Somaliland

[1] Mr. Marshall observes that about 5 per cent. of the specimens he took were typical; the rest were *A. albimaculata*.

which I recorded as *Y. asterope* will prove to be the dry-season form of the Abyssinian *Y. simplicia*—a species ranging down the Eastern side of Africa as far as Nyasa, where it meets with *Y. granulosa*. The latter seems to be the Eastern representative of *Y. doleta*, from which it differs in its usually smaller size and the less angulated character of the bands crossing the under surface of the secondaries.

The Southern examples of *Y. doleta* differ from those of the North-west in their somewhat greyer colour below, in the narrower iris to the subapical ocellus of the primaries, and sometimes in the more prominent angle to the outer stripe across the under surface of the secondaries: they might therefore be separated as a race, provided that intermediate forms do not exist in Angola or farther southward.

From *Y. asterope* they may readily be distinguished by the better defined banding of the under surface, but especially by the subanal ocellus on the secondaries, which is rounded and with a geminate or crescentic pupil in *Y. asterope*, whereas in *Y. doleta* it is represented by two tiny connate ocelli placed at a more or less oblique angle.

5. Physcænura panda, Boisd.

Tugela River, near Weenen, 2500 feet, 9th and 14th to 16th November, 1896.

Hitherto represented in the Hewitson collection, but not in our general series.

6. Pseudonympha vigilans, Trimen. (Plate L. fig. 1.)

Chuga's Hill near Weenen, 4000 feet, 29th October; Estcourt, 22nd November, 1896.

7. Pseudonympha pœtula. (Plate L. fig. 2.)

Pseudonympha pœtula, Trimen, Trans. Ent. Soc. 1891, p. 169.

Niginya, 6500 feet, Neundi, 10th, 15th, and 18th September, 1896.

Although this species is undoubtedly nearly allied to *P. trimeni*, the distinctive characters appear to be quite constant and fully justify its separation as a species.

Mr. Marshall observes that "This is a very local species, Niginya, 20 miles from here (Estcourt), being the only locality for it that I know of in Natal. It does not seem to descend below 6000 feet, frequenting the extreme edges of the rocky kraantzes or precipices; hitherto Mr. Hutchinson has only found it during the end of August and beginning of September."

8. Pseudonympha cassius, Godt.

Ulundi, 5300 feet, 11th September; Niginya, 5800 feet, 12th September, 1896; Karkloof, 15th February, 1897.

"A common species, frequenting the edges of woods."

This was also new to the Museum collection.

9. Pseudonympha sabacus, Trimen.

Karkloof, 4200 feet, 8th, 12th, and 15th February, 1897.

10. Neocænyra neita, Wallengren.

Frere, 3800 feet, 2nd, 4th, 5th, and 10th December, 1896.

As Mr Trimen has included this species in the genus *Pseudonympha*, I am not surprised that he failed to note the structural characters which I indicated as distinguishing the genus *Neocænyra*: the species of the two genera can be separated at the first glance by the different structure of their antennæ; but, apart from structural differences, the style of marking in *Neocænyra* is far more suggestive of *Erebia* and *Palæonympha* than that of *Pseudonympha*.

11. Meneris indosa, Trimen.

Karkloof, 4200 feet, 15th, 17th, and 20th February, 1897.

The neuration and palpi of this species and of *M. dendrophilus* correspond with those of *Meneris*; the antennæ are perhaps comparatively shorter, and certainly more slender and less strongly clubbed; but the form of wing and character of marking are not very dissimilar. I therefore follow Mr. Heron in placing them in *Meneris*.

12. Charaxes jahlusa, Trimen.

Tugela River, near Weenen, 2500 feet; ♀ 28th October, ♂ 10th November, 1896.

13. Pyrameis cardui, Linn.

Estcourt, 4000 feet, 25th August, 20th September, and 15th October, 1896.

14. Hypanartia schœneia, Trimen.

Karkloof, 4200 feet, May 1896.

15. Junonia cloantha, Cramer.

Estcourt, 4000 feet, 24th and 27th August, 1896.

I can see no reason for adopting Karsch's *Catacroptera*, which to my mind was based upon trivial characters.

16. Junonia archesia, Cramer.

"Dry form," Malvern, 800 feet, 11th August, 1896.

16 *a*. Junonia pelasgis, Godart.

"Wet form," Tugela River, near Weenen, 2500 feet, 23rd October and 13th November, 1896.

Mr. Marshall writes:—"I have again had an opportunity of observing the seasonal relationship existing between *J. archesia* and *J. pelasgis*, and *J. octavia-natalensis* and *J. sesamus*, which quite supports the opinion expressed by me in the Trans. Ent. Soc. for September. Unfortunately, I have been unsuccessful in obtaining

eggs laid by *J. archesia* and *J. sesamus*, and I fear I have lost my chance this season, as there are only a few battered individuals left, and their respective wet forms *J. pelasgis* and *J. natalensis* are just beginning to appear."

In the Museum we have an almost perfect transitional series between *J. archesia* and *J. pelasgis* (including *J. chapunga*), so that there can be little, if any, reason for doubting their specific identity.

17. Junonia sesamus, Trimen.

"Dry form," Malvern, 800 feet, 11th August, 1896.

I can see no object in calling the South-African species *J. octavia*. The latter is purely a Western butterfly of which the dry form is probably *J. amestris*, provided that *J. natalensis*= *calescens* can be proved to be the wet form of *J. sesamus*; this, however, is at present open to question, for Mr. Distant informs me that in the Transvaal he found *J. sesamus* exceedingly abundant, whereas he only succeeded in obtaining one specimen of *J. natalensis*. That this is also the case with *J. amestris* as compared with *J. octavia* is abundantly evident in collections.

18. Junonia aurorina.

♂. *Junonia aurorina*, Butler, P. Z. S. 1893, p. 651, pl. lx. fig. 3.

♂ ♂, Karkloof, 4200 feet, 30th January, 14th February; ♀, 15th February, 1897.

Mr. Marshall marks this as "*Junonia tugela* (wet)," which bears out what Mr. Cecil Barker says respecting the modification of the apex of the wing in that species. If proved, it will, I think, tend to show that *J. kowara* and *J. sinuata* are also seasonal forms of one species.

19. Junonia cebrene, Trimen.

Estcourt, 4000 feet, 28th August, 30th September, 2nd and 10th October, 1896.

20. Junonia clelia, Cramer.

Malvern, 800 feet, 10th August; Tugela River, 2500 feet, near Weenen, 9th and 10th November, 1896.

21. Hamanumida dædalus, Fabr.

"Dry form," Malvern, 800 feet, 11th August, 1896.

22. Eurytela hiarbas, Drury.

Durban, 7th August, 1896.

23. Byblia ilithyia, var. simplex, Butler.

Intermediate form—Estcourt, 4000 feet, 18th August; 6th, 23rd, and 27th September; 3rd, 10th, 13th, 15th, and 17th October, 1896.

I have never seen typical *B. simplex* from Africa before. The

examples taken in October are more or less intermediate between true *B. ilithyia* and *B. simplex*, usually having the underside pattern of the latter.

Var. ACHELOIA, Wallgr.

"Dry form," Durban, 6th August, 1886.

24. PLANEMA AGANICE, Hewits.

♂, Durban, 7th August, 1896.

25. ACRÆA CABIRA, Hopffer.

Malvern, 10th and 13th August, 1896.

26. ACRÆA SERENA, var. BUXTONI, Butler.

Malvern, 8th, 10th, and 11th August, 1896; Karkloof, 14th and 17th February, 1897.

"The dry-season females resemble the males in colouring."

27. ACRÆA LYCIA, var. SGANZINI, Boisd.

Malvern, 10th August, 1896.

28. ACRÆA ANACREON, Trimen.

Ulundi, 5000 feet, 13th, 15th, and 16th October, 1896.

"These were bred here from larvæ that we brought down from Ulundi, and represent the normal wet-season form in S. Africa." In Nyasaland this species tends to produce better defined red internervular streaks on the under surface, whilst the black markings on the secondaries (and notably the submarginal black band) are generally less strongly defined than in Southern examples: these differences, however, are not constant, and therefore cannot be relied upon as specific characters.

29. ACRÆA NATALICA, Boisd.

Malvern, 800 feet, 12th August, 1896.

30. ACRÆA ACARA, Hewits.

Tugela River, 2500 feet, near Weenen, 27th October and 14th November, 1896.

31. ACRÆA NEOBULE, Doubl.

Tugela River, 2500 feet, near Weenen, 1st November, 1896.

32. ACRÆA HORTA, Linn.

Karkloof, 4200 feet, 13th and 15th February, 1897.

33. ACRÆA BURNI, Butler. (Plate L. fig. 3.)

Acræa burni, Butler, Ann. Nat. Hist. ser. 6, vol. xviii. p. 467 (1896).

Tugela River, 2500 feet, near Weenen, 31st October; 2nd, 5th, and 6th November, 1896.

34. Alæna amazoula, Boisd.

Tugela River, 2500 feet, near Weenen, 1st, 2nd, 3rd, 5th, 6th, and 10th November, 1896.

The examples obtained on the 10th were coupled.

35. Polyommatus bæticus, Linn.

Frere, 3800 feet, 8th December, 1896.

36. Catochrysops asopus, Hopffer.

Tugela River, 2500 feet, 3rd, 14th, and 15th November, 1896.

37. Catochrysops procera, Trimen.

♀, Estcourt, 4000 feet, 17th October, 1896.

"So far as I am aware only twelve specimens have ever been taken as yet, and all in this neighbourhood—five by J. M. Hutchinson 13 years ago, on which Trimen founded the species, two by C. W. Morrison, and five by myself this season."

38. Catochrysops parsimon, Trimen (not Fabricius).

♂, Chuga's Hill, near Weenen, 4000 feet, 13th November, 1896. The lilac tint of the upperside is wanting in this species.

39. Catochrysops patricia, Trimen.

Estcourt, 27th September and 18th October; Tugela River, near Weenen, 28th October, 1st, 3rd, 11th, and 15th November, 1896.

I expressed the belief, to Mr. Marshall, that this would prove to be only a form of *C. parsimon*; but he writes:—

"I cannot concur in your opinion that this is conspecific with *C. parsimon*. Both their habits and distribution differ, and as they are both wet-season species, they cannot be seasonal forms." The males appear to be readily separable, but the females of the two species are so similar that Mr. Marshall himself hesitated respecting one of the specimens forwarded, labelling it *C. patricia*? However, his note would settle the matter of the distinctness of the two (which, by the way, I never associated together in the Collection), provided that the *C. parsimon* of Natal were the same as that of the West coast, which I do not admit: the example sent by Mr. Marshall wants the lilac colouring of the Western insect.

The *C. parsimon* of Trimen certainly is not the Fabrician species, which we only have from Sierra Leone and Lagos. The type referred to by Fabricius himself as in the Banksian collection from Sierra Leone is undoubtedly the female of our Sierra Leone species: it is a faded example, showing but little blue-shot colouring, and therefore Fabricius described it as brown. The diagnosis indeed fairly well fits his type, although the fuller description was probably taken from a male nearer to Trimen's *C. parsimon*, but immaculate above; we have such a male from the Scott Elliot collection (Salt Lake to Wawamba). The female *type* is again indicated at the end of the Fabrician description, "subtus—posticæ ad basin punctis *quinque* atris, annulo albo cinctis"; also—"Variat

supra alis anticis macula media nigra et posticis lunulis apicis albis maculaque rufa." In the supposed *C. parsimon* of S. Africa there are usually six black spots towards the base of the hind wings below, and the discoidal spot on the primaries is comparatively small.

40. CATOCHRYSOPS CAFFRARIÆ, Trimen.

♂ ♀, Niginya, 5800 feet, Ulundi, Natal, 17th September, 1896.
"This scarce species has never been taken in Natal before. We found it fairly numerous along a particular steep slope on the N. side of Niginya, but it flew very quickly, and owing to the steepness of the hill-side was very hard to take except when feeding. A large percentage of the specimens were much damaged, chiefly in the hind wings, by the attacks of hawk-flies (*Asilidæ*). I took many eggs and several larvæ, but failed to rear any of them."

41. CATOCHRYSOPS NIOBE, Trimen.

♂ ♀, Ulundi, 5000 feet, 19th September, 1896.

42. CATOCHRYSOPS DOLOROSA, Trimen.

Estcourt, 2nd, 4th, and 17th October; Frere, 3800 feet, 6th December, 1896.

43. CATOCHRYSOPS IGNOTA, Trimen.

Estcourt, 1st, 4th, 8th, 9th, 10th, 11th, 12th, 14th, and 17th October; Chuga's Hill, near Weenen, 4000 feet, 29th October, 1896.
"Apparently a very local insect, but common here at this time of year."

44. CATOCHRYSOPS MAHALLOKOÆNA, Wallgr.

Estcourt, 4th October; Tugela River, 31st October and 9th November; Frere, 9th December, 1896.

45. NEOLYCÆNA CISSUS, Godart.

Frere, 3rd, 4th, 5th, 6th, 9th, and 10th December, 1896.

46. CUPIDOPSIS JOBATES, Hopffer.

Tugela River, 2500 feet, 3rd November; Frere, 3800 feet, 10th December, 1896.

47. AZANUS MORIQUA, Wallgr.

Tugela River, 2500 feet, 14th November, 1896.

48. AZANUS JESOUS, Guérin.

Tugela River, 23rd and 26th October, 9th and 16th November, 1896.

49. AZANUS ZENA, Moore.

♂, Estcourt, 9th October; ♀, 12th December, 1896.
This is the *A. macalenga* of Trimen, but Moore's name has about

five years' priority. Mr. Marshall asks—"Is *Azanus macalenga*, Trimen, identical with *A. ubaldus*, Cram.? There is a single specimen of the latter in the Durban Museum from the Punjab, and I can detect no difference."

The chief difference between *A. ubaldus* and *A. zena* is that the male of the former has no belt of thickened lilac scales across the upper surface of the primaries: if the females got mixed it would be no easy matter to sort them.

50. Tarucus plinius, Fabr.

Tugela River, 30th October and 9th November, 1896.

51. Tarucus theophrastus, Fabr.

Tugela River, near Weenen, 22nd October, 3rd and 9th November, 1896.

T. cybaris cannot be distinguished from this species.

52. Zizera knysna, Trimen.

Estcourt, 27th September, 3rd and 18th October; Tugela River, 26th October, 6th and 15th November, 1896.

The specimens were labelled *Z. lysimon*, but that species can be distinguished at a glance by the outer border to the wings of the male occupying the outer fourth of the wing and by the smoky-brown upper surface of the female; the under surface of the wings is also much browner and with considerably less sharply defined markings.

53. Zizera gaika, Trimen.

Tugela River, 31st October, 1st November; Estcourt, 27th and 30th November, 13th December; Frere, 6th, 8th, and 9th December, 1896.

54. Zizera lucida, Trimen.

Estcourt, 27th September, 11th, 14th, 15th, and 18th October, 1896; Karkloof, 15th February, 1897.

55. Castalius calice, Hopffer.

Estcourt, 18th October; Tugela River near Weenen, 30th October, 1896.

"A scarce species round here. I am strongly inclined to believe the *C. melæna*, Trimen, is only the wet-season form of this."

56. Lycænesthes liodes, Hewits.

♂, Tugela River, 2500 feet, 15th November; ♀, Estcourt, 4000 feet, 13th December, 1896; Karkloof, 17th February, 1897.

Mr. Marshall notes that *Lycænesthes livida* (of which there is one worn male example from the first three consignments) is "a very rare species, taken flying round a bush on a high kopje."

57. Lycænesthes millari.

Lycænesthes millari, Trimen, Trans. Ent. Soc. 1893, p. 133, pl. viii. fig. 9.

♂, Tugela River, near Weneen, 2500 feet, 5th and 13th November, 1896.

58. Lycænesthes otacilia, Trimen.

♀, Estcourt, 13th October, 1896.
"Abundant later on, on Acacias." It is new to the Museum.

59. Lycænesthes amarah, Guér.

Tugela River, 15th and 19th November, 1896.

60. Scolitantides metophis, Wallgr.

Tugela River, 3rd, 5th, 6th, 8th, and 15th November, 1896.
I do not for a moment believe that it is possible to distinguish *S. barberæ* from *S. metophis*; in a series of six examples, obtained by Mr. Marshall on the same day, the expanse of wings varies from 16 to 20 millimetres, and the submarginal white spots on the secondaries from one to three on opposite wings of the same example: the character upon which the former may yet be separated, so far as our present series goes, is the absence of the conspicuous (but somewhat variable) white submarginal spot preceding the second cluster of silver scales on the under surface of the secondaries; and that appears to me to be insufficient. It is hard upon me, considering the reputation with which I have been saddled of being a multiplier of names, to have to call in question the validity of one of my friend Trimen's species; but I must confess that, in bolstering up *L. barberæ*, he departs so widely from the "broad views" which used to characterize his early work that I am fain to remonstrate.

61. Cacyreus lingeus, Cramer.

Karkloof, 12th and 14th February, 1897.
The generic name of *Hyreus* being preoccupied in Birds, I will rename this genus *Cacyreus*, taking *C. lingeus* as type.

62. Cacyreus palæmon, Cramer. (Plate L. fig. 4.)

Niginya, 5800 feet, Ulundi, 14th September, 1896.
Mr. Marshall writes—"You will observe that the specimens from Ulundi are of the usual bluish-coppery tinge, but round here neither sex ever shows a trace of blue; there is also a slight but seemingly constant difference on the underside: perhaps it should be regarded as a subspecies." I think myself that it is a distinct species.

63. Cacyreus marshalli, sp. n. (Plate L. fig. 5.)

Differs from *C. palæmon* in its squarer form, the costa of the primaries being shorter and the secondaries with shorter abdominal margin. Owing to the bronze-brown colouring of the

upper surface, the white spots on the fringe appear more conspicuously: the primaries below have larger but less sharply defined white spots on the outer border; the secondaries have narrower bands, that from the middle of the cell to the abdominal margin being more interrupted but grey and indistinct (so that the wing appears to be crossed by a broad belt of greyish white), the dark discal band curves upwards at its abdominal extremity, the last spot composing it being small and heart-shaped; the anal area is filled with a quadrate patch of pale sandy brown, forming the outer part of the usual whitish irregular blotch, which is more acutely indented on its outer margin; lastly, the two usual black spots show little (often no) metallic green scaling. Expanse of wings 20–28 millimetres.

Estcourt, 4000 feet, 2nd, 14th, 15th, and 18th October, 22nd, 23rd, 28th, and 29th November, and 13th December; Frere, 3800 feet, 2nd and 4th December, 1896.

Two other examples previously in the Museum bring our present series up to seventeen examples: none of these are in the least degree intermediate.

64. Cyclyrius noquasa, Trimen. (Plate L. fig. 6.)

Ulundi, 5000 feet, 19th September, 1896.

"A local species, apparently confined to the upper districts of this Colony; when met with, it is generally abundant, frequenting damp low-lying places."

65. Lachnocnema bibulus, Fabr.

Malvern, 16th August: Tugela River, near Weenen, 30th October, 2nd, 13th, and 14th November, 1896.

66. Lachnocnema durbani, Trimen.

Estcourt, 6th, 27th, 28th, and 30th September, 1st, 2nd, and 8th October, 24th November and 12th December, Tugela River, 12th November, 1896.

In his letter of October 20th Mr. Marshall says:—"I believe you are right in regarding this as conspecific with *L. bibulus*; but I have not sufficient data to enable me to speak definitely, chiefly owing to the fact that in Mashonaland I never distinguished between the two and recorded them all as *L. bibulus* in my note-book."

On the 14th December, however, he writes:—"With regard to my suggestion that *Lachnocnema durbani* was probably only the dry-season form of *L. bibulus*, I have now not the least hesitation in saying that it is incorrect. The former insect is still on the wing and in good condition, and therefore cannot be a dry-season form of anything else. Moreover, I am convinced that it is not a variety of *L. bibulus*. In your note on the subject you appear to ignore the fact that there is a decided and constant difference between the males of the two forms, which you will perceive from the specimens I have sent you.

"In this neighbourhood *L. durbani* is a very common insect, frequenting open stony kopjes, where the males may be seen (sometimes three and four together) chasing each other round and round at a great pace, about a foot or so above the ground, and resting occasionally on stones or grass-stems. *L. bibulus*, however, is distinctly an arboreal 'bush'-loving insect, and is consequently scarce here. It is always to be found flying round trees in company with various species of *Lycænesthes* or *Azanus*, and is never seen in company with *L. durbani*. It is not nearly so active an insect as the latter and does not fly much unless disturbed, but prefers sitting quietly on the smaller twigs, where its colouring affords it excellent protection. Down at the Tugela, Burn tells me it is a very common insect everywhere, but though he has collected there for four years he has never taken *L. durbani*. However, I turned it up while I was down there, finding it only among long grass on the tops of the highest hills. If, after this, you still maintain them to be conspecific, the *onus probandi* will remain with you."

Mr. Marshall seems to think that I am very hard to convince of error, and yet I have always frankly admitted myself wrong when any published opinion of mine has been shown to be incorrect. My view of the specific identity of *L. bibulus* and *L. durbani* was based upon the fact that the specimens of the former received from Nyasaland showed considerable variation in size, in the colouring of the females on the upper surface and the pattern of the under surface. There is, however, a wonderful uniformity of character in all the examples of *L. durbani* sent to us by Mr. Marshall, and I am bound to admit that, although some of the females of *L. bibulus* received from Nyasa greatly resemble those of *L. durbani* in the colouring of the upper surface, none of them correspond with the latter on the under surface.

If it could be shown that *L. durbani* was a dry form of *L. bibulus*, I do not think the difference of habit would be unique; but, unless the species is subject to alternating generation (in which case the dry phase of one brood might appear only shortly before the wet phase of the other), I see no way of explaining the simultaneous perfect condition of both insects. Of course the same argument applies to other species which have been accepted as seasonal forms, but which have also been taken in perfect condition in the middle of the rains.

67. Thestor basuta, Wallgr.

♀, Estcourt, 4000 feet, 25th November; ♂, Frere, 3800 feet, 5th December, 1896.

68. Algeides orthus, Trimen.

Estcourt, 30th September, 1st, 2nd, 3rd, 10th, and 19th October; Tugela River, 22nd and 23rd October, 1896.

"At one time I thought this species would prove identical with the brown form of *A. trikosama*, but I am now sure they are distinct."

69. Alœides trikosama, Wallgr.

Estcourt, 6th, 23rd, and 29th September, 1st, 2nd, 3rd, and 12th October; Niginya, Ulundi, 10th, 12th, 13th, 14th, 16th, and 17th September; Frere, 2nd and 10th December, 1896.

"This appears to be a very variable species, ranging from orange with brown markings to brown with very slight orange markings. I am inclined to consider the orange form as the spring one, and the brown as the late summer and autumn form, as the species does not occur in mid-winter. However, I have hardly worked out the matter sufficiently to speak definitely yet, but I have got several young larvæ from eggs laid by an orange female. She deposited them at the roots of grass, burying them just below the surface, a method of ovipositing which I have never seen in any other species."

Perhaps it may assist Mr. Marshall to indicate the times of capture of the two forms as represented by the twenty-eight examples which he has sent us in the present series and which (being in papers) were not easily examined until set:—

Orange form.	Intermediate.	Brown.
10th Sept.–10th Dec. 18 examples.	2nd–12th Oct. 4 examples.	29th Sept.–2nd Dec. 6 examples.

The extremes and intermediates were captured on the same days and all in perfect condition; therefore I think Mr. Marshall will find that they have no seasonal value.

70. Alœides thyra, Linn.

Niginya, Ulundi, 6000 feet, 10th and 15th September, 1896.

71. Zeritis amanga, Westw.

Tugela near Weenen, 2500 feet, 5th November, 1896.

72. Zeritis harpax, Fabr.

Estcourt, 23rd and 29th September; 3rd, 4th, 5th, 8th, 12th, 14th, 15th, 16th, and 17th October, 1896.

Chrysoritis, gen. nov.

Intermediate in character between *Chrysorychia* and *Cigaritis*, having almost the form of the latter, but much more nearly resembling the former in the character of the under-surface markings.

It differs from all the forms of the *Zeritis* group and from *Chrysophanus* in having no apical furca to the subcostal vein of the primaries, this vein therefore being quadriramose; the upper radial also is emitted from the subcostal vein at some distance beyond the end of the cell.

Type, *Zeritis oreas*, Trimen.

73. Chrysoritis oreas, Trimen.

Niginya, 6500 feet, Ulundi, Natal, 18th September, 1896.

"I expect this very rare species will be new to the Museum collection. Hutchinson discovered it some years ago at a spot close under the main Drakensberg range some ten miles from Ulundi, and has never met with it since. It exhibits strongly the tendency to localization, for we only found it in a limited area of two or three acres on the summit of Niginya. Within this area it was abundant, as we took over fifty there between us, but outside of it not one was to be seen. It is very sluggish, flying very little, it being sometimes quite a difficulty to make it rise off the ground."

Mr. Marshall is quite right in his surmise that this species is new to the Museum collection.

74. Crudaria leroma, Wallgr.

Tugela River, 2500 feet, 28th October; 3rd, 9th, and 13th November; Frere, 3800 feet, 5th and 6th December, 1896.

75. Chrysophanus orus, Cramer.

Estcourt, 8th October; Frere, 5800 feet, 4th, 9th, and 10th December, 1896.

76. Hypolycæna lara, Linn.

Chuga's Hill, 4000 feet, near Weenen, Natal, 29th October; Tugela River, 13th November, 1896.

Sooner or later a genus must be made for this species, which has but little in common with typical *Hypolycæna*.

77. Spindasis phanes, Trimen.

Tugela River, near Weenen, 21st and 26th October, 1896.

Both species of *Spindasis* sent in this collection are new to the Museum.

78. Spindasis masilikazi, Wallgr.

Tugela River, 2500 feet, 10th November, 1896.

79. Aphnæus hutchinsonii, Trimen. (Plate L. fig. 7.)

Tugela River, near Weenen, 30th October and 13th November, 1896.

I never could comprehend why my friend Trimen refused to separate *Spindasis* from *Aphnæus*, the former having only four subcostal branches to the primaries, and the latter five: the style of pattern and coloration on the under surface is also very distinctive.

80. Virachola antalus, Hopffer.

♀, Estcourt, 4000 feet, 13th October, 1896.

"It is a very common insect."

81. Iolaus philippus, Fabr.

Tugela River, near Weenen, 2500 feet, 1st and 11th November, 1896.

I see no reason for distinguishing this species from *Iolaus* at present, and until Lepidopterists are agreed as to the type of *Hypolycæna*,—whether *H. timolus*, or *H. sipylus*—I prefer to leave *I. philippus* where it is in the Museum collection.

82. Iolaus pallene, Wallgr.

Tugela River, near Weenen, 2500 feet, 3rd and 9th November, 1896.

The Natal examples are decidedly smaller than those from Nyasaland.

83. Iolaus mimosæ, Trimen.

Tugela River, near Weenen, 2500 feet, 5th November, 1896.

Allied to *I. umbrosa* and *I. nursei*, especially to the latter; but I cannot see in it much affinity to *I. ceres*. *I. tajorica*, Walker (apparently from Tajoura, Tripoli), may belong to the same group, but it appears only to have one angle to the transverse discal line on the under surface of secondaries and one or two lines which do not occur in the other species.

84. Argiolaus silas, Hewits.

♂, Tugela River, 2500 feet, 5th November, 1896.

85. Stugeta bowkeri, Trimen.

♀, Tugela River, 2500 feet, near Weenen, 5th November, 1896.

86. Mylothris agathina, Cramer.

♂ ♂, Durban (labelled "*Pieris thysa*"), 7th August; Malvern, 800 feet, 10th August, 1896.

87. Colias edusa and var. electra, Linn.

Ulundi, 5000 feet, 19th September; Estcourt, 4000 feet, 28th and 30th September, 3rd, 5th, 13th, and 17th October, 22nd, 26th, 28th, and 30th November; Tugela River, near Weenen, 2500 feet, 1st and 9th November; Frere, 3800 feet, 4th, 5th, and 6th December, 1896.

Among the thirty-one examples forwarded several are absolutely identical with typical "*C. edusa*"; though, strictly speaking, I believe this species ought to be called *C. hyale*, a name first given to its female by Linnæus.

88. Terias brigitta, Cramer.

Dry form, ♀, Malvern, 8th August; intermediate ♂, 10th August; wet form, 16th August; Estcourt, 27th September; ♀, intermediate, 8th October; ♂, wet, 21st November; ♂ ♂ ♀, Frere, 6th and 9th October, 1896; ♂ ♂, Karkloof, 13th and 15th February, 1897.

The dry, intermediate, and wet phases of this species have been described as distinct species—*T. brigitta* being the female of the dry phase, *T. candace* intermediate, *T. zoe* wet. The capture of all three phases in August looks somewhat curious, but the dry-season female is a good deal worn and the intermediate male a little broken.

89. Terias marshalli, Butler. (Plate L. figs. 8, 9.)

Terias desjardinsii, Trimen, nec Boisd.

♀ ♀, Malvern, 10th and 13th August, 1896.

The specimens belong to the dry-season form of the species. *T. regularis* is a very distinct species.

90. Teracolus johnstoni, Butler.

Tugela River, near Weenen, 2500 feet, 22nd October, 3rd, 15th, and 16th November, 1897.

This is the *T. eris* of Trimen and Marshall, but not of Klug. It differs from the North-African type in its slightly more elongated primaries and consequently greater elongation of the white area on these wings as well as of the ochreous streaks on the apical patch, and in the abrupt termination of the black costal border of the secondaries, which does not emit a transverse streak to the radial nervure as in *T. eris*; the internal black stripe on the primaries of the female is also constantly narrower.

From the Eastern *T. opalescens*, and the Western *T. maimuna*, the differences are even more marked, and nobody looking at a long series of each could hesitate for an instant respecting the local constancy of the characters which distinguish these four types of the *T. eris* group.

91. Teracolus buxtoni, Butler.

♂ ♂, wet-season (=*natalensis*, Staud.), Tugela, near Weenen, 2500 feet, 10th and 15th November, 1896.

Mr. Marshall labels this "*T. phlegyas*," but, in my opinion, it occupies a central position between the latter and *T. ione*. The wet-season form nearly approaches this butterfly on the upper surface, whereas the under surface much more nearly resembles the wet form of *T. imperator*. It must, however, be borne in mind that (in his "Notes on the Synonymy of *Teracolus*") Mr. Marshall has not distinguished between *T. imperator* and *T. phlegyas*, the absence of any examples of *T. natalensis* in our collection, when he examined it, having perhaps led him to believe that the latter was indistinguishable from wet-season examples of *T. imperator*. The two differ much as our *Ganoris rapæ* does from *G. brassicæ*; and as they do not occur together, I am satisfied to regard them as distinct species.

92. Teracolus ione, Godart.

♂, dry-season, Malvern, 800 feet, 10th August, 1896.

This is the form to which I gave the name of *T. jobina*.

93. Teracolus auxo, Lucas.

Intermediate form (= *T. topha*), ♂, Tugela River, 2500 feet, near Weenen, 21st October, 3rd November; ♀, 9th November, 1896. Wet-season, ♂ ♂, 15th, 16th, and 19th November, 1896.

The extreme dry-season form is *T. keiskamma*, Trimen.

Mr. Marshall writes respecting this species as quoted in the introduction to the present paper.

94. Teracolus eione, Boisd.

♂ ♂, wet-season phase, Tugela River, 23rd October, 5th, 11th, 12th, and 13th November; ♀ ♀, 2nd, 10th, and 14th November. Intermediate phase, ♂ ♀, 22nd October; ♂ ♂, 28th October, 2nd, 3rd, and 5th November.

Mr. Marshall labels some of the specimens "*T. evagore*" and others "*T. phlegetonia*," others, again, "*evagore-phlegetonia*." *T. evagore* is undoubtedly the dry-season phase of the Arabian *T. yerburyi* (both having been bred from one batch of larvæ by Capt. Nurse, who, however, followed me in incorrectly calling the dry phase *T. nouna*). *T. phlegetonia* is a species common to Western Africa and the South; it is the wet-season form of *T. antigone*, and differs from *T. eione* in having the base of the primaries broadly lemon-yellow on the under surface; this character is, however, confined to the wet phase of the species. In my judgment three of the examples obtained by Mr. Marshall should be referred to *T. antigone*.

95. Teracolus antigone, Boisd.

Intermediate phase, ♂ ♂, Tugela River, 22nd October and 9th November, 1896.

These examples correspond with my *T. friya*, but do not show the dry characters so strongly on the under surface: one of them is marked as "intermediate" and two are marked "dry." It is inconceivable that wet, intermediate, and dry forms of one and the same species should be flying together, all three being in equally good condition, excepting in an unusually dry and hot climate in which no rainy season could be said to exist.

96. Teracolus exole, Reiche.

♂, Tugela River, near Weenen, 2500 feet, 16th November, 1896.

This is labelled as *T. omphale*, and it may perhaps be an extreme development of that species in which all three phases show a well-defined wet-season upperside pattern: at any rate it is a tolerably distinct form, *T. exole*, Reiche, = *acte*, Felder, being the wet form, *T. roxane* the intermediate, and *T. hybridus* (part) the dry.

97. Teracolus omphale, Godart.

♂ ♂, Tugela River, 27th October, 12th and 14th November; intermediate phase *T. omphaloides*, 27th October; dry phase *T. theogone*, Malvern, ♂ ♂, ♀ ♀, 6th, 7th, 10th, 11th, and 15th August, 1896.

98. Teracolus ithonus, Butler.

Intermediate form (large examples of *T. hyperides*), Tugela River, near Weenen, 2500 feet, ♂, 23rd October; Durban, ♀, 7th August, 1896.

These examples are labelled as the dry-season form of *T. achine*, but *T. simplex* is the dry phase of typical *T. achine*; whereas the dry phase of *T. ithonus* is represented by *T. ignifer* (large), *T. ithonus*, and *T. harmonides* (small); the wet form being represented by *T. hero* (part), and the intermediate phase by specimens resembling those forwarded in the present collection.

T. ithonus may perhaps prove to be only a race of *T. achine*, but it appears to me rather to represent *T. antevippe* in S. Africa. I do not believe in the presence or absence of a black inner bar to the male apical orange patch being immaterial in the wet phase of a species; the dry-season forms usually want this black edging.

99. Teracolus achine, Cramer.

Wet phase, Estcourt, 15th October; Chuga's Hill, near Weenen, 29th October; Tugela River, near Weenen, 6th, 9th, 10th, 12th, 13th, and 16th November. Intermediate phase, ♂, 28th October, ♂ (*in copulâ* with wet phase), 10th and 14th November, 1896.

100. Teracolus annæ, Wallgr.

Tugela River, near Weenen, 2500 feet, 9th, 11th, and 12th November; intermediate phase, 22nd and 30th October, and 12th November, 1896.

101. Teracolus mutans, Butler.

Tugela River, near Weenen, 2500 feet, 28th and 30th October, 2nd, 9th, 10th, 11th, 12th, and 15th November, 1896.

This is the *T. vesta* of Trimen and Marshall, but not of Reiche; the latter differs considerably according to the published figures, and is an Abyssinian species.

102. Glutophrissa contracta, Butler.

♂, Durban, 6th August, 1896.

This is labelled as "*Pieris saba*," but the latter is a very distinct and purely West-African species.

103. Belenois thysa, Hopffer.

♂, Durban, 6th August, 1896.

104. Belenois mesentina, Cramer.

Estcourt, 14th and 15th October; Tugela River, 22nd, 23rd, 27th, 28th, and 29th October, 6th, 8th, 9th, 10th, and 12th November, 1896.

105. Belenois severina, Cramer.

Wet-season form, Tugela River, 31st October, 11th, 14th, and 15th November, 1896: dry-season form (=*B. infida*, var., Butl.),

Durban, 5th, 6th, and 7th August; Malvern, 9th, 10th, and 13th, August; Tugela River, 22nd, 23rd, and 27th October, 3rd November, 1896.

The "dry form" of this species seems to differ in almost exactly the opposite fashion to that of other *Pierinæ*, the apical patch on the upper surface of the primaries being blacker than in the wet form, and the secondaries on the under surface heavily black-veined; it is also noteworthy that the "dry form" was obtained from the 5th August until the 3rd of November in excellent condition.

106. Belenois gidica, Godt.

"Intermediate form," Durban, 6th August; "wet form," Tugela River, 26th October, 5th, 11th, 12th, and 13th November; "dry form" (= *B. abyssinica*, Lucas), Malvern, 13th August, 1896.

107. Synchloe hellica, Linn.

Estcourt, 20th, 22nd, and 24th August, 8th October; Frere, 2nd December, 1896.

108. Pinacopteryx pigea, Boisd.

Malvern, 13th August, 1896.

109. Pinacopteryx charina, Boisd.

Wet form, Tugela River, near Weenen, 21st October, ♂ ♀ *in copulâ*, 10th November, 1896.

110. Herpænia eriphia, Godart.

Wet form, Tugela River, near Weenen, 22nd, 23rd, and 26th October, 3rd, 9th, 10th, 12th, 13th, 14th, and 15th November, 1896.

111. Leuceronia argia, Fabr.

♂ ♀, Karkloof, 4200 feet, 14th February; ♂, 15th February; ♀, 20th February, 1897.

The genus *Leuceronia* was founded by Dr. Aurivillius.

112. Eronia cleodora, Hübn.

Durban, 6th August; Malvern, 15th August; Tugela River, 14th November.

The dry-season examples are slightly smaller, have narrower black borders above, and are more orange on secondaries below than those of the wet-season; the latter sometimes have the borders above as broad as in some male examples[1] of *E. dilatata*; consequently the two types have been confounded by some Lepidopterists.

113. Eronia leda, Boisd.

♂, dry-season form, Malvern, 800 feet, 10th August; ♂, wet-season form, Tugela River, 2500 feet, near Weenen, 1st November, 1896.

[1] Intermediate phase between dry and wet forms.

114. Papilio demoleus, Linn.

♂, Malvern, 800 feet, 8th August, 1896.

115. Papilio euphranor, Trimen.

♂ ♀, Karkloof, 5th and 14th February, 1897.
New to the Museum collection.

116. Papilio constantinus, Ward.

♂ ♀, Tugela River, near Weenen, 16th November, 1896.

117. Papilio ophidicephalus, Oberth.

♂ ♂, Karkloof, 13th and 14th February, 1897.

118. Sarangesa eliminata, Holland.

Tugela River, 2500 feet, 9th November, 1896.
Mr. Marshall writes:—"I should be glad to know whether the specimen labelled *Sarangesa motozioides* is really of that species, for Trimen has certainly amalgamated three, if not four, species in his definition of *S. motozi*, Wallgr." Until comparatively recently most Lepidopterists failed to distinguish between *S. motozi*, *eliminata*, and *pertusa*: the first and last of these differ chiefly in the more or less defined character of the hyaline markings in all the wings and the dark borders to these spots on the primaries, and (although they look fairly distinct) I am by no means sure that they will not prove to be variations of one species. *S. eliminata*, however, is a distinctly smaller insect, with the hyaline spots always small and narrow, and usually with a good deal of ochreous colouring on the under surface; the example labelled by Mr. Marshall shows less ochreous than usual, but is otherwise typical. *S. motozioides* probably does not occur so far south.

119. Sarangesa djæl.æl.æ, Wallgr.

Estcourt, 28th August, 17th October, 25th November; Frere, 5th and 6th December, 1896.

120. Pyrgus vindex, Cramer.

In his letter of October 20th Mr. Marshall observes:—"I believe *Hesperia mafa* is only the dry-season form of *H. spio* (=*vindex*), but I shall be able to settle the matter by breeding shortly."[1] In his letter of 14th December he, however, says:—"I was wrong about *Hesperia mafa*, which is also still on the wing, and therefore cannot be a winter form of *H. spio*, though it is curious that the latter has not yet put in an appearance here."

121. Pyrgus mafa, Trimen.

Estcourt, 11th, 12th, 17th, and 18th October; Frere, 6th and 9th December, 1896.
This species is new to the Museum collection.

[1] According to our identifications, *P. spio* and *P. vindex* are as distinct as any two species in the genus.—A. G. B.

122. Pyrgus asterodia, Trimen.

Niginya, 5800 feet, Ulundi, 17th September; Frere, 3800 feet, 10th December, 1896.
New to the Museum collection.

123. Pyrgus zebra, Butler.

Pyrgus zebra, Butler, Ann. & Mag. N. H. 1888, ser. 6, vol. i. p. 207.

Tugela River, 2500 feet, 26th October and 15th November, 1896.
This is quite new to the African fauna. Recently Mr. Trimen showed me specimens of a nearly allied species (or perhaps a variety of *P. zebra*), differing in the absence of the subbasal whitish bar on the under surface of the secondaries; these Natal examples, however, cannot be distinguished from those of North-western India, excepting in their slightly blacker ground-colour (which, by the way, is probably due to the superior freshness of the specimens).
Mr. Marshall suggests the possibility of this butterfly being *P. sataspes*, but the latter is a very distinct species.

124. Pyrgus ferox, Trimen.

Estcourt, 11th and 12th October; Tugela River, 25th October 2nd and 13th November; Frere, 6th December, 1896.

125. Celænorrhinus mokeezi, Wallgr.

Karkloof, 13th and 14th February, 1897.

126. Cyclopides metis, Linn.

Karkloof, 8th, 13th, and 14th February, 1897.

127. Cyclopides inornatus, Trimen.

Karkloof, 25th January and 21st February, 1897.
New to the Museum collection.

128. Kedestes macomo, Trimen.

Tugela River, 30th October and 1st November, 1896.
New to the general Museum collection, though present in the Hewitson series.

129. Kedestes tucusa, Trimen.

♀, Estcourt, 15th October, 1896.

130. Kedestes callicles, Hewits.

Tugela River, 15th November, 1896.

131. Kedestes wallengreni, Trimen.

Estcourt, 26th August, 1896.
New to the Museum collection.

132. KEDESTES NIVEOSTRIGA, Trimen.

Karkloof, 8th, 15th, 19th, and 20th February, 1897.
New to the Museum collection.

133. GEGENES LETTERSTEDTII, Wallgr.

Estcourt, 4th September, 3rd, 8th, and 17th October; Frere, 5th, 6th, and 9th December, 1896.
Mr. Marshall calls this *G. hottentota*, but an examination of the type by Dr. Scudder proved the latter to be *G. obumbrata*.

134. GEGENES OCCULTA, Trimen.

Pamphila occulta, Trimen, P. Z. S. 1891, p. 103.
Tugela River, 11th, 12th, and 15th November, 1896.
New to the Museum collection.

135. PARNARA MATHIAS, Fabr.

Malvern, 8th and 13th August; Estcourt, 27th November Frere, 5th and 7th December, 1896.

136. RHOPALOCAMPTA KEITHLOA, Wallgr.

Malvern, 8th August, 1896.

EXPLANATION OF PLATE L.

Fig. 1. *Pseudonympha vigilans*, ♂, p. 838.
2. " *pætula*, ♂, p. 838.
3. *Acræa burni*, ♂, p. 841.
4. *Cacyreus palæmon*, ♂, p. 845.
5. " *marshalli*, ♂, p. 845.
6. *Cyclyrius nogusea*, ♂, p. 846.
7. *Aphnæus hutchinsonii*, ♂, p. 849.
8. *Terias marshalli*, ♂, p. 851. (Wet phase.)
9. " " (Dry phase.)

3. On the Habits of the Sydney Bush-Rat (*Mus arboricola*). By EDGAR R. WAITE, F.L.S., Zoologist, Australian Museum, Sydney. With a Note by OLDFIELD THOMAS, F.Z.S.

[Received August 6, 1897.]

Shortly after taking possession of a new house at Mosman's Bay, Sydney, from which the builders had scarcely departed, our household was made well aware that a colony of rats had established themselves overhead. As they were evidently in considerable numbers, a six-way rat-trap was obtained, set and baited in the orthodox manner with bacon and cheese. Seven weeks passed by and none of the traps were sprung, although the nightly gambols in no way diminished. At the end of that period a single rat was caught, and on removing it from the trap it was found to be a Bush or Native Rat. Recognizing the species, and having heard that it fed chiefly if not exclusively

upon fruit, the traps were rebaited with bananas and peaches, and next morning there were three examples in the traps and again on the following day three more. Afterwards they were caught in ones and twos until they were either exterminated or scared from the dwelling.

On mentioning the circumstance to others at Mosman's Bay, I learned that it is quite common for Bush-Rats to take possession of new houses, and one man, a builder, who has had many opportunities of seeing these animals, tells me that while the common House-Rat (*Mus decumanus*) is usually found on or near the ground, the Bush-Rats invariably ascend into the upper regions; this is quite in accord with their habits as observed in the bush. The reason that new houses are more frequently occupied by Bush-Rats than older tenanted ones may be partly accounted for by the cat, which, commonly introduced with the human inhabitants, speedily clears them away.

Of the rats obtained, a number were kept alive in a suitable cage and became very tame; they were fed upon fruit—grapes, bananas, peaches, and apples, and would also eat bread and drink milk, but flesh foods were left untouched.

Dr. James C. Cox informs me that at his residence at North Sydney, these Bush-Rats have for several years occupied the roof, and that they emerge at dusk, descend by means of the vines, and feed upon the seeds of various plants in the garden, notably *Tecoma australis* and *Mandevillia suaveolens*; they also ascend the highest native fig-trees (*Ficus macrophylla*) and feed upon the fruit.

Mr. Robert Etheridge, Jr., while residing at Summer Hill, a suburb of Sydney, was similarly troubled with these rats in his house, and only obtained some immunity on cutting down a large branch which the rats used to traverse in order to reach the roof.

Mr. J. Douglas Ogilby also describes to me how at Petersham, Sydney, these rats infest the peach, apple, and other orchard trees, and destroy large quantities of fruit; he has also repeatedly witnessed them seize and devour the singing locusts (*Cicadidæ*), and describes them as frisking about the branches with great agility.

One other article of diet is still to be mentioned. Many of the Sydney suburban gardens are overrun with a common English snail, *Helix aspersa*, which flourishes to a far greater extent than I ever saw it at home[1]; during the cooler weather, when they congregate in thousands, and hibernate beneath upturned flower-pots, old boxes, and similar retreats, the rats make speedy war upon them by biting off the apex of the shell and extracting the succulent mollusc. By the kindness of Mr. J. J. Fletcher I have examined a number of empty shells, and all have, without exception, been treated by the rats in the manner indicated; in

[1] This is but another instance of how objects introduced from Europe luxuriate in Australia. Rabbits, Sparrows, Carp, and Weeds are still more familiar examples.

no single instance was the lip of the shell touched. This habit of attacking the weakest part of the shell has not been learned by one colony of rats only, for Mr. J. A. Thorpe tells me how in his garden at Paddington, another suburb of Sydney, the rats destroyed the molluscs in the manner described, to such an extent that whereas formerly they were a regular pest, few can now be found: the rats ensconce themselves beneath the broad foliage of the stag-horn ferns (*Platycerium alcicorne*), which forms a dry and cosy shelter.

In the original notice of this rat (Gould, Mamm. Austr. i. Introd. p. xxxv, 1863) the late W. Sharp Macleay described it as inhabiting the lofty eucalyptuses at Elizabeth Bay, where it "builds a nest among the branches with leaves and twigs like that of a bird."

Mr. Fletcher describes to me how he found a nest in the Linnean Society's gardens at Elizabeth Bay last November. It was in a tree, and taking it to be the work of a bird, he shook a supporting branch, whereupon a rat ran out. Mr. George Masters has often found the nest of this rat high up in bamboos; the nests are usually larger than a football and are not only used as nurseries but also as permanent habitations. On one occasion Mr. Masters ousted nine full-grown rats from one nest, and several times four and five have been discovered occupying a common retreat.

My informant also tells me that the rats gnaw holes in the bamboo-stems and take up their abode in the internodal chambers. He thinks that these shelters are formed during the wet season in order to escape the rains, and although he has examined a considerable number, he has never found the semblance of a nest within the cavities. The hole is always cut immediately below a node, so that the chamber is entered from its upper part. These holes were never observed near the ground; they were generally thirty or more feet above it, and were frequently found when a bamboo was cut down. Mr. Thorpe is likewise quite familiar with the nests in the higher branches of the bamboos and also with the rat-bored stems; he is of the opinion that, after gnawing the holes, the rats occupy the chambers in order to avoid the mid-day heat. It is also possible that by this means they seek to escape the Native Cats (*Dasyurus*) and other predaceous animals.

So far as is at present known, the distribution of this rat is very restricted—none of the places mentioned being more than three or four miles from the metropolis, while, up to my personal acquaintance with it, it had only been recorded from Elizabeth Bay; this, together with Paddington, Petersham, and Summer Hill, is on the southern side of Port Jackson, whereas North Sydney, Mosman's Bay, and Hunter's Hill, whence we have one example, are on the opposite shore.

[As I had always supposed from the original account of "*Hapalotis*" *arboricola*, these rats not only belong to true *Mus*, as Mr. Waite rightly observes, but there appears every reason to believe that they are merely introduced ship-rats: that is, forms of

the ubiquitous *Mus rattus*. The rats normally inhabiting ships are not, as is commonly supposed, *Mus decumanus*, but *Mus rattus*, and in most cases are of the grey variety of that animal, with white belly, though the black form may often be caught in the same ship as the grey. For instance, Mr. F. O. P. Cambridge caught two rats on board the Siemens cable-ship up the Amazons, one of which is nearly a typical *Mus rattus*, while the other almost exactly matches the specimens sent over by Mr. Waite as *Mus arboricola*. The habits of the latter, as here recorded, are in agreement with this supposition, for all the world over *Mus rattus* takes to roofs[1] and trees on meeting its formidable rival *Mus decumanus*, to which it leaves the gutters and cellars. This relative distribution of the two species has been frequently noticed in the East-end of London, near the Docks, where ship-rats are particularly common.

The fact that Mr. Waite knows of the occurrence of "*Mus arboricola*" only in and close to a large seaport town like Sydney is also, of course, confirmatory of the above opinion.—O. T.]

4. On the Spiders of the Island of St. Vincent.—Part III.[2]

By E. Simon[3].

[Received August 20, 1897.]

Ordo ARANEÆ.

Familia Theridiidæ.

Argyrodeæ.

Argyrodes cancellatus Hentz.

Rhomphæa (Ariamnes) paradoxa Taczanowski.

Ariamnes longissimus Keyserling.

Episineæ.

Janulus erythrophthalmus E. Sim., P. Z. S. 1894, p. 525.

Episinopsis simplicifrons, sp. nov.

♀. *Long.* 3 *mm.*—*Cephalothorax nigricans, subtiliter coriaceus et opacus, vix distincte rufulo-variegatus. Oculi antici in lineam leviter procurvam, medii majores convexi, inter se distantes sed a lateralibus contigui. Oculi postici aqui, sat magni, in lineam valde recurvam, inter se fere æquidistantes, spatiis interocularibus oculis haud latioribus. Area mediorum subparallela, paulo longior quam latior, pone oculos anticos leviter convexa*

[1] Cf. *Mus "tectorum,"* Savi.

[2] For Part I., see P. Z. S. 1891, p. 549; for Part II., P. Z. S. 1894, p. 519.

[3] Communicated by Dr. D. Sharp, F.R.S., F.Z.S., on behalf of the Committee for Investigating the Fauna and Flora of the West-Indian Islands.

haud tuberculata. Clypeus latus, sub oculis depressus, dein convexus et proclivis. Abdomen paulo longius quam latius, rhomboidale, in medio latum et utrinque obtuse prominulum, antice posticeque valde et fere æqualiter attenuatum et declive sed antice obtuse truncatum postice acuminatum, in declivitate anteriore nigricans sed in medio late et fere inordinate fulvo-variatum, in declivitate posteriore fulvum, utrinque nigro-plagiatum et in medio parum regulariter transversim nigro-striolatum, subtus omnino nigrum. Sternum nigricans, lævе, leviter convexum, postice, inter coxas distantes, late obtusum. Pedes robusti, sat longi, late fulvo nigroque variati.

Ab *E. albostriata* E. Sim. (ex Peruvia) imprimis differt tuberculis frontalibus fere obsoletis.

Euryopeæ.

Genus Stemmops Cambr.

Stemmops O. P. Cambridge, Biol. Centr.-Amer., Arachn. 1894, p. 125, pl. xvii. f. 5.

Ab *Euryopi* differt oculis quatuor posticis in lineam sat procurvam, mediis lateralibus paulo majoribus ovatis et rectis, inter se distantibus (spatio oculo saltem haud angustiore a sese remotis) sed a lateralibus contiguis.

Stemmops concolor, sp. nov.

♀. *Long.* 2 *mm.—Cephalothorax latus et brevis, parte cephalica brevi, valde attenuata et elevata, lævis, fulvo-rufescens, area oculorum antice nigra. Oculi antici in lineam valde procurvam, medii nigri et convexi lateralibus albis paulo majores, inter se anguste separati a lateralibus subcontigui. Oculi postici magni, in lineam leviter procurvam, medii paulo majores, ovati, recti, inter se distantes sed a lateralibus contigui. Abdomen ovatum, convexum, fulvo-cinereum, parce et sat longe albo-pilosum. Chelæ, sternum pedesque fulvo-rufescentia, femoribus ad basin patellisque dilutioribus. Pedes robusti, æqualiter setosi, postici anticis paulo longiores. Area genitalis simplex, plana et rufula.*

S. bicolori Cambr. affinis, sed verisimiliter distinctus.

Theridieæ.

Theridion tepidariorum C. Koch.

Ther. vulgare Hentz.
Espèce cosmopolite.

Theridion rufipes Lucas.

Ther. borbonicum Vinson, Aran. Réun. etc. 1864, p. 283, pl. xiv.f. 6.

Ther. luteipes Cambr., Journ. Linn. Soc. (Zool.) x. p. 382, pl. xii. ff. 46–51 (1870).

Ther. bajulans L. Koch, Æg. und Abyss. Ar. 1875, p. 21, pl. ii. f. 4–5.

Ther. flavoaurantiacum E. Sim., Ann. Soc. Ent. Belg., C. R. nov. 1880.

Ther. rufipes E. Sim., Bull. Soc. Zool. Fr. 1885, p. 461.

Ther. longipes V. Hasselt, Midd.-Sumatra, Arach. 1882, p. 33.

Espèce répandue dans toutes les régions chaudes du monde.

THERIDION STUDIOSUM Hentz.

Ther. jucundum Cambr., Biol. Centr.-Amer., Arachn. 1895, p. 166, pl. xxi. f. 13.

THERIDION FRONDEUM Hentz.

THERIDION ANTILLANUM E. Sim., P. Z. S. 1894, p. 522.

THERIDION FUESSLYI E. Sim., loc. cit. p. 522.

THERIDION STYLIFRONS E. Sim., loc. cit. p. 522.

THERIDION BLANDUM Cambr.

Coleosoma blandum O. P. Cambr., P. Z. S. 1882, p. 429.

Espèce répandue dans toutes les régions tropicales du monde, introduite en Europe dans les serres chaudes.

THERIDION DILUCIDUM, sp. nov.

♀. *Long.* 3 *mm.*—*Cephalothorax brevis, lævis, pallide fulvo-rufescens, margine clypei leviter infuscata, oculis angustissime nigro-cinctis. Oculi quatuor postici in lineam leviter procurvam, magni, medii lateralibus paulo majores et a lateralibus quam inter se vix remotiores (spatio interoculari oculo angustiore). Oculi antici in lineam leviter procurvam, medii nigri, lateralibus vix majores, inter se distantes sed a lateralibus subcontigui. Chelæ, partes oris, sternumque fulvo-rufescentia, lævia. Abdomen breviter ovatum, subglobosum, parcissime et tenuiter setosum, lurido-testaceum, parce albo-punctatum, punctis in medio densioribus et vittam latam confusam designantibus, interdum utrinque, prope mamillas, puncto nigro parvo notatum. Pedes longi et graciles, sat longe setosi, omnino lurido, tibiis subtus ad apicem rarius nigro-cinctis. Area genitalis fusca, convexa, fovea parva nigra subrotunda impressa.*

SPHYROTINUS LUCULENTUS E. Sim., loc. cit. p. 524.

Genus THERIDULA Emerton.

Mesopneutes et *Theridula* Cambr., Biol. Centr.-Amer., Arachn. 1894–96.

THERIDULA OPULENTA Walck.

A la synonymie ajoutez :—

Theridula tricornis O. P. Cambr., loc. cit. 1896, p. 208, pl. xxv. f. 1

Dipœneæ.

Dipœna calcarata, sp. nov.

♂. *Long.* 1·8 *mm.—Cephalothorax brevis, antice acclivis et valde attenuatus, lævis et nitidus, fusco-rufescens, parte thoracica striis radiantibus profundis impressa. Oculi antici in lineam procurvam, medii majores et valde prominuli, inter se distantes sed a lateralibus contigui. Oculi postici in lineam rectam, medii majores subangulosi, a lateralibus quam inter se paulo remotiores. Clypeus latus. Abdomen breve, multo altius quam longius, apice obtuse biangulosum, postice abrupte declive, antice nigrum, macula media testacea notatum, postice, in declivitate, obscure fulvum, confuse nigricanti-segmentatum. Sternum fusco-olivaceum. Pedes fulvo-rufescentes, fusco-variati et subannulati, antici posticis multo longiores, femore robusto longo, setis spiniformibus binis longis intus armato, tibia longa, gracili, leviter curvata, setis robustis longis munita atque ad apicem aculeo inferiore curvato et calcariformi insigniter armata, metatarso gracili, intus ad basin aculeo gracili et recto munito. Pedes-maxillares fulvi, parvi, patella tibiaque brevibus æquis, tarso ovato, bulbo ovato, simplici, stylo nigro circumdato.*

Espèce très remarquable appartenant au second groupe du genre *Dipœna*, se distinguant de ses congénères par la grande longueur et l'armature de ses pattes de la première paire (caractères probablement sexuels); son abdomen ressemble à celui d'un très petit *Poltys*.

Dipœna valmonti, sp. nov.

♂. *Long.* 1·5 *mm.—Cephalothorax brevis, sat altus, postice valde declivis sed supra fere rectus, haud vel vix distincte impressus, sublævis et setis longis albidis conspersus, fulvus, tenuiter nigro-marginatus et vitta media latissima fusca notatus. Oculi cuncti magni et inter se subæquales, quatuor antici in lineam leviter procurvam, medii inter se anguste separati a lateralibus contigui. Quatuor postici in lineam levissime recurvam (medii lateralibus paulo majores), inter se æque et anguste distantes. Clypeus latus (chelis paulo angustior), sub oculis impressus. Abdomen subglobosum, altum, postice valde declive, cinereo-testaceum, setis albis longis parce vestitum, ad marginem sat dense nigro-punctatum, in medio parcius et grossius albo-punctatum, postice in declivitate punctis nigris, vittam mediam confusam designantibus, notatum, subtus fuscum. Sternum latum, fusco-olivaceum, nigricanti-marginatum. Pedes breves et robusti, longe et parce setosi, luridi, femoribus cunctis, tibiis metatarsisque anticis apice fusco-annulatis, metatarsis tarsisque anticis sat gracilibus et inter se subæquis. Pedes-maxillares parvi, luridi, apice rufuli, patella tibiaque brevibus subæquis, tarso ovato valde acuminato, bulbo simplici.*

Dipœna meckeli, sp. nov.

♀. *Long.* 1·8 *mm.—Cephalothorax fere præcedentis, subtilissime*

coriaceus, parce et longe albo-setosus, fusco-rufescens, late et confuse nigricanti-marginatus. Oculi antici in lineam subrectam (vix procurvam), medii lateralibus plus duplo majores prominuli, inter se anguste separati, a lateralibus contigui. Oculi postici in lineam plane rectam, medii lateralibus paulo majores et a lateralibus quam inter se remotiores. Clypeus latissimus, chelis multo latior. Abdomen subglobosum, subtiliter coriaceum, parce et crasse albido-setosum, atrum, utrinque late et confuse testaceo-plagiatum. Sternum latum, sublæve, fusco-olivaceum. Pedes breves et robusti, parce et longe setosi, luridi, femoribus, tibiis metatarsisque annulis fuscis binis sat angustis et sinuosis ornatis, metatarsis anticis crassis et leviter depressis, tarsis metatarsis paulo brevioribus et acuminatis. Regio epigasteris convexa, fovea parum profunda et subquadrata impressa.

Asageneæ.

Asagena quadrimaculata Cambr., Biol. Centr.-Amer., Arachn. 1896, p. 189, pl. xxiii. f. 12.

Espèce répandue au Vénézuela et dans l'Amérique centrale. Chez les femelles surtout les quatre taches blanches de l'abdomen sont très souvent accompagnées d'une cinquième tache postérieure longitudinale, disposition rappelant celle de l'*A. phalerata*, Panz., d'Europe.

Cette espèce fait le passage des *Asagena* aux *Lithyphantes*, elle se rapproche de ceux-ci par les pattes du mâle mutiques, sans dents ni épines fémorales. Le *Lithyphantes lætus* Cambr. est une autre espèce voisine du même groupe.

Theonoeæ.

E. Simon, Hist. Nat. Ar. 2nd ed. t. i. p. 586.

Theonoe americana, sp. nov.

♀. *Long.* 1 *mm.—Cephalothorax brevis, subtiliter coriaceus, sublevis, fusco-rufescens vel olivaceus, confuse nigricanti-reticulatus et tenuiter nigro-marginatus. Oculi antici in lineam rectam, medii nigri, lateralibus albis saltem ⅓ minores, inter se anguste separati a lateralibus contigui. Oculi postici in lineam subrectam (vix recurvam), magni, inter se fere æque et sat anguste separati. Clypeus oculis lateralibus anticis haud duplo latior, chelis multo angustior, sub oculis transversim impressus, dein convexus. Abdomen magnum, globosum, atro-nitidum, setis tenuibus longis conspersum. Sternum late cordiforme, nigrum. Pedes mediocres, sat graciles, longe et parce setosi, fulvi, articulis apice fusco- vel olivaceo-annulatis.*

A *T. filiola* E. Sim. (ex Gallia) differt oculis posticis inter se fere æquidistantibus, clypeo angustiore et sterno minus convexo.

Espèce très intéressante, car le genre *Theonoe* était jusqu'ici propre au midi de l'Europe.

Mysmenopsis, gen. nov.

A Mysmena *differt oculis quatuor anticis in lineam rectam, inter se valde iniquis, mediis lateralibus multo majoribus, prominulis, inter se distantibus sed a lateralibus contiguis, oculis quatuor posticis mediocribus æquis, in lineam rectam, mediis inter se quam a lateralibus paulo remotioribus, area quatuor mediorum multo latiore quam longiore et antice quam postice latiore, clypeo area oculorum latiore sed chelis angustiore, sterno longius cordiformi postice longe attenuato et inter coxas posticas disjunctas producto. Pedum metatarsi tarsique circiter æquilongi, ungues superiores valde curvati mutici.*

Mysmenopsis femoralis, sp. nov.

♀. *Long.* 1·5 *mm.*—*Cephalothorax nigro-piceus, lævis et nitidus, antice setis albidis longis paucis et seriatis munitus, parte cephalica antice sat acclivi. Oculi antici in lineam subrectam, medii nigri, prominuli, lateralibus multo majores, inter se distantes sed a lateralibus contigui. Oculi postici mediocres, æqui, in lineam rectam, medii inter se quam a lateralibus remotiores. Area mediorum multo latior quam longior et antice quam postice latior. Abdomen globosum, nigrum, lineolis binis albis longitudinalibus, inter se remotis et flexuosis, lineolisque transversis 3- vel 4-clathratum, postice supra mamillas, confuse albido-plagiatum. Sternum nigro-opacum, cordiforme, postice longe attenuatum et, inter coxas posticas disjunctas, productum. Pedes parum longi, sat robusti, longe setosi, luridi, femoribus tibiisque nigricanti-biannulatis, metatarsis ad apicem minute fuscis, femoribus* 1ⁱ *paris reliquis multo robustioribus leviter curvatis, subtus in parte apicali calcare crasso sed acuto insigniter armatis.*

Mysmenopsis funebris, sp. nov.

♀. *Long.* 1·2 *mm.*—*Cephalothorax oculique antici fere præcedentis. Oculi postici minores et inter se latius distantes, in lineam rectam. Abdomen globosum, nigrum, punctis albis fere inordinatis, sæpe lineolas binas longitudinales lineasque transversas valde sinuosas designantibus, supra ornatum. Sternum præcedentis, nigro-opacum. Pedes luteo-olivacei, nigricanti-annulati, femoribus anticis fere omnino infuscatis, reliquis paulo robustioribus et curvatis sed muticis, haud calcaratis.*— ♂. *Cephalothorax brevior et multo altior. Pedes-maxillares nigricantes, femore brevi et gracili, patella parva nodosa, tibia brevissima vix perspicua, tarso magno ovato convexo sed apice breviter acuto, reliquis articulis cunctis haud breviore, bulbo maximo, simplici, subgloboso, apice processu parvo et uncato munito.*

A præcedente præsertim differt femoribus muticis, haud calcaratis.

Familia ARGIOPIDÆ.

Subfamilia LINYPHIINÆ.

Genus ERIGONE Aud. (sensu stricto).

Ce genre est représenté à St. Vincent par deux espèces voisines de l'*E. dentimandibulata* Keyserl., qui diffèrent des formes typiques par la marge du céphalothorax mutique dans le deux sexes, et l'apophyse patellaire du mâle très réduite. Nous avons trouvé dans les montagnes du Vénézuela un grand nombre d'espèces du même groupe (cf. Hist. Nat. Ar. t. i. p. 638).

ERIGONE POEYI, sp. nov.

♂. *Long.* 2·5 *mm.—Cephalothorax fusco-piceus, lævis et nitidus, margine mutica. Oculi antici in lineam subrectam, medii lateralibus paulo minores, inter se subcontigui, a lateralibus anguste separati. Oculi postici magni, in lineam rectam, inter se fere æque et anguste distantes, medii paulo majores. Abdomen ovatum, fuscum, postice paulo dilutius sed transversim nigricanti-striatum, parce setosum. Sternum fusco-piceum, sublæve, subtilissime coriaceum. Chelæ robustæ, convexæ, valde attenuatæ et leviter divaricatæ, antice intus, prope marginem interiorem, dente maximo recto et acuto infra directo, extus dentibus curvatis seriatis* 5 *vel* 6, *basilaribus reliquis minoribus, valde armatæ. Pedes fulvo-rufescentes, omnino mutici. Pedes-maxillares longi; femore gracili, curvato, subtus tuberculis nigris parvis setiferis* 5 *et intus tuberculis minutissimis, fere inordinatis munito; patella curvata, cylindrata, subtus ad apicem dente parvo munita; tibia patella circiter æquilonga, ad basin graciliore sed versus apicem valde ampliata, subtus mutica, supra elevata subcristata, minute et obtuse bilobata; tarso sat angusto acuminato.*

Ab *E. dentimandibulata* Keyserl., cui affinis est, imprimis differt tibia pedum-maxillarium maris breviore, ad apicem valde ampliata et superne cristata.

ERIGONE WATERTONI, sp. nov.

♂. *Long.* 2 *mm.—Cephalothorax fusco-rufescens, lævis et nitidus, margine mutica. Oculi antici in lineam procurvam, inter se fere æquidistantes, medii minores. Oculi postici in lineam rectam, inter se æqui et fere æquidistantes. Abdomen ovatum, atrum, supra late dilutius. Chelæ longæ, antice deplanatæ et valde coriaceæ, extus dentibus curvatis seriatis* 4 *vel* 5 *armatæ, margine superiore sulci dentibus mediocribus trinis* (2 *et* 3 *inter se geminatis subæquis, altero paulo majoribus*) *munito. Pedes lutei, mutici. Pedes-maxillares mediocres; femore gracili, curvato, subtus granulis nigris seriatis paucis armato; patella sat longa, subtus ad apicem dente valido recto sed apice leviter uncato armata; tibia patella breviore sed multo crassiore, apice valde*

ampliata et paulo altiore quam longiore, supra late et obtusissime producta ; tarso sat angusto acuminato.

A præcedente differt oculorum linea antica procurva, chelis antice deplanatis et coriaceis dente longo interiore carentibus, apophysi patellari longiore, tibia breviore et multo altiore.

MICRONETA VARIA, sp. nov.

♀. *Long.* 2 *mm.—Cephalothorax fulvo-rufescens, lævis, tenuissime nigro-cinctus, oculis singulariter nigro-marginatis. Oculi antici in lineam leviter procurvam, inter se æque et angustissime distantes, medii minores. Oculi postici in lineam rectam, inter se æque et anguste distantes, medii lateralibus paulo majores. Abdomen oblongum, convexum, sed postice acuminatum, supra antice fulvo-rufulum, postice nigrum, sed macula media magna ovata lutea notatum, subtus atrum. Sternum lævе, nigro olivaceum. Pedes sat longi, graciles fulvi. Tuberculum genitale magnum, semicirculare, rufulum, utrinque crasse marginatum.*

♂. *Long.* 2 *mm.—Cephalothorax plerumque utrinque late infuscatum, regione frontali paulo altiore. Chelæ valde acuminatæ. Abdomen angustum et longum nigro-nitidum, in medio leviter depressum et late albido-cinctum. Pedes paulo longiores, femoribus subtus sæpe infuscatis et subvittatis. Pedes-maxillares fusci, patella brevi ; tibia patella vix longiore, subtus convexa, supra ad apicem leviter producta ; tarso magno, intus ad basin leviter producto et dentibus binis sat brevibus, æquis et acutis armato ; bulbo maximo valde complicato.*

M. semiatræ Keyserl. (ex Brasilia) valde affinis.

POCOBLETUS BIVITTATUS, sp. nov.

♀. *Long.* 2·6 *mm.—Cephalothorax lævis, luteus, regione oculorum nigra, utrinque macula maxima ovata nigricanti, marginem posticum haud attingente, notatus. Oculi antici inter se approprinquati, in lineam plane rectam, medii lateralibus fere duplo minores. Oculi postici magni, inter se anguste et æque distantes in lineam leviter recurvam. Oculi quatuor medii aream paulo longiorem quam latiorem et antice quam postice multo angustiorem occupantes, antici posticis multo minores. Abdomen valde convexum, postice fere abrupte declive et acuminatum, in parte prima fulvum et confuse nigro-marginatum, in parte altera nigrum leviter fulvo-variatum et punctis albo-opacis, lineam transversam et utringue lineam marginalem sinuosam designantibus ornatum, subtus atro-olivaceum. Sternum olivaceum, versus marginem infuscatum. Pedes sat longi, graciles, fulvo-olivacei, fusco-annulati, tibiis setis spiniformis longis paucis supra munitis, reliquis articulis muticis. Regio epigasteris nigra, valde convexa, semicircularis.*

A *P. coronigero* E. Sim. præsertim differt magnitudine majore et cephalothorace luteo nigro bivittato.

Subfamilia Tetragnathinæ.

Dyschiriognatha montana, sp. nov.

♀. *Long.* 2·8 *mm.*—*Cephalothorax fusco-piceus, nitidus, utrinque, prope marginem, parce impresso-punctatus et postice subtiliter transversim rugatus, parte cephalica antice sensim acclivi, utrinque striis profundis discreta et postice stria brevi transversa secta, parte thoracica foveola media transversa brevi et procurva, striisque duabus divaricatis notata. Abdomen globosum, nitidum, olivaceum, supra antice vittis obliquis duabus, utrinque punctis inordinatis maculaque majore, in medio punctis parvis geminatis 2 vel 3 albo-nitidis vel argentatis ornatum, subtus atrum punctis minutissimis quatuor (anticis argenteis posticis fulvis), quadrangulum magnum latius quam longius designantibus, notatum. Sternum fusco-piceum, grosse et parce rugosum. Chelæ piceæ, coriaceæ et leviter inæquales. Pedes graciles, fulvo-olivacei, femoribus dilutioribus, reliquis articulis apice minute fuscis. Spiraculum ventrale rectum in medio situm.*

♂. *Long.* 2·6 *mm.*—*Cephalothorax sæpe paulo dilutior, vitta media vittisque marginalibus nigricantibus notatus. Chelæ longiores angustiores et divaricatæ. Pedes, præsertim antici, longiores, Pedes-maxillares graciles, ramulo tarsi tenui, longo, flexuoso sed obtuso, bulbo maximo, rufulo, globoso depressiusculo.*

Se trouve aussi au Vénézuela.

Tetragnatha antillana, sp. nov.

♀. *Long.* 12–15 *mm.*—*Cephalothorax fulvus, confuse fusco-marginatus, parte cephalica leviter infuscata sed regione oculorum lineaque media dilutioribus notatus. Oculi quatuor medii inter se subæquales, aream circiter æque longam ac latam et antice quam postice angustiorem occupantes. Oculi laterales utrinque spatio oculo paulo latiore inter se distantes, anticus postico minor. Abdomen longe cylindratum, postice sensim attenuatum, apice oblique truncatum et leviter prominulum, supra albo-argenteum vel aureum, vitta media fusca lata, postice leviter attenuata et flexuosa et lineam albam includente, notatum, in lateribus et subtus nigricans, sed lineis binis parallelis obscure fulvis notatum. Chelæ obscure fulvæ, apice nigræ, læves, longæ, cylindratæ et proclives, margine superiore sulci dente apicali mediocri acuto et intus recte directo, dein dente remoto mediocri et acuto antice leviter arcuato, dein dentibus acutis seriatis 6–7, versus basin sensim minoribus, armato, subtus ad marginem apicalem (prope radicem unguis) dente valido, longo, leviter depresso atque acuto et antice recte directo, ad marginem sulci dente apicali mediocri, dein dente parvo singulariter sito, dein dentibus seriatis 4–5, versus basin sensim minoribus, instructo.*

♂. *Long.* 12 *mm.*—*Abdomen angustius, cylindratum, supra omnino albo-argenteum vel auratum. Chelæ longiores, supra extus ad apicem, prope radicem unguis, dente arcuato et acuto*

intus, prope medium, minute tuberculato, intus ad apicem dentibus binis subgeminatis et divaricatis, 1° recto, altero curvato, ad marginem sulci dente subapicali valido recto et acuto, dein dente singulo, dein dentibus seriatis 5–6, versus basin sensim minoribus, subtus dente apicali parvo et obtuso, dente subapicali longiore acuto et arcuato, dein dentibus sat parvis 8–9, superioribus inter se remotis, inferioribus minoribus et inter se sensim densioribus, armatæ. Pedes-maxillares longi et graciles; patella multo longiore quam latiore; tibia patella paulo longiore, graciliore, sed versus apicem leviter ampliata; tarso angusto, processu apicali bulbo vix longiore, ramulo basali longo apice minute bifido.

A *T. elongata* Walck. (*grallator* Hentz) et *laboriosa* Hentz, quibus affinis est, præsertim differt chelarum maris dente exteriore subapicali intus minute tuberculato, sed apice haud bifido et dente medio marginibus sulci reliquis dentibus non multo majore, chelarum feminæ dente apicali inferiore longiore et antice directo.

TETRAGNATHA VICINA, sp. nov.

♂. *Long.* 10 *mm.*—*A præcedente, cui valde affinis est, differt magnitudine minore, chelis maris dente exteriore apicali longiore et graciliore fere cylindrato sed acuto et intus prope apicem minutissime tuberculato, dentibus binis apicalibus interioribus longioribus, 1° recto 2° curvato, et inter se paulo remotioribus sed dente apicali marginis sulci carentibus, subtus dente apicali sulci reliquis dentibus multo majore, his 7–8 inter se regulariter distantibus.*

TETRAGNATHA PISCATORIA, sp. nov.

♀. *Long.* 10 *mm.*—*Cephalothorax obscure fulvus, in medio atque ad marginem plus minus infuscatus. Oculi quatuor medii aream subquadratum occupantes, antici posticis vix majores. Oculi laterales utrinque spatio oculo latiore inter se distantes, anticus postico minor. Abdomen longum, cylindratum, postice sensim attenuatum, supra albo-argenteum vel auratum, linea media ramosa obscuriore notatum, in lateribus et subtus omnino nigrum. Chelæ longæ, cylindratæ, proclives, obscure fulvæ, supra intus, ad marginem sulci, dente apicali sat valido acuto et intus directo, prope medium dente sat longo et acuto, dein dentibus minoribus seriatis 4–5, subtus dente apicali carentes, ad marginem sulci dente 1° sat longo acuto recto et intus directo, dein dentibus minoribus seriatis et subæquis 7–8, armatæ.*

♂. *Chelæ longiores, valde proclives, fulvo-nitidæ, supra dente exteriore haud apicali, sed in parte secunda sito, longissimo, gracili, apice simpliciter acuto, ad marginem dente apicali parvo acuto et antice directo, prope medium dente longo acuto et recto; dein dentibus minoribus seriatis 3 vel 4; subtus dentibus apicalibus binis fere interioribus subgeminatis et iniquis (interiore valido et arcuato, interiore parvo et recto) dein dentibus 8–9 regulariter seriatis (1–4 inter se subæquis, reliquis versus basin*

sensim minoribus). *Pedes-maxillares fere* T. antillanæ, *sed ramulo exteriore tarsi apice obtuso haud bifido.*

A *T. tenuissima* O. P. Cambr., cui verisimiliter affinis est, differt dente exteriore chelarum maris longo et gracili, ad apicem remotiore.

Genus CYRTOGNATHA Keyserl.

Agriognatha O. P. Cambr., Biol. Centr.-Amer., Arachn., 1896, p. 212.

CYRTOGNATHA SERRATA, sp. nov.

♀. *Long.* 8 *mm.*—*Cephalothorax lævis, subtilissime coriaceus, fulvo-rufescens, linea marginali vittaque media lata et confusa fuscis notatus, parte cephalica vix convexa, lata, antice parum attenuata. Oculi magni, inter se subæquales, quatuor medii aream subquadratam occupantes, oculi laterales utrinque contigui et prominuli* (*anticus postico paulo major*). *Chelæ robustæ, longæ, divaricatæ, fulvo-rufulæ, margine inferiore sulci dentibus validis binis æquis inter se remotis instructo. Partes oris fuscæ. Sternum obscure fulvum. Abdomen longum et cylindraceum, obscure fulvum vel olivaceum, supra antice lineis binis parallelis, postice maculis parvis biseriatis* 3 *vel* 4 *nigris ornatum, subtus concolor. Pedes longi, fulvo-rufescentes, femoribus cunctis ad apicem, tibiis anticis in medio atque ad apicem, confuse fusco-annulatis.*

♂. *Long.* 7 *mm.*—*A femina differt chelis multo longioribus et valde divaricatis, robustis et convexis, sed in parte apicali valde attenuatis, subacuminatis, depressis, extus carinatis et prope medium minute dentatis, margine inferiore sulci dentibus trinis æquis inter se æquidistantibus* (1 *et* 2 *rectis, altero inflexo*), *margine superiore, prope radicem unguis, dente robustissimo compresso et arcuato, dein dentibus binis minoribus et acutis armatis. Pedibus valde aculeatis, femoribus* 1' *paris, antice prope basin, aculeis uniseriatis* 4–5, *extus aculeis minoribus uniseriatis* 16–18 *insigniter armatis, metatarsis cunctis aculeis seriatis parvis et numerosis subtus munitis. Pedes-maxillares fere* Tetragnathæ, *sed tibia patella non multo longiore, ad basin gracili, versus apicem sensim ampliata.*

CHRYSOMETA TENUIPES Keyserl.

Tetragnatha tenuipes Keyserl., Sitz. Isis, Dresden, 1863, p. 147, pl. vii. ff. 12–14.

Espèce commune en Colombie et au Vénézuela.

Genus ARGYROEPEIRA Emerton.

Argyroepeira et *Opas* O. P. Cambr., Biol. Centr.-Amer., Arachn. p. 184.

ARGYROEPEIRA ARGYRA Walck.

Tetragnatha argyra Walck., Apt. ii. 1837, p. 219.
Linyphia ornata Taczanowski, Hor. Soc. Ent. Ross. x. 1873, p. 11.

? *Argyroepeira acuminata* O. P. Cambr., Biol. Centr.-Amer., Arachn. 1889, p. 5, tab.i . f. 6.

Espèce très répandue dans toutes les Antilles, le Mexique, l'Amérique centrale, le Vénézuela et les Guyanes.

ARGYROEPEIRA AURULENTA C. Koch.

Linyphia aurulenta C. Koch, Ar. xii. 1845, p. 127, f. 1049.
Epeira hortorum Hentz, Journ. Bost. Soc. N. H. v. 1847, p. 477.
Tetragnatha quinquelineata Keyserling, Sitz. Isis, Dresden, 1863, p. 145, pl. iii. f. 3–6.

Également commun dans le sud des États-Unis, le Mexique et les Antilles.

ARGYROEPEIRA REGNYI, sp. nov.

♀. *Long.* 5·5 *mm.—Cephalothorax fulvo-rufescens, lævis, anguste fusco-marginatus, parte cephalica confuse infuscata, thoracica macula longitudinali parva notata. Oculi quatuor medii inter se subæquales (antici nigri), aream paulo longiorem quam latiorem occupantes. Oculi laterales utrinque contigui, a mediis sat remoti. Abdomen cylindraceum, antice tuberculis binis rotundis munitum, supra splendide argenteum vel auratum, tuberculis anticis fusco-rufulis, linea media fusca valde ramosa et utrinque maculis nigris, longis et sinuosis, vittam interruptam designantibus, ornatum, in lateribus fuscum vitta lata obliqua argentea vel aurea notatum, subtus atrum, utrinque linea abbreviata sæpe interrupta et postice maculis parvis seriatis ornatum. Chelæ rufescentes, apice fuscæ. Partes oris nigræ, ad marginem dilutiores. Sternum fusco-rufulum, antice nigro-setosum. Pedes longi, obscure fulvi vel olivacei, femoribus tibiisque apice anguste nigro-cinctis. Fovea vulvæ semicircularis, carina media lata plana et utrinque plagula nigra munita.*

♂. *Long.* 3 *mm.—A femina differt abdomine multo minore, pedibus longioribus. Pedes-maxillares luridi, bulbo rufulo; femore gracili recto; tibia patella plus duplo longiore, gracili, sed versus apicem sensim ampliata; tarso depressiusculo, ovato, haud calcarato, ramulo basali parvo et recto munito; bulbo magno, convexo et ovato.*

Ab *A. curta* O. P. Cambr. (ex Panama et Venezuela), cui valde affinis est, imprimis differt cephalothorace fusco-marginato, abdomine subtus atro (haud obscure fulvo) vittis duabus argenteis latioribus notato.

ALCIMOSPHENUS LICINUS E. Sim.

A. licinus E. Simon, Hist. Nat. Ar. 2e ed. t. i. p. 931.

"♀. *Long.* 8–9 *mm.—Cephalothorax fulvo-rufulus, lævis et glaber. Abdomen læte rufo-coccineum, postice utrinque maculis obliquis sinuosis, ad apicem tuberculi maculis duabus minoribus, subtus utrinque vitta marginali, intus valde tridentata et punctis mediis binis nigerrimis, decoratum. Chelæ, partes oris, sternum coxæque rufo-coccinea, lævia et nitida. Pedes nigri, tibiis,* 1

paris dilutioribus et olivaceis, tibiis, metatarsis tarsisque apice minute lurido-annulatis. Pedes-maxillares nigri, femore rufo."

Espèce répandue dans toutes les Antilles, décrite de St. Domingue et de la Jamaïque.

HOMALOMETA, gen. nov.

A Meta *differt oculis anticis in lineam plane rectam, mediis nigris lateralibus albis paulo majoribus et inter se quam a lateralibus fere duplo remotioribus, oculis posticis albis æquis et rotundis, in lineam subrectam (levissime recurvam), mediis inter se quam a lateralibus paulo remotioribus, oculis quatuor mediis aream latiorem quam longiorem et antice quam postice latiorem occupantibus, clypeo oculis anticis plus duplo latiore, leviter convexo. Laminis convexioribus. Chelis cylindraceis, margine superiore sulci dentibus sat longis trinis, margine inferiore dentibus binis minoribus dentibusque ultimis minutissimis vix perspicuis instructis. Abdomine ovato, regione epigasteris convexa et producta.*

HOMALOMETA NIGRITARSIS, sp. nov.

♀. *Long.* 3·5 *mm.—Cephalothorax oblongus, sat convexus, lævis et glaber, luteo-rufescens. Abdomen sat late ovatum, albido-opacum, postice et subtus leviter flavido-tinctum, supra area magna ovata fulva notatum, subtus regione epigasteris fulva, convexa, postice truncata et minute fusco-binotata, utrinque carinula parva nigra et obliqua notata. Chelæ, partes oris, sternum pedesque luteo-rufescentia, lævia et glabra, tarsis quatuor anticis apice nigris, tibiis anticis aculeis setiformibus paucis subtus armatis.*

♂. *Long.* 3 *mm.—A femina differt abdomine minore, pedibus anticis numerosius sed tenuiter aculeatis. Pedes-maxillares albidi, subpellucentes, bulbo rufulo; femore sat longo, gracili et recto; patella parva; tibia patella plus duplo longiore, versus apicem valde ampliata, compressa et subtriquetra; tarso angusto, lacinioso, bulbum parum superante, ramulo basali gracili et recto; bulbo ad basin subgloboso, ad apicem stylo nigro crasso, circulum formante, munito.*

AZILIA GUATEMALENSIS Cambr.

Azilia guatemalensis O. P. Cambr., Biol. Centr.-Amer., Arachn. 1889, p. 12, tab. iii. f. 3–4.

Également répandu dans l'Amérique centrale et le Vénézuela (*A. rojasi* E. Sim.).

DOLICHOGNATHA TUBERCULATA Keyserl.

Cyrtophora tuberculata Keyserl., Spinn. Amer., Ep. 1893, p. 265.
Dolichognatha tigrina E. Sim., Ann. Soc. Ent. Fr. 1893 (Oct.), p. 330.
Dolichognatha diversa O. P. Cambr., Biol. Centr.-Amer., Arachn. 1895, p. 147.

Espèce connue de la Floride, du Mexique et du Vénézuela.

Subfamilia Argiopinæ.

Argiope argentata Fabr.

Argyopes argentatus et *fenestrinus* C. Koch, 1839.
Epeira argentata et *amictoria* Walck., 1841.
Ar. argentata, *maronica* et *subtilis* (pullus) Taczanowski, 1872.
Très commun dans toute l'Amérique centrale et méridionale et aux Antilles.

Cyclosa caroli Hentz.

Epeira caroli Hentz, Journ. Bost. Soc. N. H. vi. 1850, p. 24, pl. iii. f. 15.
Également commun dans le sud des États-Unis et au Vénézuela.

Cyclosa triquetra E. Sim.

Cyclosa triquetra E. Simon, Hist. Nat. Ar. 2e éd. t. i. p. 779.
Espèce découverte au Vénézuela, ou elle en commune.

Eustala anastera Walck.

Epeira anastera Walck., Apt. t. ii., 1837, p. 33, no. 4.
Epeira eustala Walck., loc. cit. p. 37, no. 12.
Epeira bombycinaria Hentz, Journ. Bost. Soc. N. H. 1847, p. 476.
Epeira parvula Keyserling, Sitz. Isis, Dresden, 1863, p. 131.
Epeira parvula Emerton, N. Engl. Ep. 1884, p. 317.
Epeira bombycinaria Keyserling, Spinn. Amer., Ep. iv. 1892, p. 145.
Epeira anastera McCook, Amer. Spid. etc. iii. 1893, p. 172.
Commun dans le sud des États-Unis et aux Antilles.

Eustala variolata Cambr.

Epeira variolata O. P. Cambr., Biol. Centr.-Amer., Arachn. 1889, p. 26, tab. vi. f. 14.
Se trouve aussi dans l'Amérique centrale et au Vénézuela.

Eustala fusco-vittata Keyserl.

Epeira fusco-vittata Keyserl., Sitz. Isis, Dresden, 1863, p. 129; Keyserl., Spinn. Amer., Ep. 1892, p. 251, pl. xiii. f. 187.
Espèce tres répandue dans l'Amérique centrale, la Colombie, le Vénézuela et les Antilles.
Cyclosa thorelli McCook et *Epeira illicita* Cambr. en sont probablement synonymes.

Araneus (Epeira) purpurascens Cambr.

Epeira purpurascens O. P. Cambr., Biol. Centr.-Amer., Arachn. 1889, p. 33, tab. vii. f. 4–5.
Également de l'Amérique centrale et du Vénézuela.

Araneus (Epeira) nauticus L. Koch.

Epeira nautica, L. Koch, Aeg. u. Abyss. Arachn. 1875, p. 17, pl. ii. f. 2.

Epeira pullata Thorell, St. Rag. Mal. etc. i. 1877, p. 45.
Epeira volucripes Keyserl., Verh. z.-b. G. Wien, 1884, p. 528; McCook, Amer. Spid. iii. pl. vi. ff. 1–2.
Répandu dans presque toutes les régions tropicales du monde.

ARANEUS (EPEIRA) LABYRINTHEUS Hentz.

Epeira labyrinthea Hentz, Journ. Bost. Soc. N. H. 1847, p. 471.
Epeira rectangula Nicolet, in Gay, Hist. de Chile, Zool. iii. 1849, p. 500.
Répandu dans toute l'Amérique des États-Unis au Chili.

ARANEUS (EPEIRA) THEISI Walck.

Epeira theisi Walck., Apt. ii. 1837, p. 53.
Epeira mangareva Walck., Apt. iv. 1847, p. 469.
Epeira oaxacensis Keyserl., Sitz. Isis, Dresden, 1863, p. 121.
Répandu dans presque toutes les régions tropicales du monde.

ARANEUS (AMAMRA) GIBBIFER Cambr.

Amamra gibbifera O. P. Cambr., Biol. Centr.-Amer., Arachn. 1894, p. 137, tab. xviii. f. 10.
Décrit du Mexique, retrouvé depuis au Vénézuela.

ARANEUS WENZELI, sp. nov.

♀. *Long.* 7 *mm.*—*Cephalothorax fusco-olivaceus vel nigricans, albido-pubescens, parte thoracica utrinque late dilutiore et testacea. Oculi quatuor medii inter se subæquales, aream leviter prominulam, circiter æque longam ac latam et antice quam postice latiorem occupantes, sed spatio inter posticos oculo haud angustiore. Oculi laterales a mediis sat distantes, minores, utrinque æqui et contigui. Oculi quatuor antici in lineam leviter recurvam. Clypeus mediis angustior. Abdomen oblongum, antice rotundum, postice leviter attenuatum, tuberculis humeralibus tuberculoque apicali turbinatis sat parvis munitum, nigrum, supra antice macula rhomboidali et utrinque maculis minoribus elongatis et miquis uniseriatis, subtus maculis longitudinalibus binis abbreviatis albis ornatum. Sternum nigrum, læve, ad marginem impressum. Chelæ robustæ, fuscæ, margine inferiore sulci tridentato. Pedes parum longi, fusco-olivacei, femoribus metatarsis tarsisque ad basin luteis, interdum lutei, femoribus, tibiis metatarsisque annulis fuscis binis ornatis, tarsis apice fuscis. Tuberculum vulvæ fusco-nitidum, plus duplo latius quam longius utrinque rotundum, antice marginatum, in medio late emarginatum et unco brevi subtriquetro munitum.*
Cette espèce rentre dans le groupe de l'*A. grayi* Bl.; elle parait voisine de l'*Epeira graphica* Cambr.

GASTERACANTHA TETRACANTHA L.

Plectana linnæi et *lata* Walck., Apt. ii. 1837, pp. 163–165.
Gasteracantha quadridens C. Koch, Ar. xi. 1845, p. 50, f. 880.
Nous possédions déjà cette espèce de St. Thomas et de la Guadeloupe.

THERIDIOSOMA ARGENTEO-LUNULATUM E. Simon.

Theridiosoma argenteo-lunulatum E. Sim., Ann. Soc. Ent. France, 1896, p. 484.

Découvert au Vénézuela.

VENDILGARDA THERIDIONINA E. Simon.

Vendilgarda theridionina E. Sim., Hist. Nat. Ar. 2e éd. t. i., 1895, p. 919.

Découvert au Vénézuela.

VENDILGARDA MUSTELINA, sp. nov.

♀. *Long.* 2 *mm.*—*Cephalothorax brevis et altus, lævis, fulvo-coccineus. Oculi postici in lineam valde procurvam, medii rotundi lateralibus majores et a lateralibus quam inter se remotiores (spatio oculo angustiore a sese distantes). Oculi antici in lineam rectam, medii nigri, inter se contigui lateralibus multo majores. Abdomen maximum, globosum, partem thoracicam omnino obtegens, fulvo-testaceum, pubescens, subtus in medio sensim infuscatum. Chelæ, partes oris, sternum pedesque fulvo-aurantiaca, metatarsis ad apicem tarsisque 4i paris nigris. Sternum lævе, convexum, postice, inter coxas disjunctas, late obtusum. Pedes robusti, modice longi, sat longe setosi.*

♂. *Long.* 1·8 *mm.*—*A femina differt pedibus anticis longioribus, femoribus tibiisque sat robustis (tibiis ad basin attenuatis), metatarsis tarsisque gracilibus. Pedes-maxillares rufuli, tarso bulboque globoso-reniformibus, maximis, cephalothorace toto haud minoribus.*

Species inter *Theridiosoma* et *Vendilgardam*, oculis mediis anticis inter se contiguis et mediis posticis majoribus eximie distincta.

OGULNIUS INFUMATUS, sp. nov.

♀. *Long.* 0·5 *mm.*—*Cephalothorax brevissimus et altus, fulvo-rufescens, oculis angustissime nigro-cinctis. Oculi quatuor antici in lineam subrectam, medii nigri et rotundi lateralibus albis et ovatis saltem duplo majores. Oculi postici albi et ovati, in lineam valde procurvam semicircularem, medii lateralibus paulo majores, inter se distantes (spatio interoculari oculo paulo latiore) sed a lateralibus subcontigui. Abdomen maximum, globosum, rufescens, postice et subtus sensim et confuse infuscatum, lævе et nitidum, setis longis parce munitum. Sternum fuscum, lævе, maximum, postice late, recte truncatum et subquadratum. Pedes robusti et brevissimi, flavidi, sat longe setosi.*

ANAPIS HAMIGERA, sp. nov.

♂ ♀. *Long.* 2 *mm.*—*Cephalothorax fusco-piceus, rufescens, parte thoracica crebre rugosa et opaca, cephalica lævi et nitida, valde convexa, antice acclivi, fronte recte truncata. Oculi medii magni, subrotundi et inter se contigui. Oculi laterales a mediis late remoti, utrinque contigui et prominuli, anticus postico major. Clypeus altissimus, in medio leviter impressus. Sternum*

nigro-piceum, subtiliter coriaceum et opacum. Abdomen globosum, nigrum, parce et sat longe crinitum. Pedes rufuli, antici posticis multo longiores et robustiores, tibiis prope apicem fusco-notatis, sat longe pilosi, metatarsis anticis leviter depressis et intus, prope medium, aculeis parvis binis munitis. Pedes-maxillares maris rufescentes, sat longi; femore subrecto; patella longiore quam latiore, gracili, sed versus apicem leviter ampliata et apophysi longa, acutissima et retro-arcuata supra insigniter instructa; tibia patella paulo longiore et graciliore, apice sensim ampliata et supra obtusissime prominula; tarso magno, ovato, supra ad basin processu vel crista apice bifida munito; bulbo globoso, magno, stylo libero munito.

Cette espèce remarquable se trouve aussi au Vénézuela; nous en avons donné diverses figures dans notre *Histoire Naturelle des Araignées* (t. i. pp. 923-924, figs. 991-992-996-967).

Familia THOMISIDÆ.

MISUMENA AMERICANA Keyserl.

Misumena americana Keyserl., Spinn. Amer., Later. 1880, p. 85, pl. ii. f. 44.

MISUMENA ASPERATA Hentz.

Thomisus asperatus Hentz, Journ. Bost. Soc. N. H. v. 1847.
Misumena georgiana et *spinosa* Keyserl., Sp. Amer., Later. 1880.
Misumena foliata Banks.

Ces deux espèces sont très répandues dans le sud des États-Unis.

GEPHYRINA INSULARIS sp. nov.

♀ (*pullus*). *Long.* 5 *mm.*—*Cephalothorax planus, pallide luteus, albo-marginatus, pilis niveis pronis plumosis crebre vestitus. Abdomen depressum, longum, subparallelum, antice truncatum et emarginatum, albidum, niveo-pilosum. Chelæ, partes oris, sternum pedesque pallide lutea, tibiis quatuor anticis aculeis inferioribus longis subpellucentibus 3-3 aculeisque lateralibus multo minoribus armatis.*

A *G. alba* E. Sim. (ex Vénézuela) præsertim differt oculorum linea postica minus recurva et oculis mediis posticis inter se quam a lateralibus paulo remotioribus.

Familia CLUBIONIDÆ.

Subfamilia SELENOPINÆ.

? SELENOPS AISSA Walck.

Selenops aissa Walckenaer, Apt. i. 1837, p. 547.

Détérmination incertaine, les individus recueillis n'étant pas adultes

Subfamilia Sparassinæ.

Heteropoda regia Fabr.

Heteropoda venatoria, auctores (*nec* L.).

Espèce répandue dans toutes les régions tropicales du monde ; sans doute introduite à St. Vincent.

Sparassus sancti-vincentii, sp. nov.

♀. *Long.* 22 *mm.*—*Cephalothorax paulo longior quam latior, rufescens, cervino-pubescens, ad marginem posticum paulo dilutior, regione frontali infuscata, parte cephalica vix distincte fusco-lineata. Oculi antici in lineam vix procurvam, inter se fere æquidistantes (spatiis interocularibus oculis circiter æquis), medii lateralibus paulo majores. Oculi postici in lineam leviter procurvam, anticis minores et inter se subæquales, medii a lateralibus quam inter se remotiores. Area quatuor mediorum subquadrata. Clypeus oculis anticis paulo angustior. Abdomen late oblongum, postice attenuatum, supra fuscum et sat longe cervino-pubescens, antice maculis binis magnis subtriquetris, dein maculis binis longis subgeminatis, postice maculis seriatis minoribus, vittam formantibus, et utrinque maculis obliquis fulvis ornatum, subtus fulvum, utrinque fusco-punctatum et vitta media fusca, sæpe confusa et antice evanescente, notatum. Chelæ robustæ, nigræ, margine inferiore sulci dentibus validis trinis denteque ultimo parvo munito. Partes oris nigræ. Sternum fusco-rufescens, lævе. Pedes ordinarii longi, fusco-rufescentes, coxis dilutioribus. Plaga vulvæ fulva, nitida, subrotunda, striis binis profundis, postice convergentibus et aream mediam longe et acute triquetram designantibus, impressa.*

♂. *Long.* 17 *mm.*—*A femina differt pedibus gracilioribus, anticis multo longioribus, metatarsis tarsisque longe scopulatis. Pedes-maxillares graciles et longi, rufescentes, versus extremitatem infuscati ; patella fere duplo longiore quam latiore, parallela, utrinque uniaculeata ; tibia patella longiore et paulo graciliore, prope basin aculeis longissimis verticillatis munita, extus apophysi apicali parva nigra et recta armata ; tarso tibia circiter æquilongo, vix latiore, longe fusiformi, pubescente.*

A *S. antiguensi* Keyserl., cui valde affinis et subsimilis est, præsertim differt structura genitali feminæ et apophysi tibiali maris multo minore et recta.

Pseudosparianthis ravidus, sp. nov.

♀. *Long.* 7 *mm.*—*Cephalothorax ovatus, postice convexus, antice longe declivis et attenuatus, stria thoracica tenui et longa munitus, rufescens, tenuissime nigro-marginatus, parte cephalica sæpe confuse fusco-reticulata. Oculi antici in lineam sat procurvam, inter se fere æquidistantes, medii lateralibus majores. Oculi postici anticis minores, in lineam procurvam, inter se latius et fere æque separati, medii lateralibus (leviter prominulis) paulo minores. Area mediorum latior quam longior et antice quam*

postice vix angustior. Abdomen oblongum, postice attenuatum, supra fuscum vel nigricans, utrinque testaceo-punctatum et vitta media testacea, valde pennata, antice lineas tenues arcuatas nigras includente ornatum. Chelæ, sternum, partes oris pedesque fulvo-rufescentia, tibiis quatuor anticis aculeis 3–3 longis, pronis, apice leviter uncatis, metatarsis aculeis similibus 2–2 subtus armatis, sed aculeis lateralibus carentibus.

♂. *Long.* 6·5 *mm.—A femina differt pedibus longioribus et gracilioribus, tibiis metatarsisque anticis aculeis inferioribus aculeisque lateralibus binis utrinque munitis. Pedes-maxillares fulvi tarso infuscato; patella convexa, mutica, paulo longiore quam latiore; tibia patella vix longiore, intus aculeata, extus, ad marginem exteriorem, apophysi inferiore submedia longa et obtusa apophysique apicali minore et truncata munita; tarso mediocri, ovato et acuminato.*

Subfamilia Clubioninæ.

Clubioneæ.

Chiracanthium inclusum Hentz.

Clubiona inclusa Hentz, Jour. Bost. Soc. Nat. Hist. 1847, p. 370, pl. xxiii. f. 18.

Chiracanthium viride Emerton, New England Drassidæ, 1890, p. 23, pl. v. f. 12.

♀. *Long.* 7–8 *mm.—Cephalothorax fulvo-rufescens, albo-sericeo pubescens, fronte leviter infuscata. Oculi antici in lineam rectam, medii paulo majores et a lateralibus quam inter se paulo remotiores. Oculi postici in lineam leviter procurvam, inter se subæquales et fere æquidistantes. Abdomen ovatum, convexum, pallide luridum, concolor, albo-sericeo-pubescens. Chelæ robustæ, læves, nigro-rufescentes, versus basin leviter dilutiores, parce albo-pilosæ. Partes oris fusco-castaneæ. Sternum pedesque lutea, femoribus cunctis intus ad apicem uniaculeatis. Fovea vulvæ simplex, nigra, semicircularis, antice rotunda, postice recte truncata.*

♂. *A femina differt pedibus longioribus, femore 2i paris aculeo valido erecto et leviter lanceolato intus ad apicem armato et tibia aculeo simili sed minore intus, prope basin, munita. Pedes-maxillares lutei, tarso nigro; tibia tereti, patella non multo longiore, longe crinita, extus ad apicem apophysi nigra, gracili, longa et apice minute bifida armata; tarso sat longe ovato, apophysi basali apophysi tibiali circiter æquilonga, retro directa, subrecta, apice acuta et canaliculata munito.*

Espèce répandue dans le sud des États-Unis et aux Antilles.

Anyphæneæ.

Anyphæna simplicipalpis, sp. nov.

♀. *Long.* 6 *mm.—Cephalothorax ovatus, fulvo-rufescens, albo-sericeo-pubescens, parte thoracica vittis latissimis binis fuscis*

dentatis, lineolis radiantibus abbreviatis obscurioribus sectis, notata. Oculi antici in lineam rectam, inter se appropinquati et valde inæquales, medii lateralibus multo minores. Oculi postici in lineam vix procurvam, sat magni, inter se æqui et fere æquidistantes. Abdomen oblongum, testaceum, luteo-pubescens, parce nigro-punctatum et in parte apicali punctis nigris majoribus subgeminatis et seriatis (3–3) notatum, subtus rima ventrali in medio sita. Chelæ robustæ, læves, margine inferiore sulci dentibus minutis quatuor (1 et 2 inter se appropinquatis et prope radicem unguis sitis, reliquis remotioribus). Pedes fulvi, leviter fusco-variati et subannulati, aculeis ordinariis armati.

♂. *Long.* 6 *mm.—Chelæ longiores et graciliores. Pedes-maxillares lutei, tarso infuscato; femore gracili leviter curvato; tibia patella longiore, tereti, setis paucis longis munita atque extus ad apicem apophysi parva et acute turbinata armata; tarso tibia paulo breviore, ad basin vix latiore, ad apicem longe attenuato et subacuminato.*

AYSHA TENUIS L. Koch.

Anyphæna tenuis, L. Koch, Arach.-Fam. Drass. 1867, p. 211.

♀. *Long.* 7–8 *mm.—Cephalothorax fulvo-rufescens, lævis, albo-sericeo-pubescens. Oculi antici in lineam recurvam, medii nigri, lateralibus albis vix minores et a lateralibus quam inter se vix remotiores. Abdomen oblongum, testaceo-luridum, albo-sericeo-pubescens. Chelæ robustæ, convexæ, læves, fulvo-rufescentes. Sternum pedesque lurida, pedes aculeis ordinariis armati. Fovea vulvæ subrotunda, plana, albo-testacea, prope medium carinula transversa tenui et procurva notata.*

♂. *Chelæ paulo longiores. Pedes-maxillares gracillimi et longi; femore parallelo, leviter curvato, subtus, in parte basali, setis erectis albis tenuibus et longis, uniseriatis, munito; patella sat parva; tibia patella plus duplo longiore, gracili, curvata, extus ad apicem apophysi parva, cylindrata recta et acuta, infra oblique directa, armata; tarso sat angusto, tibia breviore; bulbo ovato, apice stylo nigro, circulum formante, munito.*

Ab *A. ravida* E. Sim., cui valde affinis est, imprimis differt structura genitali.

Décrit de St. Domingue, retrouvée dans la plupart des Antilles.

VULFILA MACRA, sp. nov.

♂. *Long.* 3 *mm.—Cephalothorax longe ovatus, parum convexus, fulvo-rufescens, versus marginem sensim dilutior, lævis, parce et longe albo-pubescens. Oculi antici in lineam plane rectam, inter se fere æquidistantes, sed valde inæquales, medii nigri, lateralibus albis plus quadruplo minores. Oculi postici parvi æqui, inter se late et fere æque remoti, lineam leviter procurvam designantes. Abdomen angustum et longum, albo-testaceum. Chelæ, sternum pedesque pallide lutea, pedes, præsertim antici, longi et graciles, tarsis fere filiformibus, haud scopulatis sed fasciculis*

parvis munitis, aculeis ordinariis armati. Pedes-maxillares lutei, tarso leviter infuscato; tibia patella vix longiore, extus ad apicem apophysi brevi sed crassa et obtusa lutea et subpellucida munita; tarso sat late ovato sed longe attenuato, tibia cum patella paulo longiore.

A *V. tenuissima* E. Sim. (ex Jamaica) præsertim differt oculis posticis minoribus et inter se distantioribus, cephalothorace abdomineque brevioribus, hoc albo-testaceo, haud nigro-punctato.

Subfamilia Ctenin.æ.

Ctenus unilineatus, sp. nov.

♀. *Long.* 20 *mm.*—*Cephalothorax obscure fusco-rufescens, pilis tenuibus pronis fulvis, pilis paucis albidis mixtis, vestitus, linea media exili recta, sæpe in parte thoracica leviter ampliata, albo-luteo pilosa, ornatus. Oculi quatuor medii aream paulo latiorem quam longiorem et antice quam postice multo angustiorem occupantes, antici posticis plus duplo minores. Oculi laterales antici parvi, ovati et albi, cum basi mediorum posticorum lineam rectam designantes. Clypeus leviter retro-obliquus, oculis mediis anticis vix latior. Abdomen ovatum, supra fuscum, cervino-pubescens, in parte basali linea media exili recta albido-lutea, in parte altera maculis parvis biseriatis* (3–3) *albidis et nigro-marginatis supra ornatum, subtus fulvum antice confuse obscurius. Chelæ validæ, fusco-castaneæ, lævs, parce pilosæ, margine inferiore sulci quadridentato. Sternum pedesque fulvo-rufescentia, pedes fulvo pubescentes et parce albo-punctati, tibiis anticis aculeis 5–5 subtus armatis* (*sed aculeo medio apicali carentibus*), *metatarsis aculeis similibus* 3–3 *munitis, aculeis lateralibus dorsalibusque carentibus.*

♂. *Long.* 17 *mm. A femina differt pedibus longioribus et gracilioribus, tibiis anticis aculeis inferioribus, utrinque aculeis lateralibus minoribus binis aculeisque dorsalibus trinis munitis, metatarsis posticis rectis* (*nec sinuosis nec insigniter aculeatis*). *Pedes-maxillares longi, parum robusti; patella intus uniaculeata; tibia patella longiore, tereti, leviter arcuata, aculeis longis* 3–4 *subverticillatis, atque apophysi exteriore apicali parva, nigra, valde compressa, obtusa, sed ad marginem inferiorem minute et acute dentata, instructa; tarso mediocri, tibia non multo longiore.*

Caloctenus luteovittatus, sp. nov.

♀. *Long.* 13 *mm.*—*Cephalothorax ovatus, parte thoracica parum convexa, cephalica antice sensim acclivi, fuscus, cervino-pubescens et pilis depressis albis paucis conspersus, regione frontali et oculorum rufulo-pilosa, vitta media lata, in parte thoracica paulo angustiore et dentata, lutea et crebre flavido-pilosa decoratus. Oculi quatuor medii aream paulo longiorem quam latiorem et antice quam postice angustiorem occupantes, antici posticis minores. Oculi laterales antici parvi, ovati et obliqui, a mediis anticis quam a posticis evidenter remotiores. Clypeus verticalis planus, oculis*

mediis anticis fere duplo latior. Abdomen oblongum, supra nigrum, cervino rufuloque pubescens, vitta media lata integra, lutea pallide flavido-pilosa et rufulo-marginata et in parte secunda fasciculis biseriatis pilorum longorum fulvorum decoratum, subtus obscure fulvum. Chelæ robustæ, convexæ, fuscæ, ad basin paulo dilutiores et crasse albido-pilosæ, margine inferiore sulci quadridentato (dentibus 1, 2 et 3 inter se subcontiguis, dente ultimo remoto). Sternum pedesque obscure fulva, hi valde fusco-variati et subannulati, femoribus 1' paris intus prope medium aculeis longissimis binis, tibiis aculeis inferioribus longis et pronis 5–6, aculeis lateralibus apicalibusque multo minoribus, metatarsis aculeis inferioribus longissimis 3–3 valde armatis. Fovea vulvæ magna, semicircularis, lutea, carinula media rufula, antice depressa, rugosa et crasse pilosa, postice fulvo-nitida et minute cordiformi, divisa.

CALOCTENUS PENICILLIGER, sp. nov.

♀. *Long.* 12–15 *mm.—Cephalothorax fere præcedentis, cervino-rufulo pubescens, pilis albidioribus lineam marginalem valde sinuosam et interruptam vittamque mediam latam sed postice valde acuminatam designantibus ornatus. Oculi fere præcedentis, sed clypeo mediis anticis plus duplo latiore. Abdomen ovatum, supra fuscum, rufulo luteoque pubescens, in parte prima linea media exili recta dilutiore et albido-pilosa, in parte altera fasciculis biseriatis pilorum crassorum luteorum ornatum, subtus obscure fulvum. Chelæ robustæ, convexæ, nigræ, ad basin albo-pilosæ, margine inferiore sulci ut in præcedente quadridentato. Sternum pedesque obscure fulvo-rufescentia, hi valde nigricanti-variegati et annulati, aculeis ut in præcedente ordinatis. Fovea vulvæ magna, semicircularis, lutea, carinula media valde pilosa et utringue tuberculo nigro turbinato munita.*

♂. *Long.* 10 *mm.—Pedes longissimi, metatarsis tarsisque gracillimis fere filiformibus, aculeis tibiarum et metatarsorum multo minoribus. Pedes-maxillares fulvi fusco-variati; tibia patella longiore, tereti et leviter arcuata, extus ad apicem apophysi parva nigra compressa minute et acute bifida armata, tarso tibia æquilongo vel paulo breviore, anguste ovato; bulbo ovato, simplici.*

Subfamilia LIOCRANINÆ.

MICARIOSOMATEÆ.

MESOBRIA, gen. nov.

Cephalothorax sat late ovatus, antice attenuatus, fronte mediocri, sat convexus et stria thoracica lata impressus. Oculi antici in lineam procurvam, medii lateralibus majores et inter se quam a lateralibus remotiores. Oculi postici in lineam fere æqualiter procurvam, antica haud latiorem, inter se subæquales, medii a sese quam a lateralibus remotiores. Oculi laterales utringue anguste disjuncti. Oculi quatuor medii aream paulo longiorem

quam latiorem et antice quam postice paulo angustiorem occupantes. Clypeus oculis anticis circiter æquilatus. Chelæ robustæ, antice muticæ. Sternum late cordiforme, postice attenuatum. Coxæ posticæ inter se distantes. Pedes robusti, tibiis metatarsisque anticis aculeis pronis longis et biseriatis subtus armatis, tarsis leviter fusiformibus apice fasciculatis.

A *Micariosomate* præsertim differt oculis mediis anticis lateralibus majoribus, oculorum linea postica procurva et chelis antice muticis, a *Teutamo* et *Sesieute* differt area oculorum mediorum paulo longiore quam latiore, clypeo oculis anticis haud latiore et cephalothorace latius ovato.

MESOBRIA GUTTATA, sp. nov.

♀. *Long.* 3 *mm.*—*Cephalothorax lævis, luridus, regione oculorum clypeoque nigris, macula media ovata, utrinque linea dorsali angusta arcuata et valde dentata maculisque marginalibus trinis subrotundis nigricentibus ornatus. Abdomen breviter ovatum, fulvo-testaceum, antice maculis convergentibus binis, prope medium macula longitudinali arcubusque minoribus binis, dein maculis obliquis parvis subgeminatis et postice, supra mamillas, macula subrotunda supra decoratum, subtus concolor. Chelæ fulvæ, antice late nigro-vittatæ. Partes oris, sternum pedesque lutea, femoribus, tibiis, metatarsisque nigro-biannulatis. Pedes robusti, tibiis anticis aculeis longis pronis sat gracilibus 4–4, metatarsis aculeis similibus 2–2 subtus instructis.*

Subfamilia MICARIINÆ.

CASTANEIRA SPINOSA, sp. nov.

♀. *Long.* 5 *mm.*—*Cephalothorax longus et angustus, antice posticeque attenuatus, stria thoracica carens, niger, subtiliter et crebre coriaceus, parcissime albo-pilosus. Oculi antici in lineam procurvam, medii lateralibus paulo minores, inter se distantes (spatio interoculari oculo angustiore), sed a lateralibus subcontigui. Oculi postici magni, in lineam rectam antica vix latiorem, medii lateralibus paulo majores et inter se quam a lateralibus vix remotiores. Area mediorum vix longior quam latior. Oculi laterales utrinque spatio oculo paulo angustiore a sese distantes. Clypeus oculis lateralibus anticis vix latior. Abdomen longe ovatum, petiolo cylindraceo sat longo duriusculo valde rugato et rugoso munitum, supra antice scuto nigro-nitido convexo et subrotundo obtectum, postice nigro-æneum micanti tinctum, pilis simplicibus fulvo-sericeis vestitum, sed pilis plumosis niveis, vittam mediam transversam et utrinque lineam obliquam formantibus, ornatum. Chelæ sternumque nigricantia, subtilissime coriacea. Pedes sat longi parum robusti, lutei, coxis femoribusque nigricantibus, his plus minus fulvo-vittatis, tibiis metatarsisque 4ⁱ paris infuscatis apice luteo annulatis, tibiis anticis aculeis pronis 5–5, metatarsis aculeis 2–2 subtus armatis. Pedes-maxillares nigri, femore subtus aculeis erectis longis binis rectis, patella*

aculeo arcuato, tibia aculeis binis similibus interioribus, valde armatis.

♂. *Long.* 4·5 *mm.—Cephalothorax longior, stria media brevissima impressus. Abdomen longius petiolatum, scuto nigro-nitido, prope medium valde constricto, ad marginem anticum aculeis gracilibus erectis binis armato, supra omnino obtectum. Pedes maxillares nigri, patella tibiaque circiter æquilongis, haud longioribus quam latioribus, tibia paulo crassiore extus ad apicem dente minutissimo armata, tarso angusto arcuato et longissimo, bulbo rufulo, simplici, antice longe attenuato et acuminato.*

CORINNOMMA ALBOBARBATUM, sp. nov.

♂. *Long.* 3 *mm.—Cephalothorax longus et angustus, stria thoracica minutissima, vix perspicua, munitus, niger, opacus crebre coriaceus, pilis longis erectis albis hirsutus. Oculi antici in lineam subrectam (vix procurvam) inter se valde inæquales, medii lateralibus fere triplo majores, inter se distantes sed a lateralibus subcontigui. Oculi postici mediocres, in lineam rectam antica paulo latiorem, medii inter se quam a lateralibus remotiores (spatio interoculari oculo duplo latiore). Area mediorum latior quam longior. Oculi laterales utrinque spatio oculo circiter æquilato a sese distantes, anticus postico multo minor. Clypeus oculis anticis plus duplo latior. Abdomen longe oblongum, supra duriusculum et tenuiter rugosum, rufulum sed postice sensim infuscatum, pilis crassis plumosis læte flavo-coccineis crebre vestitum, subtus nigrum et simpliciter albo-pubescens. Chelæ crassæ, antice leviter deplanatæ, opacæ, nigræ, apice rufulæ, parce albo-pilosæ. Sternum nigro-nitidum. Pedes sat breves, versus extremitates graciles, coxis fulvis, femoribus nigris, tibiis sex anticis luteis utrinque nigro-lineatis, metatarsis fuscis, tarsis luteis, tibiis anticis aculeis debilibus 5–4, metatarsis aculeis similibus 2–2 subtus armatis. Pedes-maxillares olivacei, tarso luteo, patella tibiaque brevibus, hac mutica leviter compressa, tarso longissimo angustissimo recto et tereti, bulbo rufulo, simplici, apice longe producto.*

A speciebus Asiaticis præsertim differt area oculorum mediorum evidenter latiore quam longiore.

Seul représentant Américain du genre *Corinnomma*, jusqu'ici propre à la région tropicale de l'ancien monde.

Subfamilia CORINNINÆ.

TRACHELAS FEMORALIS, sp. nov.

♀. *Long.* 5 *mm.—Cephalothorax brevis et valde convexus, rufo-castaneus, minute rugosus (rugositates in parte thoracica lineas divaricatas parum regulares designantes). Oculi antici in lineam procurvam, medii nigri, lateralibus ovatis et albis, minores et a lateralibus quam inter se remotiores. Oculi postici mediocres, inter se æquales, lineam latam valde recurvam designantes, medii a lateralibus quam inter se multo remotiores (sed spatio*

inter medios oculo fere duplo latiore). Clypeus oculis lateralibus anticis multo angustior. Abdomen oblongum, cinereo-testaceum, regione epigasteris rufula. Chelæ robustæ, rufulæ, parce rugosæ. Sternum rufo-castaneum, valde rugoso-clathratum, antice area angusta longitudinali læviore notatum. Pedes breves et robusti, fulvo-rufescentes, postici anticis dilutiores.

♂. *Long.* 5 *mm.—A femina differt abdomine scuto dorsali rufulo angusto et abbreviato munito, pedibus anticis robustissimis, femoribus subclavatis, leviter arcuatis, subtus in medio valde convexis, tibiis denticulis uniseriatis* 5 *vel* 6 *areaque apicali minute spinulosa subtus munitis, metatarsis gracilibus parce et minute granosis. Pedes-maxillares lutei, parvi et graciles; tibia patella circiter æquilonga, vix graciliore, mutica, sed extus ad apicem leviter angulosa; tarso tibia longiore, vix crassiore, tereti, bulbum simplissimum et angustum superante.*

Species femoribus anticis maris subtus valde convexis et pedibus-maxillaribus parvis et simplicibus eximie distincta.

Genus Corinna C. Koch.

Synopsis Specierum.

1. Cephalothorax prope medium stria superficiali transversa procurva impressus. Tegumenta setis longis erectis parce munita. Aculei tibiarum anticarum (4–4) longi. Abdomen supra nigro-nitidum, vitta transversa lata angulosa albida ornatum ..... *punicea.*
   Cephalothorax stria transversa carens. Tegumenta breviter pubescentia. Abdomen haud vittatum. Aculei tibiarum anticarum mediocres ..... 2.
2. Area oculorum mediorum subquadrata. Tibiæ anticæ aculeis 4–4, metatarsi aculeis 2–2 subtus armati ..... 3.
   Area oculorum mediorum latior quam longior et subparallela. Tibiæ anticæ aculeis 5–5 vel 6–6 subtus armatæ ... 5.
3. Oculi antici inter se æquidistantes. Cephalothorax unicolor fuscus. Abdomen fuscum, in parte apicali maculis parvis testaceis obsoletis biseriatis ornatum. Bulbus maris stylo apicali libero arcuato munitus ..... 4.
   Oculi medii antici a lateralibus quam inter se paulo remotiores. Cephalothorax vitta media vittaque marginali valde dentata albidis notatus. Bulbus maris apice obtusus ..... *tomentosa.*
4. Tibia pedum-maxillarium maris extus ad apicem emarginata, acute nigro-marginata, et apophysi inferiore depressa sed acutissima armata ..... *pallidoguttata.*
   Tibia pedum-maxillarium maris extus ad apicem apophysibus trinis æquis armata (superiore arcuata, media acute triquetra, inferiore obtusa) ..... *subsignata.*
5. Chelarum margo inferior quinque-dentatus. Metatarsi antici aculeis 3–3 aculeoque medio apicali minore subtus armati ..... *lacertosa.*
   Chelarum margo inferior quadridentatus. Metatarsi antici aculeis 2–2 subtus armati, sed aculeo apicali carentes ..... 6.
6. Cephalothorax minute rugosus. Oculorum linea antica valde procurva ..... *napæa.*
   Cephalothorax subtiliter coriaceus. Oculorum linea antica parum procurva ..... *consobrina.*

CORINNA LACERTOSA, sp. nov.

♀. *Long.* 12–14 *mm.*—*Cephalothorax oblongus, modice convexus, tenuiter et crebre rugosus, parce fulvo-pubescens, nigricans. Oculi antici in lineam leviter procurvam, inter se æquidistantes, medii rotundi, lateralibus ovatis fere duplo majores. Oculi postici æqui, medii a lateralibus quam inter se remotiores. Area mediorum subparallela, latior quam longior. Abdomen oblongum, fuscum, subtus dilutius, pilis brevibus latis et depressis fulvis vestitum. Chelæ robustæ, valde convexæ et geniculatæ, nigro-nitidæ, rugosæ, margine inferiore sulci dentibus 5 inter se contiguis armato. Sternum fusco-rufescens, subtiliter et crebre rugosum. Pedes sat longi, fulvo-rufuli, tibiis anticis aculeis sat brevibus 5–5, metatarsis aculeis similibus 3–3, aculeoque parvo medio-apicali, subtus armatis. Plaga vulvæ antice rufula rugosa et fovea ovata impressa, postice nigra, ampliata, depressa, utrinque angulosa, marginata et septo angusto divisa.*

♂. *Chelæ crassius rugosæ. Pedes-maxillares rufuli, tibia tarsoque nigris; femore compresso, supra ad apicem triaculeato; patella paulo longiore quam latiore, intus uniaculeata; tibia patella circiter æquilonga, versus apicem valde ampliata, apophysi apicali crassissima extus convexa, intus depressa atque ad basin acute dentata, ad apicem incurva attenuata sed truncata; tarso longe ovato sat angusto, ad basin crasse marginato et extus, secundum apophysem tibialem, prominulo et obtusissimo; bulbo nigro, simplici, ad basin rotundo, ad apicem depresso et extus emarginato.*

CORINNA PALLIDOGUTTATA, sp. nov.

♀. *Long.* 10 *mm.*—*Cephalothorax oblongus, parum convexus, sublævis, fusco-rufescens, postice leviter dilutior, breviter fulvo-pubescens. Oculi antici in lineam valde procurvam, inter se æque et sat anguste distantes, medii lateralibus circiter ⅓ majores. Oculi postici in lineam sat procurvam, inter se æquales, medii a lateralibus quam inter se paulo remotiores. Area mediorum subquadrata. Abdomen oblongum, fuscum, subtus dilutius, pilis plumosis pronis cinereo-fulvis crebre vestitum, supra, in parte apicali, punctis testaceis (sæpe obsoletis) biseriatis ornatum. Chelæ fusco-rufulæ, læves, parum convexæ, margine inferiore sulci quadridentato. Sternum rufulum, læve. Pedes longi, parum robusti, tibiis anticis aculeis sat longis 4–4, metatarsis aculeis similibus 2–2 subtus armatis, sed aculeis apicalibus carentibus. Plaga vulvæ subrotunda, leviter convexa, nigra, sed area media leviter depressa testacea ovata seu subquadrata notata.*

♂. *Pedes chelæque longiores, hæ leviter rugosæ. Pedes-maxillares longi et parum robusti; tibia patella longiore versus apicem leviter et sensim incrassata, extus ad apicem depressa, et carinula arcuata ad angulum inferiorem dente depresso et acutissimo armata, munita; tarso angusto et longo, leviter*

fusiformi; bulbo mediocri, basin tarsi tantum occupante, sed stylo libero valido et longo munito.

CORINNA SUBSIGNATA, sp. nov.

♂. *Long.* 10 *mm.*—*Cephalothorax oblongus, modice convexus, crebre et subtiliter rugosus, fusco-rufescens, breviter fulvo-pubescens. Oculi antici in lineam sat procurvam, inter se æquidistantes, medii lateralibus vix ⅓ majores. Oculi postici in lineam sat procurvam, inter se æquales, medii a lateralibus quam inter se remotiores. Area mediorum subquadrata (vix latior quam longior). Abdomen oblongum, fuscum, pilis plumosis fulvo-cinereis crebre vestitum, antice scuto rufulo ovato, postice punctis obscure testaceis vix expressis et biseriatis supra munitum. Sternum rufescens. Chelæ longæ, nigro-nitidæ, extus leviter rugosæ. Pedes rufescentes, longi et graciles, ut in præcedente aculeati. Pedes-maxillares longi et parum robusti, fere præcedentis, sed tibia extus ad apicem apophysibus trinis sat brevibus instructa, superiore subacuta et hamata, media paulo longiore, depressa, attenuata atque ad basin leviter angulosa, inferiore minore nigra et obtusa.*

CORINNA TOMENTOSA, sp. nov.

♀. *Long.* 10–12 *mm.*—*Cephalothorax ovatus, parum convexus, fusco-rufescens, versus marginem dilutior, fulvo-pubescens, pilis plumosis pronis albidioribus, vittam mediam latam vittamque marginalem valde dentatam designantibus, ornatus. Oculi antici in lineam modice procurvam, medii lateralibus circiter ⅓ majores et a lateralibus quam inter se paulo remotiores. Area mediorum subquadrata, vix latior quam longior. Abdomen oblongum, fuscum, subtus dilutius, pilis plumosis cinereo-fulvis crebre vestitum, supra vitta media, postice attenuata et dentata, et utrinque punctis inordinatis testaceis, ornatum. Chelæ robustæ, fusco-rufescentes, nitidæ, minutissime et parce rugosæ, margine inferiore sulci quadridentato. Sternum rufescens, lævе, pubescens. Pedes parum longi, fulvo-rufescentes, tibiis anticis aculeis mediocribus 4–4, metatarsis aculeis similibus 2–2, subtus armatis, sed aculeis apicalibus carentibus. Plaga vulvæ plana, nigra, semicircularis, fovea longitudinali angusta et sulciformi impressa.*

♂. *Chelæ longiores, nigræ, crebrius rugosæ. Pedes longiores. Pedes-maxillares robusti, rufuli, tibia tarsoque nigris; tibia patella circiter æquilonga, extus, in parte apicali, paululum ampliata et carinula tridentata armata (dentibus trinis æquis et acutis, medio nigro et recto, reliquis fulvis, leviter depressis et arcuatis), apophysique apicali paulo longiore fulva, tereti apice inæqualiter bifida (ramulo inferiore brevi, obtuso et depresso, altero longiore gracillimo, flagelliformi arcuato et sinuoso) insigniter armata; tarso sat anguste ovato, ad basin crasse marginato; bulbo nigro ovato apicem tarsi fere attingente, apice stylo brevi sed crasso et depresso, circulum formante, munito.*

CORINNA PUNICEA, sp. nov.

♀. *Long.* 9 *mm.*—*Cephalothorax longe oblongus, modice convexus, antice parum attenuatus, rufo-castaneus, subtilissime coriaceus, subglaber, stria thoracica brevi sed profunda striaque transversa tenuissima et procurva impressus. Oculi antici in lineam valde procurvam, medii lateralibus plus duplo majores et a lateralibus quam inter se vix remotiores. Oculi postici in lineam sat procurvam, inter se æqui et fere æquidistantes (spatiis interocularibus oculis plus duplo latioribus). Area mediorum paulo latior quam longior et postice quam antice vix angustior. Abdomen longum, subcylindratum, supra nigro-nitidum, parce et longe nigro-setosum, vitta transversa lata, in medio ampliata, albo-testacea ornatum, subtus albo-testaceum, postice nigro-marginatum. Chelæ robustæ, convexæ, rufulæ, valde rugosæ et parce nigro-crinitæ, margine inferiore sulci dentibus contiguis* 4 (1. *minore*) *armato. Sternum sat angustum, oblongum, rufulum, sublæve. Pedes sat breves, læte rufuli, versus extremitates leviter infuscati, parce et longe setosi, femoribus supra setis spiniformibus longissimis et erectis paucis armatis, tibiis anticis aculeis longis pronis* 4–4 (*basilaribus reliquis minoribus*), *metatarsis aculeis similibus* 2–2, *subtus armatis. Plaga vulvæ plana, paulo longior quam latior, in medio minutissime foveolata.*

♂. *Feminæ subsimilis. Pedes-maxillares rufuli, apice infuscati; tibia patella circiter æquilonga, vix angustiore, extus, ad marginem inferiorem, apophysi submedia nigra, antice oblique directa, recta et obtusa, subtus ad basin ampliata et subangulosa instructa; tarso sat anguste ovato; bulbo ad basin valde convexo et subrotundo, ad apicem stylo crasso et valde incurvo armato.*

CORINNA CONSOBRINA, sp. nov.

♀. *Long.* 8 *mm.*—*Cephalothorax oblongus, convexus, fusco-rufescens, sæpe postice paulo dilutior, subtiliter coriaceus et pilis pronis fulvo-nitidis parce munitus, stria thoracica brevi sed profunda impressus. Oculi antici in lineam leviter procurvam, inter se æque et anguste distantes cuncti rotundi, medii lateralibus fere duplo majores. Oculi postici parvi, æqui, in lineam leviter procurvam, medii a lateralibus quam inter se non multo remotiores (spatio interoculari oculo plus duplo latiore). Area mediorum subparallela, latior quam longior. Abdomen oblongum, fusco-nigricans, fulvo-pubescens. Chelæ robustæ, valde convexæ, nigro-rufescentes, rugosæ, margine inferiore sulci dentibus* 4 *æquis armato. Sternum fusco-rufescens, coriaceo-rugosum. Pedes mediocres, fulvo-rufescentes, femoribus obscurioribus, tibiis anticis aculeis mediocribus* 6–6 (*apicalibus reliquis minoribus*), *metatarsis aculeis similibus* 2–2, *subtus armatis. Area genitalis plagula anteriore nigra subrotunda et late foveolata, plagulaque posteriore convexiore transversa et semilunari, postice minute et profunde foveolata, munita.*

CORINNA NAPÆA, sp. nov.

♀. *Long.* 7 *mm.*—*Cephalothorax breviter ovatus, parum convexus, nigro-castaneus, minute et parce rugosus, stria thoracica brevissima impressus. Oculi antici in lineam valde procurvam, inter se fere æquidistantes, medii lateralibus fere duplo majores. Oculi postici æqui, in lineam sat procurvam, inter se fere æquidistantes. Area mediorum latior quam longior, subparallela. Abdomen oblongum, nigro-nitidum. Chelæ robustæ, valde convexæ, nigro-castaneæ, rugosæ, margine inferiore sulci dentibus parvis æquis quatuor armato. Sternum rufescens, subtiliter rugosum. Pedes rufescentes, femoribus anticis subtus infuscatis et tenuissime coriaceis, tibiis anticis aculeis sat validis pronis 5–5 vel 6–5, metatarsis aculeis similibus 2–2 subtus armatis.*

Familia AGELENIDÆ.

HAHNIA ERNSTI, sp. nov.

♂. *Long.* 2 *mm.*—*Cephalothorax ovatus, luteo-olivaceus, anguste nigricanti-cinctus, lineis radiantibus pallidioribus vix expressis notatus, area oculorum nigra. Oculi antici inter se subcontigui, medii lateralibus minores. Oculi postici inter se subæquales, in lineam parum procurvam, medii inter se quam a lateralibus remotiores. Clypeus area oculorum non multo angustior, leviter proclivis. Abdomen subglobosum, testaceum, supra lineis transversis nigris quinque in medio arcuatis et angulosis ornatum. Sternum fusco-olivaceum, latum, leviter convexum, læve. Mamillæ pedesque pallide olivacei, parce setosi. Pedes-maxillares pallide olivacei, tarso leviter rufescenti; femore brevi, parallelo et subrecto; patella longiore quam latiore, versus apicem ampliata; tibia patella breviore et angustiore, apice oblique secto; tarso magno, reliquis articulis simul sumptis haud breviore, multo latiore, ovato-reniformi, depressiusculo; bulbo simplici, longe ovato, rufulo, anguste nigro-circumdato.*

♀. *Long.* 2 *mm.*—*Cephalothoracis pars cephalica macula postica subtriquetra, pars thoracica vittis radiantibus trinis obscurioribus notatæ. Pedes, pedes-maxillares mamillaque pallide testacei distincte fusco-annulati.*

Également commun au Vénézuela dans les forêts froides.

Familia LYCOSIDÆ.

LYCOSA SANCTI-VINCENTII, sp. nov.

♀. *Long.* 12 *mm.*—*Cephalothorax fusco-nigricans, fulvo-pubescens, vitta marginali sat angusta et valde flexuosa, vittaque media, oculos posticos vix attingente, postice sensim attenuata et utrinque, prope medium, minute excisa, fulvis et albo-pilosis notatus. Oculi antici in lineam procurvam, linea 2ª paulo angustiorem, medii lateralibus majores. Abdomen oblongum, supra fusco-nigrans, albido-cinereo-pubescens, antice late dilutius et rufescens,*

sed vitta media nigra, leviter angulosa et postice evanescente, notatum, subtus nigrum, nigro-velutinum et albo-marginatum. Sternum nigrum, sæpe fulvo-marginatum. Chelæ robustæ, ad basin fusco-rufescentes et luteo-pilosæ, ad apicem nigræ, margine inferiore sulci tridentato. Pedes modice longi, tarsis gracilibus, fulvo-rufescentes, valde nigro-variati et subannulati, tibiis anticis aculeis inferioribus 3–3 aculeisque lateralibus interioribus binis minoribus, metatarsis aculeis inferioribus 2–2 aculeisque apicalibus multo minoribus trinis, subtus armatis. Fovea vulvæ multo longior quam latior, subparallela, marginata, et carina rufula, leviter lanceolata et postice abrupte transversim ampliata, divisa.

♂. *Long.* 10 *mm.—Pedes longiores et graciliores, tibiis metatarsisque anticis utrinque aculeis lateralibus binis armatis. Sternum plerumque fulvum, linea media nigra vel fusca notatum. Abdomen subtus vix infuscatum, sæpe fulvum. Pedes-maxillares fulvi; tibia patella circiter æquilonga, multo longiore quam latiore, versus apicem vix incrassata; tarso sat angusto, acuminato.*

Familia Oxyopidæ.

Oxyopes salticus Hentz.

Oxyopes salticus Hentz, Journ. Bost. Soc. N. H. iv. 1844, p. 388.

♂ ♀. *Long.* 5–6 *mm.—Cephalothorax luteus, supra fusco-olivaceo-pubescens, vitta marginali lineisque dorsalibus trinis, media recta, lateralibus postice convergentibus, niveo-pilosis, decoratus. Area oculorum nigra, crasse luteo alboque pilosa. Clypeus chelæque antice lineolis binis nigris integris notati. Abdomen maris fuscum, squamulis subrotundis albis micantibusque mixtis crebre vestitum. Abdomen feminæ fulvum, supra vitta lanceolata obscuriore albo-marginata, subtus vitta fusca vel nigra ornatum. Pedes lutei, femoribus subtus tenuiter nigro-vel fusco-lineatis, aculeis longissimis nigris armati. Pedes-maxillares maris nigerrimi (interdum femore patellaque dilutioribus), crasse nigro-pilosi et hirsuti; patella tibiaque brevibus, tibia ampliata sed mutica; tarso magno, extus ad basin processu crasso et obtusissimo munito.*

Espèce très répandue dans le sud des États-Unis.

Oxyopedon rana, sp. nov.

♂ ♀. *Long.* 4 *mm.—Cephalothorax brevis et altus, lævis, obscure fulvus, sæpe versus marginem leviter infuscatus, pilis squamiformibus (ovatis) pronis, albis fulvisque mixtis, crebre vestitus. Oculi late nigro-marginati, quatuor antici inter se anguste et fere æque separati et valde inæquales, medii lateralibus plus decuplo minores, quatuor postici inter se subæquales, lateralibus anticis minores, medii inter se quam a lateralibus saltem duplo remotiores. Clypeus latissimus, leviter proclivis. Abdomen breve, antice posticeque valde attenuatum, antice truncatum,*

postice acuminatum, obscure fulvum concolor, supra pilis squamiformibus sordide albidis, subtus pilis simplicibus albidioribus, crebre vestitum. Chelæ sternumque obscure fulva. Pedes lutei, albido-squamulati, aculeis tenuibus longis fuscis subpellucentibus armati. Pedes-maxillares maris lutei, breves; femore robusto, compresso, subclaviformi; patella tibiaque brevibus, hac extus ad apicem extrinsecus nigra munita; tarso ovato, extus ad basin leviter anguloso.

Ordo PEDIPALPI.

ADMETUS PALMATUS Herbst.

Phalangium reniforme Fabr. (nec L.).
Admetus palmatus E. Sim., Ann. Soc. ent. Fr. 1892, p. 51.
Neophrynus palmatus Kræplin, Rev. Tar. 1895, p. 30.
Très répandu dans toutes les Antilles.

Ordo SOLIFUGÆ.

CLEOBIS CUBÆ Lucas.

Galeodes cubæ Lucas, Mag. Zool. cl. viii. 1835, pl. ii.
Décrit de Cuba.

5. On some New or Rare Birds' Eggs.

By ALFRED NEWTON, F.R.S., F.Z.S.

[Received November 16, 1897.]

(Plate LI.)

After an interval of many years it is with peculiar pleasure that I find myself, thanks to the exertions of several kind friends, able once more to offer some 'Notes on New or Rare Birds' Eggs'[1], and thus continue the record, begun by my predecessors, of oological discoveries, the chief of which have, during the last half-century, been communicated to this Society[2].

TRINGA SUBARQUATA, Güldenstädt. (Plate LI. figs. 1–4.)

For the discovery of this long-sought treasure, egg-collectors have to thank Mr. Hugh Leyborne Popham, whose perseverance in a second time visiting the valley of the Jenisei (the Yenesay of some writers) has met with a fitting and (according to my precon-

[1] *Cf.* Proc. Zool. Soc. 1861, pp. 393–402, pl. xxxix.; 1867, pp. 161–168, pl. xv.; 1871, pp. 55–58, pl. iv.

[2] *Cf.* Owen and Lyall, Proc. Zool. Soc. 1852, pp. 12 and 32, *Aves*, pl. xlvi. (*Apteryx*, *Stringops*, &c.); Gould, *op. cit.* 1853, p. 45, *Aves*, pl. liii. (*Menura*); Walter, *tom. cit.* p. 192, *Aves*, pl. lvi. (*Prosthematodera*); Wolley, *op. cit.* 1857, p. 55, *Aves*, pl. cxxii. (*Ampelis garrulus*); Sclater, *op. cit.* 1859, p. 353 (*Balæniceps*); Bartlett, *op. cit.* 1868, p. 116, pl. xii. (*Rhinochetus* and *Eurypyga*). To some scattered papers by others as well as myself I need not here refer.



Hanhart imp

NEW OR RARE BIRDS' EGGS.

ceived notions) an almost unexpected reward. The story of the nest and eggs of the Pigmy Curlew or Curlew-Sandpiper having been found in Greenland, unlikely as it was from the first, may be dismissed from consideration after the explanation by Colonel Feilden (Ibis, 1879, p. 486) of the way in which the mistake arose, and thus we have no positive information as to its breeding-haunts, except that which was furnished by the observations of Von Middendorff to be immediately cited, and it gradually became evident that in this species, as with some others of its congeners, the focus of existence was limited to a comparatively small area, though the early age at which the young wander in many directions to great distances from their home rendered its determination difficult, and served to induce a belief, for which there was really no foundation, that the species might breed over a very considerable extent of circumpolar land—a belief that was hardly dispelled until the publication of Professor Palmén's work on the ornithology of the Voyage of the 'Vega'[1].

Von Middendorff (Sib. Reise, Bd. ii. Th. 2, i. p. 220) says of *Tringa subarquata* that he met with one on the Taimýr River (lat. 74° N.) on the 4th of June, and that soon after it was dispersed over the swampy tracts of the *Tundra* to breed, and that a bird shot on the 15th contained an egg nearly ready for exclusion (*fast ausgetragenes Ei*). He adds that the nearer he approached the mountains, the rarer became the species, and also that though he met with one on the Boganída on the 27th of May, it did not seem to breed there.

Thus, as I informed Mr. Popham before his departure last spring, the probability seemed to be against his falling in with a breeding-place of this Sandpiper unless he was able to get to the East and North of the Boganída country, a difficult task to accomplish, while he did not propose in his recent journey to go beyond the valley of the Jenisei. His pleasure therefore may be imagined when, on the 3rd of July, he watched a *Tringa subarquata* go three times to her nest on an island in the mouth of that river, and from that nest he took the four slightly incubated eggs which he has kindly entrusted me, in his absence, to exhibit to-night. The note with which he has favoured me states that the nest was "a rather deep hollow in the reindeer-moss on a low ridge of ground somewhat drier than the surrounding swampy *tundra*, in much the same sort of place that a Grey Plover would choose." To ensure the identification of the eggs Mr. Popham shot the hen bird from the nest. These eggs measure from 1·47 to 1·4 by from 1·02 to 1 inch, and can be, I think, best described by saying that except in size they closely resemble those of the Common Snipe, *Gallinago cœlestis*; but it would be quite in accordance with xperience to find that others should exhibit a considerable departure from that pattern.

[1] Bidrag till Kännedomen om Sibiriska Ishafskustens Fogelfauna m.m., bearbetade af J. A. Palmén (Vega-Expeditionens Vetenskapliga Jakttagelser, v. p. 309, tab. 3). Stockholm: 1887.

TURDUS VARIUS, Pallas. (Plate LI. fig. 5.)

More than twenty years ago my good friend the late Mr. Swinhoe, so well known for his long-continued ornithological researches in China, offered to and even pressed upon me a nest and three eggs which he obtained near Ningpo in 1872 and considered to belong to *Oreocincla varia* or *Turdus varius*. The account of them he related to me and the appearance of the specimens failed to satisfy me as to his determination, and as I could not accept his view of them, I felt bound to decline the gift he would so generously have made. He subsequently communicated a description of them to the late Mr. Rowley, in whose 'Ornithological Miscellany' it was published in March 1877 (ii. pp. 255–257), together with a plate representing the nest and the three eggs. One of the latter afterwards became the property of Mr. Dresser, and thanks to him I am able to show it to you to-night, while the remaining two, one of which has been elsewhere figured, and the nest remained in Mr. Swinhoe's possession until his death, and are now, I understand, in the British Museum.

I know of no other eggs professedly of this species in Europe, except that which I also exhibit. It is one of four taken, as I am informed, in the spring of 1890 near Tokio in Japan, by Professor Isao Ijima of that University, and given by him to Canon Tristram, from whom I received it in 1891. I cannot doubt that it is correctly referred to this species; and I may describe it as having a pale bluish-green ground, very closely and finely mottled with reddish-brown, the markings near the larger end being in some places confluent, so as to form blotches, while there are traces of pale lavender-grey spots intervening. This egg measures 1·29 by ·86 inch, and is thus, as might be expected, larger than the eggs of most Thrushes, even than those of *T. viscivorus*. Mr. Dresser's specimen, received from Mr. Swinhoe, measures 1·16 by ·9 inch and is of a french white, sparsely spotted with brownish-red, much like some eggs of *T. viscivorus*[1].

CHASIEMPIS SANDVICENSIS (Latham).

Neither Mr. Scott Wilson nor Mr. Perkins on the first visit of each to the Sandwich Islands succeeded in obtaining eggs of this long-described species, though its beautiful nests were known to both. The second attempt of each of these gentlemen was more successful, and Mr. Wilson obtained a considerable series of specimens. I find they measure from ·82 to ·87 by from ·58 to ·62 inch. It would be useless to figure them or to describe them otherwise than by saying that they might pass perfectly for eggs of a *Parus* or *Sitta*. The nests are beautiful structures, almost always built in a three-pronged fork of a bush, and are thickly studded with lichens.

[1] I may note that Dr. Menzbier (Ibis, 1893, pp. 371, 372) considers that *Turdus varius* probably breeds in the Ural Mountains, though it seems as yet to have been found there only after midsummer.

HIMATIONE VIRENS (Latham). (Plate LI. figs. 6, 7.)

I believe that until very recently no egg of any species of the remarkable Family *Drepanididæ* has been known. Whatever doubts may exist as to the extent of that Family, there can be none as to the inclusion in it of the genus *Himatione*. I have therefore great pleasure in exhibiting two eggs of one of the species that have been longest known, *H. virens*. They may be described as being of a french white, rather closely freckled or streaked with purplish-brown, which towards the larger end may form a zone or cap. A specimen obtained by Mr. Wilson measures ·83 by ·58 inch: one obtained by Mr. Perkins at Kona in Hawaii, and thoroughly identified, seems to be a little smaller, but its impaired condition makes exact measurement dangerous. Its fellow-egg had already hatched, and the chick has furnished Dr. Gadow with the means of continuing his investigations. Several other eggs belonging to species of this Family have been brought home by Mr. Wilson, and among them apparently those of *H. mana* and *Vestiaria coccinea*. They exhibit much the same character of coloration, and there is a strong family-likeness in the nests to which they belong. Mr. Perkins has already noticed (Ibis, 1893, p. 106) the nest of the present species; but I may mention the fact that both the Drepanids and *Chasiempis* use to a considerable extent in nest-building "the skeletonized fruit-capsules" of the so-called "Cape Gooseberry" (*Physalis peruviana*), a plant not indigenous to Hawaii—it being, I think, contrary to the general rule for birds to use, except accidentally, materials of foreign origin.

EMBERIZA RUSTICA, Pallas. (Plate LI. figs. 8, 9.)

In the Fourth Edition of Yarrell's 'British Birds' (ii. p. 31) mentioned an egg "professedly" of this species which was in my own collection. The kindness of Mr. Dresser in placing at my disposal some authenticated eggs of this rare Bunting enables me to say that my own specimen has most likely been wrongly named. The two I exhibit were from a nest of five received by him from Herr J. Alb. Sandman, who took them at Kivarijoki, near Pudasjärvi in Finland, on the 5th of June, 1886, and fully identified the species. This Bunting has occurred in Lapland during the breeding-season, and has been more than once believed to breed in that country (*cf.* Yarrell, *ut supra*); but, so far as my knowledge goes, its nest has not before been found in Europe, and it therefore gives me much pleasure to exhibit these genuine specimens of its eggs, which may be described as being of a pale sea-green, with irregular greyish-olive blotches and dashes. They measure respectively ·78 and ·8 by ·57 and ·58 inch.

PODOCES PANDERI, Fischer. (Plate LI. fig. 10.)

Eggs of this very interesting form of bird, the first, according to my knowledge, ever obtained, were procured in Turkestan by Herr Fedtchenko, and exhibited by Professor Cabanis at the annual

meeting of the Deutsche ornithologische Gesellschaft in October 1872, two of them being figured shortly after in the 'Journal für Ornithologie' (1873, p. 63, Taf. iii. figg. 37, 38); but I think it will be admitted by oologists that the figures leave much to be desired in the way of characterization, and I am greatly indebted to Mr. Dresser for allowing me to exhibit one received by him along with two other eggs and the nest from M. Zarudny through Professor Menzbier. It was obtained at Utch Adji in the Transcaspian Province, and, as will be seen, is of a very pale greyish-green, with spots and blotches of brownish-grey and greyish-olive, not much unlike some Pies' eggs or those of *Perisoreus infaustus*, indicating the Corvine affinities of this curious desert-form. It measures 1·07 by ·77 inch. The excellent observations on *Podoces panderi* of M. Zarudny, published in the 'Bulletin' of the Naturalists' Society of Moscow for 1889 (N.S. iii. pp. 455–465, pl. v.), accompanied by figures of its nest, have been most properly quoted by Mr. Dresser in the 'Supplement' to his 'Birds of Europe' (pp. 239–243), and to them I refer for further particulars.

EXPLANATION OF PLATE LI.

Figs. 1–4. Egg of *Tringa subarquata*, p. 890.
5. „ *Turdus varius*, p. 892.
6, 7. „ *Himatione virens*, p. 893.
8, 9. „ *Emberiza rustica*, p. 893.
10. „ *Podoces panderi*, p. 893.

November 30th, 1897.

E. T. Newton, Esq., F.R.S., in the Chair.

Mr. Oldfield Thomas exhibited specimens of a remarkable partially white Antelope of the genus *Cervicapra* which had been obtained by Mr. F. V. Kirby, F.Z.S., in the mountains of the Lydenburg District of the Transvaal, and read the following account of them contributed by Mr. Kirby himself:—

"The specimens of this Antelope which are now exhibited were shot by me on a spur of the Steenkamp Berg, about 12 miles distant and to the west of the township of Kruger's Post; the circumstances under which I procured them being as follows. During the autumn of 1896, whilst I was on the Sabi, making ready for my next expedition to Portuguese East Africa, I received an invitation from Mr. Abel Erasmus, Native Commissioner for the Lydenburg District, residing at Kruger's Post, to ride out to his farm for a shot at 'Rooi Rhébuck,' as the Mountain Reedbuck is styled by Colonists and Boers, it being looked upon as merely a variety of the common Vaal Rhébuck, the only grounds of course for this supposed affinity being the fact that they are usually found on the mountain-ranges in similar localities to those in

which the Vaal Rhébuck occur. The temptation was great, as at that time I had not a single good head in my possession, so naturally enough I accepted at once, and after a ten hours' ride reached Kruger's Post, on the western slope of the Berg. I had good sport, and had already secured several fine heads of the ordinary Mountain Reedbuck, when, in conversation with a Boer who had ridden with me out shooting, I learned that on the summit of a high spur of the Steenkamp range, in the direction of the Steelpoort River, some *white* 'Rooi Rhébuck' were supposed to occur. In answer to my question, he informed me that he himself had only seen the skin of one, a half-grown ewe, which had been caught by a Kafir in a springe. The latter had told him that there were many others in the range, but that the ascent of the range was exceedingly steep and difficult, and could not be managed on horseback.

"The mere fact that so little seemed to be known of this Antelope aroused my curiosity to such an extent, that I did not rest satisfied till I secured the co-operation of three Boers, living in the district, who knew the range, and who agreed to ride out with me to point out the spot. Accordingly one dark dull morning at 2 A.M. we saddled up our horses and set out, but were unfortunately detained for nearly an hour at dawn, owing to a dense, cold fog, which hung over the whole country, and through which it was impossible to distinguish any object at over twenty paces. We were further delayed on the slope of a rocky spur by seeing a troop of seven Mountain Reedbucks galloping away in front of us; we gave chase and eventually shot two of them. After an 'off-saddle' we resumed our course, and at last about 9 A.M. reached the foot of the hill, where we again off-saddled for refreshment and to make our plans for the ascent of the ridge. From the spot where we halted I should judge the summit to be about 1900 ft. high; but the ascent was certainly likely to be very difficult, the whole face of the slope being strewn with huge granite boulders and patches of dense scrub. When confronted with the task before them, two of my companions refused to go any further with me, but Mr. Hendrik Schoeman said he would go, so we once more saddled up and rode up amongst the boulders as far as we could; then handing our horses over to the others, who promised to meet us in the afternoon at a kraal some 5 miles distant, Schoeman and I tackled the ascent, and gained the summit about 2½ hours later. The general appearance of the spur, looking N.E. and S.W., was that of an irregular plateau with a rocky ridge running longitudinally along it.

"One side of the plateau was bounded abruptly by a sheer precipice, while on the other side it sloped off somewhat more gradually towards the Steelpoort in a series of lesser, broken plateaux, thus giving me the idea that it could be more easily ascended from that side. A few scattered 'sugar-bushes' grew in places, and the grass was short and wiry. As our time was limited we decided to hunt the S.W. end of the spur, my companion taking the left,

and I the right side of the stony ridge. Almost immediately upon reaching the level ground over the ridge, I saw a little troop of seven or eight Antelopes run out from a slight hollow on my right front and stand among the stones about 200 yards distant. I had no difficulty in making them out, even at that distance, the snow-white tails and legs being so very conspicuous, and I knew at once that they were some of the 'White Rooi Rhébuck' of which I had heard. I lost no time in putting a shot in, but missed, striking short; as I reloaded, another lot of eight ran out below me, also to the right, stood for a moment, then came cantering up the slope, in a direction that would take them past me at a little over 120 yards. They did not make me out at all, but came leisurely on, a fine ram running third in the troop. I waited till they were almost abreast of me, then fired, hitting the ram hard: he 'pecked' forward, recovered himself, ran 50 yards, and fell dead. The rest ran on over the stony ridge, and I fired at a ewe as she was disappearing; the bullet clopped loudly, and she ran just out of sight and stood. I at once heard my companion's rifle, three shots being fired, and ascertained that he had killed my wounded ewe, and shot another ram which I must have overlooked in the troop. Some time later I heard two more shots, and saw a good ram coming over the ridge towards my side; I ran hard to get within range, but he disappeared behind some rising ground. To my surprise, however, as I ran round the knoll, I saw him standing, looking at me, within fifteen yards; he sprang off at a gallop, and I missed an easy shot. Mr. Schoeman had also missed the same ram and killed a half-grown ewe. During these three-quarters of an hour, however, I saw over thirty of these Antelopes, but they were all out of range; in no case did they attempt to run over towards the 'hang' of the mountain, they either made over towards my companion, ran along the ridge in front of me, or more often broke back, galloping along the broken ground at the edge of the plateau. All were out of range, and I had no wish to fire recklessly at them, as we already had more than we could carry down.

"I am certain that amongst these there was not a single normal coloured individual, for even at a distance the white legs, belly, and tails were most conspicuous. I afterwards saw four, lying down in fairly open ground—first three ewes, then a single ram,—but all jumped up immediately they sighted me. Near the end of the range, which falls somewhat abruptly, we again saw a number of these singular Antelopes running backwards and forwards, so that it would be difficult to state even approximately how many separate individuals we saw altogether between us, but I think I am within the mark in putting the number at between 35 and 40.

"I shot one more, a ram, after a hard run, at just over 200 yards, the bullet breaking his neck.

"I carefully removed the skins of the two largest rams, of the full-grown ewe, and of the young ewe, all of which I saved; and towards evening we made our way down again, each carrying a buck on our shoulders, after placing the other three at a spot

where a native could find them, hanging my handkerchief up in a sugar-bush as a guide.

"I have placed the entire skin and skull of the largest ram, together with the entire skin of the young ewe, and the body-skin of a normal coloured Mountain Reedbuck ram, in the hands of Mr. Oldfield Thomas, to be deposited, after exhibition, in the National Collection.

"Although at present Mr. Thomas is doubtful whether these Antelopes can fairly be considered a new and undescribed permanent variety, I am myself very confident that they will eventually prove to be so. I hope before long to be enabled to confirm my opinion that they occur throughout the highest portion of the range, for I think it most unlikely that they are confined to the comparatively restricted area which we visited, and I only regret that I was prevented from pursuing my investigations further at the time.

"It is scarcely credible that albinism should show itself in this form, though I admit, as Mr. Thomas points out, that the white hoofs lend colour to this supposition. But if this be the case, it is very singular that no intermediate forms showing *less* tendency to albinism—as, for instance, individuals lacking the white spot on the frontal and the pure white tail[1]—have ever been found amongst the normal coloured ones, or even that no such one was either seen or killed by us; and, further, that no normal coloured individual was seen amongst the Antelopes on the summit.

"In conclusion, I propose that, until we are in possession of further details as to the occurrence of this singularly marked Antelope, it should be styled '*Cervicapra fulvorufula subalbina*.'

"As can be seen from the specimens now exhibited, it is in many respects similar to the ordinary Mountain Reedbuck, but differs from it most markedly in having all four legs white from the knees down, white hoofs, a pure white tail both above and below, a white 'kol' or spot on the frontal, and a more or less clearly defined white stripe down the back of the neck and along the dorsal line; while the white of the belly is continued further up the flanks than in the true *Cervicapra fulvorufula*.

"The male specimen in the British Museum may be looked upon as the type of the name suggested."

In conclusion Mr. Thomas expressed the opinion that—whether species, subspecies, or aberration—this Antelope, which had the general characters of a semi-albino, but was practically constant, and in considerable numbers held the entire monopoly of a mountain plateau, presented a problem of the utmost interest to students of Variation; and he was glad to be able to say that Mr. Kirby was now again going out to the same district, and would do his best to obtain further evidence on the subject.

[1] [As a fact, there are some slight differences between the two specimens, and even between the two sides of one of them, but these differences are so slight that it would not be fair to use them as an argument against Mr. Kirby's view.—O. T.]

Mr. Kirby in his remarks had omitted to mention a fact by no means irrelevant to the question, namely that normal Mountain Reedbucks (*Cervicapra fulvorufula*) do not ordinarily inhabit the summits of mountains, but only their lateral cliffs and slopes, and that in the mountains referred to they appeared to range almost or quite as high as usual. The new form would therefore seem to present a genuine difference in habits, as well as in colour.

Mr. Oldfield Thomas exhibited a specimen of a remarkably small Skunk of the genus *Spilogale* which had been received in a collection made by Mr. P. O. Simons in Western Mexico.

It appeared to be undescribed, and was characterized as follows :—

SPILOGALE PYGMÆA, sp. n.

Size very small, barely half that of any known species. Pattern of coloration differing considerably from that found in the other members of the genus, which in this respect were all so like each other that they had formerly been supposed to form but a single species. White of forehead united to the white ear-patches so as to form a band across the face from ear to ear, but in the centre of the face the white did not project forward beyond the level of the eye. Median pair of light dorsal bands grey, not white, and running right through to the rump without interruption by black transverse bands on the posterior back; each was, however, divided for its posterior half by a narrow black longitudinal line commencing at the usual level of the anterior transverse band, and running backwards and afterwards outwards just like that in connection with the transverse line in the other species. Chin white, with two white stripes diverging from it towards the ear-patches. Upper surface of both hands and feet white, in continuation in front with the white lateral stripe, and behind with a white line running up on to the hams; but the inner side of both carpus and tarsus with a large black patch continuous with the black of the belly. Claws rather small, whitish horn-colour. Tail short, with hairs not half the length of the head and body, mixed black and white basally above, white terminally and below, the basal half inch below quite black; longest hairs little over 1½ inch in length.

Skull very markedly of the narrow high-crowned type; crests and ridges exceedingly little developed, the postorbital processes minute; intertemporal breadth greater than interorbital, but this possibly due to parasites being present; brain-case vaulted, very thin, little ridged, the temporal crests scarcely perceptible, and not approaching within 8 mm. of each other. In these respects, as was so often the case in mammals, the old skull of a small species simulated the young one of larger forms. Teeth apparently similar in form to those of the larger species, of which they formed a diminutive copy. Lower jaw not very markedly convex below.

Dimensions of the type, an old female, measured in the flesh by collector :—

Head and body 182 mm.; tail 68; hind foot with claws 34; ear 23.

Skull—basal length (basion to gnathion) 38·2; basilar length of Hensel 36·6; occipito-nasal length 41·5; greatest mastoid breadth 25·8; breadth across postorbital processes 14; interorbital breadth 12; intertemporal breadth 13·2; palate-length from henselion 15; height of brain-case from basisphenoid 15·5; front of canine to back of molar (alveoli) 13·1; length of posterior narial fossa 9·1; distance between outer corners of m^1 16. P^4, length 4·8, breadth 3·3; m^1, outer length 4·4, greatest diagonal diameter 5·6; m_1, length 6.

Hab. Rosario, Sinaloa, W. Mexico.

It would be seen from the description that this remarkable little species differed far more from any of the other species than they did from each other. It was unfortunate that the only specimen was a female, but it being fully adult, with the teeth beginning to be worn and the basilar suture entirely closed, no doubt could exist as to the extremely small size of the species.

Mr. Thomas also exhibited a Badger from Lower California which he considered different from any previously described, and characterized as follows :—

TAXIDEA TAXUS INFUSCA, subsp. n.

Pattern apparently as in *T. t. berlandieri*, Baird, but the general colour as much darker than in that animal as that of *T. t. neglecta*, Mearns, was as compared with *T. t. typica*. Mesial stripe broad and well-marked throughout, from nose to tail, specially broadened on the nape, where it reaches a width of from 1½ to 2 inches. Black cheek-patch not united to orbital patch and only doubtfully connected by grey with the black crown-band. Long hair of back without sub-basal bands, uniformly tawny buff except for the subterminal band of black and tip of dirty white. Tail-hairs similar, except those of the extreme tip, which are blackish brown throughout. Under surface brownish or tawny white; mesial line clear white. No interramial black spot.

Dimensions of the type, an adult male, measured in the flesh :—

Head and body 580 mm.; tail 122; hind foot 94; ear 50.

Skull, basilar length of Hensel 113; greatest breadth 79.

Hab. Santa Anita, Lower California. Coll. D. Coolidge.

Type obtained Aug. 1, 1896. Original number 560. Four specimens examined.

This form appeared to be undoubtedly most closely allied to the Mexican *T. t. berlandieri*, but differed in its darker tones, in the broadening of the dorsal stripe on the nape, and in the entire absence of the black interramial spot.

Mr. Lydekker exhibited skins of a variety of the Mule-Deer from Lower California, for which he suggested the name *Mazama*

(*Dorcelaphus*) *hemionus peninsulæ*. This form differed from *M.* (*Dorcelaphus*) *hemionus californicus*, Caton, in its smaller size, in the simple spike-like antlers, and in the presence of a black line down the middle of the back, which was either almost in continuation with the black tail-tip, or separated therefrom by a ring of tawny hairs. Similar specimens from Cape St. Lucas had been mentioned by Caton, Amer. Nat. vol. x. p. 468 (1876).

Type collected by Mr. D. Coolidge on the Sierra Laguna, Lower California. Original number 327.

Mr. Sclater exhibited a very fine head of the Wild Goat of



Head of Wild Goat from Hadramut.

Hadramut, S.E. Arabia, sent to him for examination by Herr J. Menges of Limburg, being one of the specimens upon which Prof. Dr. Th. Noack of Brunswick had lately founded his *Capra mengesi* (Zool. Anz. no. 510, 1896, and no. 541, 1897). The length of the horns along the upper surface in the specimen was 41·5 inches; the width at the base was about 2 inches, and the depth 3·3 inches.

Mr. Sclater remarked that after an examination of this and other specimens of the same animal kindly lent to him by Herr Menges, he and Mr. Thomas had been unable to appreciate the differences upon which the supposed new species had been founded, and were inclined to believe that *Capra mengesi* was the same as *C. sinaitica*[1], which was known to occur on the western coast of the Red Sea.

Mr. Boulenger exhibited examples of an extremely rare South-American Fish, *Vandellia cirrhosa*, C. & V., a small loach-like Siluroid, of which only four specimens were known to be in collections, viz., three, the types, without locality, received by the Paris Museum in the beginning of this century from the botanist Vandelli, and a fourth, from the Hyayary River, in the Museum of Comp. Zool., Cambridge, Mass.

In his 'Study of Fishes,' Dr. Günther had observed that "the natives of Brazil accuse these fishes of entering and ascending the urethra of persons while bathing, causing inflammation and sometimes death. This requires confirmation."

Dr. J. Bach, a medical practitioner of La Plata, who has recently explored the Rio Jurua, and obtained the specimens exhibited, had supplied Mr. Boulenger with the following information respecting them:—The 'Candyrú,' as the fish is called, is much dreaded by the natives of the Jurua district, who, in order to protect themselves, rarely enter the river without covering their genitalia by means of a sheath formed of a small coconut-shell, with a minute perforation to let out urine, maintained in a sort of bag of palm-fibres suspended from a belt of the same material. The fish is attracted by the urine, and when once it has made its way into the urethra, cannot be pulled out again owing to the spines which arm its opercles. The only means of preventing it from reaching the bladder, where it causes inflammation and ultimately death, is to instantly amputate the penis; and at Tres Unidos, Dr. Bach had actually examined a man and three boys with amputated penis as a result of this dreadful accident. Dr. Bach was therefore satisfied that the account given of this extraordinary habit of the 'Candyrú' is perfectly trustworthy.

Mr. Boulenger further showed a photograph, taken by Dr. Bach, of two nude Indians wearing the protective purse.

Mr. R. E. Holding exhibited a head of a Fallow Deer (*Dama vulgaris*) from the Drummond Castle herd, and made remarks on the specimen as indicating the intimate association between organic disease and defective horn-growth. It had been noticed that for

[1] See P. Z. S. 1886, p. 316, pl. xxxiii.

two or three seasons this buck had been very late in shedding its horns, the new horns being somewhat irregular and remaining a longer time in the velvet stage. This year the horns were again very



Head of Fallow Deer, showing malformation of the horns.

late, and the new growth being very defective the animal was shot on Sept. 13. It would be seen that the right horn was without tines, the palm consisting of three points only. The left horn was only seven inches long, and showed a tendency to division of the beam, the velvet covering being still vascular and the tips of the horns soft. On an examination of the internal organs a large cyst filled with inflammatory fluid was found in the fat surrounding the kidneys, and had doubtless had its origin in those organs. The liver was also much thickened and contained hardened masses of fibrous tissue in its substance. The teeth and jaws indicated caries. Defective horns in Deer were so frequently attributed to bullet

wounds and other injuries, that Mr. Holding thought the specimen exhibited was of some interest as indicating that organic disease might also be a factor in the degeneration of horns.

The following papers were read :—

1. On the Regeneration of the Legs in the *Blattidæ*.

By H. H. Brindley, M.A., St. John's College, Cambridge[1].

[Received September 13, 1897.]

In 1892 Mr. Bateson called my attention to the fact that specimens of the common Cockroach (*Stylopyga orientalis*) are not unfrequently found to exhibit an abnormal condition of the tarsus, or distal portion of one or more of the walking-legs. This abnormal condition is a numerical variation of the tarsal joints, only four being present instead of the normal number, five—the tarsus as a whole, however, presenting in other respects the features proper to the five-jointed or normal condition. Mr. Bateson suggested to me that it might be worth while to investigate in detail this instance of meristic variation.

The particular interest of the case was that the inspection of four-jointed tarsi in a few individuals seemed to point to the conclusion that the relative proportions of the several joints therein were constant. This abnormal tarsus seemed to possess a fixity or organic stability of structure such as is held usually to be the outcome of the continued operation of selection, an influence which can hardly be called upon to account for the condition of an occasional abnormality.

The investigation thus originated called attention to facts other than those bearing directly on the original question concerning which information was sought. The latter have been discussed by Mr. Bateson in his work on Variation[2]. I postpone reference to his conclusions till an account has been given of the observations made before and after his book was published. The present paper is concerned chiefly with certain facts regarding the reproduction of lost or injured legs in the Blattidæ, and with some points in the post-embryonic development of *Stylopyga orientalis*.

The former of these two subjects cannot be considered apart from that of the reproduction of parts among other Insecta and the Arthropoda as a whole. It has therefore seemed more satisfactory to describe separately the results of the observations and experiments originally undertaken for a more circumscribed purpose, leaving the details of reproduction to a future communication.

The leg of the Cockroach resembles that of other Orthoptera, and consists of the following parts: a massive coxa, which is movably articulated with a small trochanter, to which latter is immovably fused a stout femur. The parts distal to the femur are the tibia and tarsus, all of whose articulations are movable.

[1] Communicated by W. Bateson, M.A., F.R.S., F.Z.S.

[2] 'Materials for the Study of Variation,' 1894, pp. 63 & 415.

The femur very frequently, and the tibia always, have a conspicuous armature of spines. The tarsus in all the Blattidæ is five-jointed. The proximal joint is the longest and stoutest, the next much smaller, and the succeeding two very much smaller, while the distal joint approaches the proximal in length and bears a pair of claws. Between the claws many species have a thin rounded projection, the arolium.

In other Orthoptera the number of tarsal joints is 3 in Forficulidæ, Hemimeridæ, and Acridiidæ, 2 or 3 in Gryllidæ, 4 in Locustidæ, and 5 in Mantidæ and Phasmidæ [1].

The occasional occurrence among Blattidæ of tarsi possessing only four joints, but in other respects normal, has been noted by entomologists from time to time.

In the last century Geoffroy [2] specially characterized the genus *Blatta* as having four joints in the tarsi of the posterior pair of legs and five in those of the other pairs, though, in spite of this statement, he figures both sexes with five-jointed tarsi on all the legs. His description was doubtless based on one or two abnormal individuals.

This error was corrected by Serville [3], who does not allude, however, to the occasional occurrence of abnormal tarsi.

A few years later Brisout de Barneville [4] called attention to the occasional presence of four-jointed tarsi in several species of Blattidæ. He gives the following table, in which, as elsewhere in this paper, I have followed the nomenclature of Brunner [5]:—

	Total number of individuals examined.	Number of individuals with one or more of the tarsi four-jointed.
Nyctibora latipennis	1	1
N. sericea	11	5
Epilampra cinerea	10	2
Homalosilpha ustulata	3	2
Periplaneta americana	11	1
Leucophæa surinamensis	51	10
Monachoda grossa	10	1
Blabera atropos	1	1
Panesthia javanica	14	4

[1] Brunner von Wattenwyl, 'Prodr. Europ. Orthop.' 1882.
[2] 'Hist. abrégée des Insectes,' 1764, i. p. 379.
[3] Hist. nat. des Insectes, 1839, p. 58.
[4] Ann. de la Soc. Entom. 1848, sér. 2, vi. Bulletin, p. xix.
[5] 'Nouveau Système des Blattaires,' Vienne, 1865, and "Révision du Système des Orthoptères," Ann. Mus. Genova, 1893, sér. 2, xiii.

Brunner[1] quotes Serville's remarks, and states that he could add a large number of cases. He observes that the abnormal tarsus is usually unilateral and on the posterior legs (*Nyctibora*, *Epilampra*, &c.).

The above-mentioned authors examined only small numbers of individuals, and it was therefore desirable to extend the inquiry as to the frequency of occurrence of abnormal tarsi through greater numbers. This has been done among certain easily obtained species, the total numbers examined being :—

TABLE A.

	Adult.	Young.	Total.
Periplaneta americana	750	180	930
P. australasiæ	230	411	641
Phyllodromia germanica	102	0	102
Stylopyga orientalis	1635	1976	3611

The specimens of *P. americana* and *P. germanica* were obtained from the Society's Gardens, those of *P. australasiæ* from the Botanic Garden, Cambridge (where the egg-cases of this species appear to have been introduced in packets of plants from Kew and South America), and those of *S. orientalis* from Cambridge bakehouses, except 262 captured in a bakehouse at Poole, Dorset. The specimens of *P. americana* and *P. germanica* were caught by hand, and those of the other two species by traps. This probably explains the small number obtained of the young of the two former species, as the larger adults are more easily picked up.

It is possible that some of the young of *P. germanica* were wrongly included as belonging to *P. americana*, for both species occur in the same warm houses in the Society's Gardens.

An examination of these specimens showed the percentage frequency of occurrence of individuals with one or more tarsi four-jointed to be as follows :—

TABLE B.

	Adult males.	Adult females.	Total adults.	Young.	Total.
P. americana	21·8	28·5	25·2	8·3	21·9
P. australasiæ	16·9	23·2	20·0	14·8	16·7
P. germanica	14·9	16·4	15·7	...	15·7
S. orientalis	20·6	21·8	21·4	16·4	18·7

[1] Nouv. Syst. des Blattaires, p. 146.

The examination took no account of the sex of immature individuals, because of the very great difficulty or impossibility of rightly ascertaining it without making a dissection in each case.

In the great majority of cases only one of the six legs bore a four-jointed tarsus, though many individuals possessed the abnormality on more than one leg. This point was examined in detail in rather more than one thousand young and adult individuals of both sexes distributed among three species, with the following result :—

TABLE C.

	Number of four-jointed tarsi in single individuals.						Number of individuals examined.	
	1.	2.	3.	4.	5.	6.		
P. americana	155	36	7	4	1	0	cases	203
P. australasiæ	92	19	4	1	0	0	,,	116
S. orientalis	588	108	23	10	0	4	,,	733

In all four species the posterior pair of legs was the most frequently affected. The following table gives the percentage incidence of four-jointed tarsi among the three pairs of legs :—

TABLE D.

	Pair.	Adult.	Young.	Total.
P. americana	I.	20·3	11·1	19·7
	II.	31·1	33·3	31·2
	III.	48·6	55·5	49·1
P. australasiæ	I.	22·8	30·1	26·9
	II.	21·1	28·8	25·4
	III.	56·1	41·1	47·7
P. germanica	I.	6·2	.....	6·2
	II.	18·7	.....	18·7
	III.	75·0	.....	75·0
S. orientalis.....	I.	26·9	15·7	21·4
	II.	22·9	27·7	25·4
	III.	50·2	56·4	53·2

The abnormal tarsi occurred indifferently on the right and left sides—thus, in 1329 cases in *S. orientalis*, 661 were on the right and 668 on the left side.

Having set forth the preliminary results obtained, it becomes

necessary to state that at first the frequent occurrence of the abnormal tarsus encouraged a belief that it was a congenital variation. This was supported by several features of the case besides the above. It happened by chance that individuals of *P. americana* were examined first. Among these there were several cases where one tarsus of a pair was normal, and the other abnormal; and in these cases the tarsi were of approximately equal dimensions and seemed symmetrical till closely examined. Moreover, as shown by Table B, the abnormality occurred with distinctly greater frequency among females than males.

Finally, the abnormal tarsus was found in three individuals of *S. orientalis* only ·4 cm. in body-length, which is the average size of newly-hatched young.

These facts offer material for discussion, but they must be left for awhile, as the evidence they afford in favour of congenital origin of the four-jointed tarsus seems rebutted by that subsequently obtained—that the abnormality is the form assumed by the tarsus when it is a reproduction taking the place of a lost or injured tarsus.

Cockroaches, like other Orthoptera, attain sexual maturity after performing a series of ecdyses, which in some species probably extend over several years. The power of reproducing lost appendages is known to be possessed by members of several of the tribes of Orthoptera. Among the Blattidæ the reproduction of the antennæ of the Cockroach after amputation was first described by Heineken[1].

The evidence given below appears to establish that the four-jointed tarsus arises in connection with the reproduction of the leg when any part thereof has been lost or severely injured during the immaturity of the animal.

(a) *Absence of abnormal tarsi in newly-hatched individuals.*

A number of egg-cases of *S. orientalis* were collected and artificially incubated, from which altogether 210 young were hatched. In a few cases limbs were found to have been broken off, but all the tarsi of entire limbs were normal.

(b) *Relative infrequency of abnormal tarsi in very young individuals.*

That there was a smaller proportion of abnormal tarsi in young than in adult individuals is shown by Table B. This led to an examination of young of different ages, with the following result:—

388 immature *P. australasiæ*.

Body-length.	Percentage with abnormal tarsi.
Under 1·05 cm.	10·7
1·05 to 2·0 cm.	20·0
2·05 to 3·0 cm.	25·0

[1] "Observations on the Reproduction of the Members in Spiders and Insects," Zool. Journal, 1829, iv. p. 425.

(c) *Evidence from amputation experiments.*

In describing these it will be convenient to employ abbreviations, viz:—

R and L for right and left.

1, 2, and 3 to denote the respective pairs of legs.

t_1, t_2, and so on for the tarsal joints, starting with the proximal joint.

Altogether the legs of 833 immature individuals of *S. orientalis* of various ages were mutilated and the animals confined in cages till ecdysis occurred. The mutilations were easily performed under chloroform, but it was found that recovery did not occur unless fresh air was admitted immediately the Cockroaches fell on their backs and ceased to struggle. Of the total number operated on 103 were mutilated in one leg and 730 in two legs. In the tabular summary of these experiments given below, "reproduction" must be taken to imply that regrowth of the parts removed took place, and that the new tarsi were always in a *four*-jointed condition.

TABLE E.

Nature of mutilation.	Leg mutilated.	Number of mutilations.	Number of reproductions observed.
t_2 torn away from t_1 ...	3 R	300	141
t_1 divided with scissors.	2 L	21	3
	3 L	109	16
	Total	130	19
Tarsus torn away from tibia.....	2 R	300	144
	3 R	89	45
	Total	389	189
Tibia divided with scissors	3 R	14	2
	3 L	300	122
	Total	314	124
Femur torn away from trochanter	1 L	300	137
	2 R	17	4
	3 L	23	11
	Total	340	152
	Total	1473	625

It will thus be seen that about $\frac{5}{12}$ of the mutilations were followed by reproduction of the lost parts accompanied by the appearance of a four-jointed tarsus. The normal five-jointed condition never occurred in reproduction. In only two or three

cases were the reproduced parts at all malformed. These will be dealt with later on. The balance of 848 cases in which reproduction was not observed is accounted for by no reproduction occurring at ecdysis or by death before ecdysis. The recent observation by Bordage[1] that the reproduced tarsus of certain Phasmids is invariably four-jointed is of much interest in connection with the above results.

(d) *Liability to accidental injury in immature individuals.*

The evidence already obtained that the occurrence of the four-jointed tarsus in a captured Cockroach indicates accidental injury in the part, was confirmed indirectly by the examination of 1106 young of *S. orientalis*, when first caught, with the result that ·8 % were found to be imperfect as regards either the whole or portions of one or more legs. This is a considerably lower percentage than that for the occurrence of four-jointed tarsi recorded in Table B, but the importance of the frequent occurrence of imperfect individuals is increased by bearing in mind that reproduction of lost parts may take place at any of the several ecdyses and that, as has been ascertained by observation, when once a four-jointed tarsus has appeared it is perpetuated through the succeeding ecdysis and almost certainly though all subsequent ones up to their cessation on maturity being attained, which accounts for the higher percentage of such tarsi found in adult individuals.

From another point of view the relation of abnormal tarsi to accidental injury in captured individuals is emphasized by comparing Table D with the following results of examining newly captured *S. orientalis* for the distribution of imperfect legs :—

Pair.	92 young.	131 adults.
I.	25 %	20·6 %
II.	32·6 %	19·1 %
III.	42·4 %	60·3 %

The long third pair of legs seems to suffer more from their exposed condition as compared with the less extended anterior pairs, and this was observed to be the case with individuals kept in confinement. The tarsi of these, if subsequently reproduced, were invariably four-jointed.

Newport[2] has noticed a similar special liability to injury in the long posterior legs of *Scolopendra*.

It is of course possible that the four-jointed form of tarsus may be occasionally of congenital origin, but the balance of evidence indicates clearly that in *S. orientalis*, at all events, it is a result of the loss of the normal tarsus.

[1] "Sur la régénération tetramérique du tarse des Phasmides," Compt. Rend. Acad. Sci. séance de 28 Juin, 1897.

[2] "On the Reproduction of Lost Parts in Myriapoda and Insecta," Phil. Trans. 1844.

Numerical variations in the joints of reproduced appendages have been described by several observers in other Orthoptera than the Blattidæ and in certain other groups of the tracheate Arthropoda. As has been pointed out, the phenomena of reproduction of the legs and the special features of the peculiar form of tarsus associated therewith in the Cockroach must be considered with some reference to what is known of the reproduction of lost parts in the Arthropoda generally. The close connection between the phenomena of reproduction of appendages and ecdysis permits the insertion at this place of certain facts noticed during the mutilation experiments already briefly described.

Immediate effects of mutilation.—A drop of blood appeared on the cut or ruptured surface of the leg, but clotted in a minute or two, thus preventing further hæmorrhage. The loss of part or the whole of the leg seemed to inflict mechanical inconvenience only, and an individual which had lost portions of three legs moved about on recovery from anæsthesia with fair activity and resumed its normal habits at once. It was noticed that in nearly all cases the remaining portions of a partially removed tarsus were very soon dropped off, the tibia then terminating the limb. The remaining half of a divided tibia was sometimes dropped and sometimes retained. These losses of parts proximal to the artificially injured region never occurred simultaneously with the inflicted injury. In considering this matter it is necessary to bear in mind the fact that Arthropods of several groups have the power of throwing off their appendages in response to stimuli of various kinds, a phenomenon to which the name autotomy has been given. In Cockroaches there seems to exist a very slight degree of autotomy. If thrown into boiling water they do not snap off their legs as is the case, for instance, with many Spiders. On the other hand, a Cockroach held by a leg not infrequently escapes by its separation from the body when no particularly strong pull is made by the forceps holding the limb, and with a suddenness suggestive of autotomy. Moreover, it was noticed that the break occurs, invariably, either at the tarso-tibial articulation or (and much more frequently) at the suture where femur and trochanter are fused. But if a certain degree of autotomy be admitted, it must be remembered that, in a Cockroach preserved in spirit, a break is effected easily at either of the above-mentioned places, while a strong pull with the forceps is necessary to separate femur and tibia. If the body be held and the tarsus pulled, the break occurs at the femoro-trochanteric suture, while if the femur be held instead, a pull on the tarsus is followed by its separation from the tibia.

I cannot find any record of observation on this point in the Blattidæ, but in the case of the Phasmidæ, Scudder[1] observed that in *Diapheromera* amputation of any portion of a leg distal to the femoro-trochanteric suture was followed by loss before the next

[1] Proc. Boston Nat. Hist. Soc. 1869, xii. p. 99.

ecdysis of the remaining parts up to the suture. Scudder does not speak of immediate loss suggesting autotomy as usually understood, but he states that the regrowth which replaced the lost parts necessarily always commenced from the above place. On the other hand, Bordage [1] describes well-marked autotomy and subsequent reproduction in two other genera of Phasmids as always occurring at the femoro-trochanteric suture. As in the case of the Blattidæ, these observations on the Phasmidæ were on individuals which had not performed their final ecdysis, after which reproduction of lost appendages ceases.

Bordage, who employed different kinds of stimuli for bringing about autotomy, found that the age of the individual, as well as the mode of stimulation, was a controlling factor in the readiness with which autotomy occurred. Heineken [2], early in this century, experimented on the autotomy of the posterior, or jumping, legs in genera of Gryllidæ, Locustidæ, and Acridiidæ; while more recently Frédéricq [3] and Contejean [4] have observed in detail the autotomy of the jumping-legs of *Locusta viridissima*. The experiments of these authors show that the autotomy of the jumping-legs takes place at the femoro-trochanteric suture. [The statement of the last-named that inasmuch as the trochanter is absent in *Locusta viridissima*, the autotomous break occurs between femur and coxa, appears to rest on the fact that in this species the trochanter is telescoped into the coxa in such a manner as to be visible only when the femur is removed. In a spirit-specimen a sharp pull on the femur always leaves the trochanter still attached to the coxa. In connection with this point, as well as with others in the present enquiry, I am indebted to Dr. David Sharp, F.R.S., for much kind advice and assistance.]

The above-mentioned authors, in addition to ascertaining that different methods of injury and stimulation caused autotomy after a shorter or longer latent period, demonstrated that the event is dependent on the integrity of the third pair of thoracic ganglia, and is as truly a reflex action as the autotomy exhibited by the appendages of Decapod Crustacea, or the tail in certain Lizards. In connection with these observations it must be noted that the power of reproducing lost legs is usually supposed to be absent in the Orthoptera Saltatoria. Graber [5] has observed reproduction of the antennæ in *Gryllus* and *Locusta*, but could not obtain reproduction of the tarsi. For further information the writings

[1] "Phénomènes d'autotomie observés chez les nymphes de *Monandroptera inuncans* et de *Rhaphiderus scabrosus*," Comptes-Rendus Acad. Sci. 1897, cxxiv. pp. 210 & 378.

[2] *Loc. cit.* p. 427.

[3] "Les mutilations spontanées ou l'autotomie," Rev. Scientifique, 1886, sér. 3, xii. p. 613.

[4] "Sur l'autotomie chez la Sauterelle et le Lézard," Compt.-Rend. Acad. Sci. 1890, cxi. p. 611.

[5] "Zur Entwickelungsgeschichte und Reproductionsfähigkeit der Orthopteren," Sitzungsb. der Akad. d. Wiss., Math.-naturw. Cl. lv. Bd. i., Wien, 1867; also Ann. & Mag. Nat. Hist. ser. 3, xix. p. 147.

of the above-mentioned authors and those of Durieu [1], Frédéricq [2], Peyerimhoff [3], and Werner [4] may be referred to. More recently, however, Griffini [5], quoting the above in connection with cases he has observed of apparent reproduction of appendages in *Gomphocerus*, *Oedipoda*, and *Pristes*, concludes that, as is the case in the Cursoria, reproduction may not improbably occur during the post-embryonic development of the Saltatoria also.

From these statements it appears that more extended observations would show that among the Orthoptera alone the more immediate effects of injury to a limb differ considerably in the several tribes of the order. While in some genera a slight stimulus may bring about immediate autotomy at a certain fixed place, in others little or no autotomy is observable even when strong means of stimulation, such as amputation of the more distal portions of a limb, are employed, the injury in such cases being followed sometimes by the eventual dropping away of certain portions of the remaining stump, and sometimes by the retention of the entire stump. Again, though the subject of autotomy necessarily bears a close relation to that of reproduction of lost parts, there seems to be no direct ratio between the degree of autotomy exhibited and the power of reproduction possessed in any particular case.

More or less parallel are the diverse results obtained from mutilation of the limbs in different genera of Arachnida recorded by Heineken [6], Blackwall [7], Parize [8], and Frédéricq [9], to whose work fuller reference will be made later on in connection with the phenomena of reproduction of the lost parts.

Mortality in confinement.—About 25 % of the 833 mutilated individuals died before accomplishing an ecdysis. Apparently this mortality was not due to the injuries inflicted, for it was not excessive in the period immediately following mutilation, but occurred at a steady rate throughout the experiment. The animals were kept in three glass-fronted boxes $24 \times 8 \times 10$ inches in size, and provided with narrow dark shelters imitating the crevices haunted by Cockroaches when at large. The boxes remained throughout the experiment in a room kept at a temperature of 16° C. It is very possible that these arrangements reproduced the natural habitats too imperfectly and that overcrowding, or want

[1] "Notes sur quelques Orthoptères," Petites Nouv. Entomol. 1876, no. 158.

[2] *Loc. cit.*; also 'La Lutte pour l'existence chez les Animaux Marins' (Paris, 1889), p. 259.

[3] "Note sur l'atrophie des membres chez les Orthoptères," Miscellanea Entomologica, 1895, iv. p. 70.

[4] "Selbstverstümmelung bei Heuschrecken," Zool. Anzeiger, 1892, Jahrg. xv. p. 58.

[5] "Di un *Pristes tuberosus* anomalo," Boll. de Musei di Zool. ed Anat. Comp. Torino, 1896, xi. no. 234; also "Di due Acrididi anomali," *ibid.* xi. no. 256.

[6] *Loc. cit.*

[7] "Report on some recent Researches into the Structure, Functions, and Economy of the Araneidea made in Great Britain," Brit. Assoc. Rep. 1845, p. 62.

[8] "L'amputation réflexe des pattes des Crustacés," Rev. Scientifique, 1886, sér. 3, xi. p. 379.

[9] *Loc. cit.*

of sufficient space for running about, was the chief cause of this degree of mortality. That it was abnormally high seems probable, especially in view of the facts which will be mentioned later on, concerning the hatching of the egg-cases. Moreover, though Cockroaches once established in a building may become extremely numerous, their slowness in spreading in the neighbourhood is well known, and it is probable that we by no means understand what conditions are most favourable to this imported species. I succeeded, however, in maintaining a few individuals in health for nearly two years and one lived for rather over that time, and eventually escaped from confinement. Bread and cake were always readily eaten, but the animals seemed to pay no attention to a moist sponge always kept in the cages. With large numbers in one cage it was impossible to observe how often any one individual made a meal, but Dr. Sharp [1] has called attention to the very small amount of food that is required to maintain a Cockroach in good condition, and that many weeks of starvation seem to make little difference to the animal. In the case of my own Cockroaches, a weak individual was never attacked by his companions, but the soft parts of the dead were soon devoured, as were all cast skins not removed from the cages. These latter were certainly not always eaten by their owners, though occasionally they were.

Occurrence of the Ecdyses.—On this subject the monograph of Miall and Denny [2] contains the following statement in quotation of Cornelius [3] :—"The first change of skin occurs immediately after escape from the egg-capsule, the second four weeks later, the third at the end of the first year, and each succeeding moult after a year's interval. At the sixth month the insect becomes a 'pupa,' and at the seventh (being now four years old) it assumes the form of the perfect insect. The changes of skin are annual and, like fertilization and oviposition, take place in the summer months only. These statements are partly based on observations of captive Cockroaches, and are the only ones accessible; but they require confirmation by independent observers, especially as they altogether differ from Hummel's account of the life-history of *Blatta germanica*, and are at variance with the popular belief that new generations of the Cockroach are produced with great rapidity."

The observation of Hummel [4] referred to is that *Phyllodromia germanica* performs six ecdyses between April and September, and becomes adult within seven months from hatching out of the egg-capsule. My own observations on the post-embryonic development of *S. orientalis* may now be described.

In the first place great difficulty was experienced in obtaining

[1] Cambr. Nat. Hist. v. p. 229.

[2] 'The Structure and Life-history of the Cockroach (*Periplaneta orientalis*)' (London, 1886), p. 23.

[3] 'Beiträge zur näheren Kenntniss von *Periplaneta orientalis*.' Elberfeld, 1853.

[4] "Quelques observations sur la Blatte germanique." Essais Entomologiques. I. St. Pétersbourg, 1821.

undoubtedly newly hatched individuals. Between 500 and 600 egg-capsules were collected from bakehouses and kitchens in Cambridge, very many of them immediately after deposition by the females.

At first they were placed in an incubator in the Zoological Laboratory in a constant temperature of 38° C., but so little success attended this method that the capsules obtained later were left undisturbed, as nearly as possible in the exact spots where they had been deposited. But from the whole number of capsules observed, only 20 hatchings were obtained, the total number of young thus raised being 210, an average of 10·5 young from each capsule, which in this species normally contains 16 embryos.

If this observation may be regarded as resting on a fairly sufficient number of instances, it would seem that a large proportion of the egg-cases deposited do not hatch out, and also that some of the young in those that do hatch never appear. As all the cases that hatched did so within a few days after deposition, while the others examined long after were invariably found to be quite brittle and dried up inside, it seems unlikely that the non-hatching of the greater number observed was merely a result of allowing insufficient time for hatching to take place. If this view be accepted, it affords a partial explanation of the well-known tardiness with which this species spreads.

With regard to the time of year when ecdysis occurred, the following observations were made. The mutilated Cockroaches commenced living in captivity during the first three months of the year. The dates of 235 observed ecdyses were distributed thus:—

March.....	4	ecdyses.
April	12	„
May	18	„
June	92	„
July	72	„
August	33	„
September	4	„

That the number of ecdyses during the maximum period increased rather more rapidly than it declined, is apparent from the following:—

May, 3rd week.....	4	ecdyses.
„ 4th „	8	„
June, 1st „	12	„
„ 2nd „	42	„
„ 3rd „	21	„
„ 4th „	17	„
July, 1st „	23	„
„ 2nd „	22	„
„ 3rd „	10	„
„ 4th „	17	„

The dates when ecdysis occurred indicated no relation with either age or sex, and the final ecdyses at which the adult condition commenced were distributed over the whole period in the same ratio as those of still immature individuals.

The statement by Cornelius, that the post-embryonic development of *S. orientalis* extends over several years, received distinct confirmation from my observations, though to a very imperfect extent, as the purpose for which the immature individuals were kept in captivity was not primarily connected with their life-history, and consequently they were usually removed and placed in spirit when they had completed a single ecdysis. With regard to the statement that an ecdysis is performed immediately on leaving the egg-case, I failed to observe the actual emergence of the young therefrom, though in several cases I examined them within twenty-four hours of their hatching out. With these I could find no trace of cast cuticles, nor did any ecdysis occur for a week succeeding the examination. It is quite possible, however, that ecdysis did occur almost simultaneously with hatching, and that the cuticles shed were speedily devoured, as the young of this species commence to feed within a few hours of hatching. As already mentioned, the four-jointed form of tarsus was found in young only ·4 cm. in body-length, which appears, from measurements I have made, to be the length of newly hatched individuals. Whether or not such very young individuals could have lived long enough to suffer loss of a tarsus, perform ecdysis, and reproduce the lost part it is not possible to decide.

As regards the statement that two further ecdyses are performed in the first year, I was able only to ascertain that individuals of less than half the adult size may cast their cuticle twice within five months. This observation was made on eleven individuals which performed an ecdysis in April or May. These were isolated from the others and were observed to again shed the cuticle on different dates between June 7th and August 21st. The body-length of these individuals ranged from ·6 to ·95 cm. after the second ecdysis noted (the mean length of an adult being 2·1 cm.). The shortest time between two ecdyses observed was forty-three days (April 25th to June 7th). More than two ecdyses were not observed in a single individual, even among the several which were kept in captivity for about two years. It is, however, quite possible that an ecdysis occurred occasionally without being detected, as during certain weeks the animals were looked at only every other day. So far as these observations go, it will be seen that they confirm the statement of Cornelius that the post-embryonic development of this species is relatively long.

The Act of Ecdysis.—The mode of shedding the cuticle is described and illustrated by Miall and Denny[1], to whose account it may be added that the whole process usually lasts for two or three hours, though sometimes the crumpled mass of cast

[1] *Op. cit.* p. 32.

cuticle remains adhering to the hinder end of the abdomen for more than a day after. Coloration of the new cuticle commences as blotches on the dorsal surface and extends gradually to the outlying parts, the extremities of the limbs becoming completely coloured by the end of the third day after ecdysis. The animal remains unusually still during this period and eats very little, apparently not at all during the first day.

Loss of Appendages during Ecdysis.—Five cases were observed in which normal, and apparently uninjured, tarsi were broken off during ecdysis. This may result from a struggle to free the leg during its sliding away from inside the old cuticle. As already pointed out, the region where a break in the leg occurs most easily is the suture between the femur and trochanter, so that these occurrences of a break at a normally stronger point may perhaps be accepted as an indirect argument that there is a certain degree of autotomy in the usual rupture between femur and trochanter.

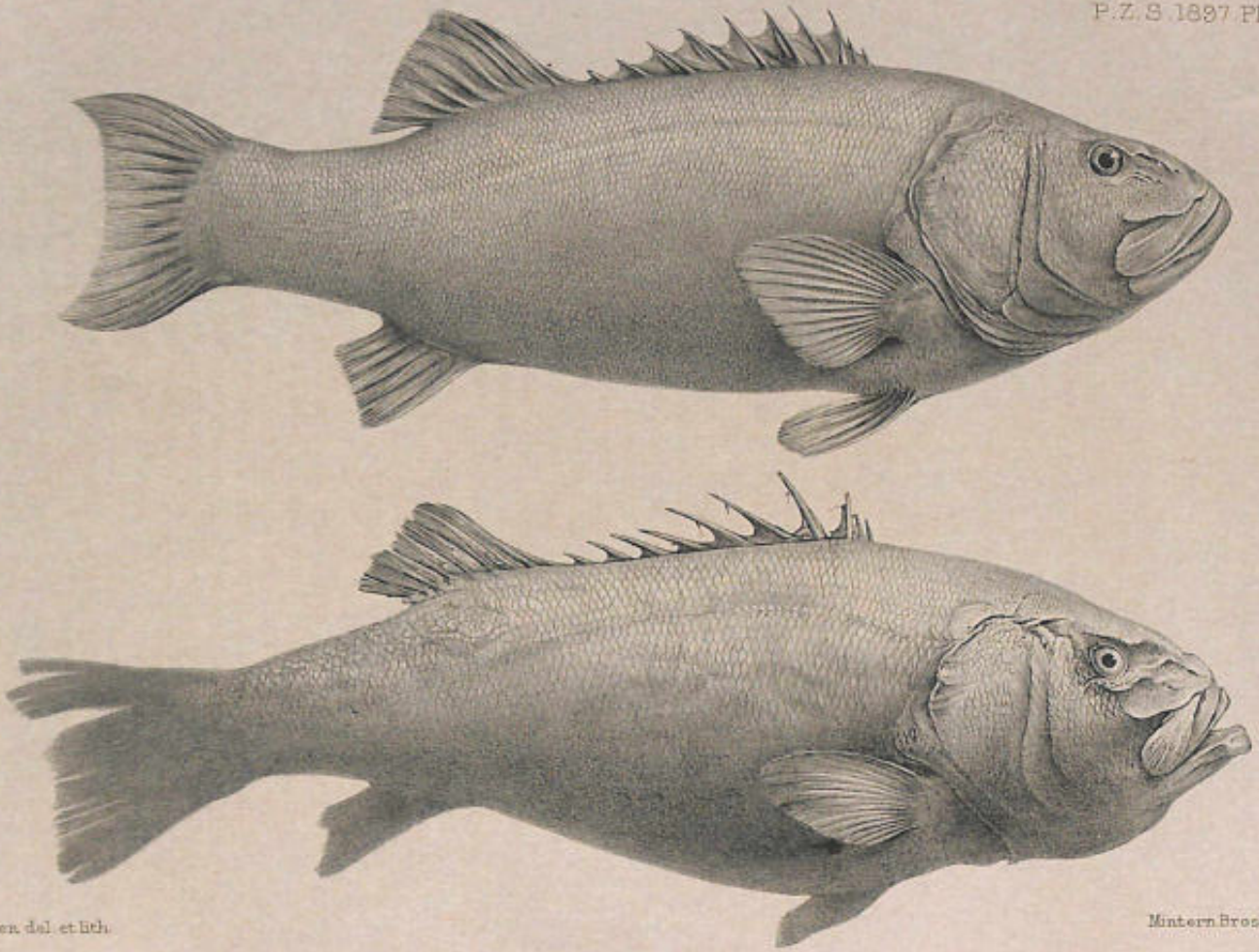
Note on the Numerical Proportion of the Sexes.

Among the whole number of adult specimens collected for the purposes of the present enquiry, the actual and percentage distribution of the sexes were:—

	Male.		Female.	
P. americana	371	49·5%	379	50·5%
P. australasiæ	118	51·3%	112	48·7%
P. germanica	47	46·1%	55	53·9%
S. orientalis	505	30·9%	1130	69·1%

As the habits of the two sexes are similar, the above is probably a fairly accurate indication of their usual numerical proportion, except possibly in the case of *Phyllodromia germanica*.

In a future communication I hope to give an account of the structure of the reproduced leg with special reference to the four-jointed tarsus, and also of certain cases in which apparently reproduced tarsi were found to be in a three-jointed condition.



J. Green del. et lith.

Mintern Bros. imp.

STEREOLEPIS GIGAS.

2. On a Gigantic Sea-Perch, *Stereolepis gigas*.

By G. A. Boulenger, F.R.S.

[Received September 30, 1897.]

(Plate LII.)

Since the publication of the first volume of the new Catalogue of Fishes, the Trustees of the British Museum have acquired, through the kind mediation of Prof. C. H. Gilbert, two specimens of the little-known *Stereolepis gigas*, Ayres, from the coast of California. I am thus enabled to supplement our knowledge of this fish, especially with regard to the skeleton, of which nothing was known beyond the statement, by Hilgendorf, that Japanese specimens (*Megaperca ischinagi*, Hilg.) have 12+14 vertebræ.

The conclusion arrived at from a comparison of the descriptions, that *Megaperca ischinagi* is specifically identical with *Stereolepis gigas*, is confirmed by the study I have made of these specimens and their comparison with a photograph of the type of the former species, preserved in the Berlin Museum, for which I am indebted to the kindness of Prof. Hilgendorf. I must particularly insist on this point, since my identification has not been accepted by Jordan and Evermann, who in their 'Fishes of America' published 1896, agree with me only in so far as the generic identity goes, remarking that "Mr. Boulenger is probably in error in placing this Japanese species [*Megaperca ischinagi*] in the synonymy of *Stereolepis gigas*." These authors, however, do not seem to have examined many Californian specimens, nor to be aware of the range of their variations, since they ascribe to them "ventrals long, reaching vent," whereas the large specimen before me has these fins rather short and widely separated from the vent, just as in the Japanese specimen in the Berlin Museum.

I will first proceed with a short description of the external characters from the larger Californian specimen, 1·4 metres long, and add a few notes taken from the photograph of the nearly equally large (over one metre) Japanese specimen. The account of the skeleton which follows is drawn up from a specimen 9 decim. long, with the vertebral column somewhat malformed in its caudal portion.

Depth of body nearly equal to length of head, $3\frac{1}{4}$ times in total length. Crown flat; snout convex, $2\frac{1}{2}$ diameter of eye, which is 7 times in length of head and $2\frac{1}{2}$ in interorbital width; lower jaw projecting; maxillary extending to below centre of eye, the width of its distal extremity nearly equalling diameter of eye. Greater part of head scaly; maxillary naked; præopercle finely serrated; no opercular spines, they becoming worn and blunt with increasing age. Gill-rakers strong, longest as long as gill-fringes, 8 on lower part of anterior arch. Dorsal XI 9; originating immediately behind vertical of axilla; spinous and soft portions confluent but deeply notched, the former twice as long and only half as deep as the latter; 5th–7th spines subequal, longest, $\frac{1}{4}$ length of head. Pectoral asymmetrical, rounded, with

20 rays, $\frac{1}{2}$ length of head. Ventral slightly shorter than pectoral, measuring $\frac{1}{4}$ the distance between its base and the origin of the anal. Latter short, III 8, originating below middle of soft dorsal; spines adnate, very indistinct. Caudal feebly notched, middle rays $\frac{2}{3}$ length of outer. All the soft fins covered with very minute scales. Caudal peduncle $1\frac{1}{4}$ as long as deep. Scales rough, 115 $\frac{15}{40}$; lat. l. 80. Uniform blackish brown.

A comparison of these notes with Hilgendorf's description shows agreement on all points save the number of soft dorsal rays, which is ascribable to mere individual variation, since other Californian specimens have 10 rays just as in the Japanese. The resemblance with the photograph further confirms the probable identity; the curious shape of the head, the proportions of the body and fins, even the slightly emarginate caudal and the indistinctness of the anal spines are the same in both, as any ichthyologist may convince himself on inspection of the plate appended to this paper. The scales are a little larger in the Japanese specimen, but this difference appears to me to be within the limits of individual variation, as ascertained in the gigantic Perches of the genera *Polyprion* and *Epinephalus*. The stronger angles of the caudal in the Californian specimen do not seem to afford a reliable character since Jordan and Evermann describe the fin as "nearly truncate."

Skull very similar to that of *Polyprion*, to which genus *Stereolepis* is nearer allied than to any other. Ascending processes of præmaxillaries short, not extending to the frontals, which are large, broad, rugose but without crests; parietal and supraoccipital bones not extending forwards to between postfrontal processes; supraoccipital crest low; second suborbital bone developing a subocular lamina which is longer than broad and rounded behind; supplemental maxillary bone well developed, half the length and one-third the width of the maxillary. Jaws, vomer, and palatines with villose bands of minute sharp teeth.

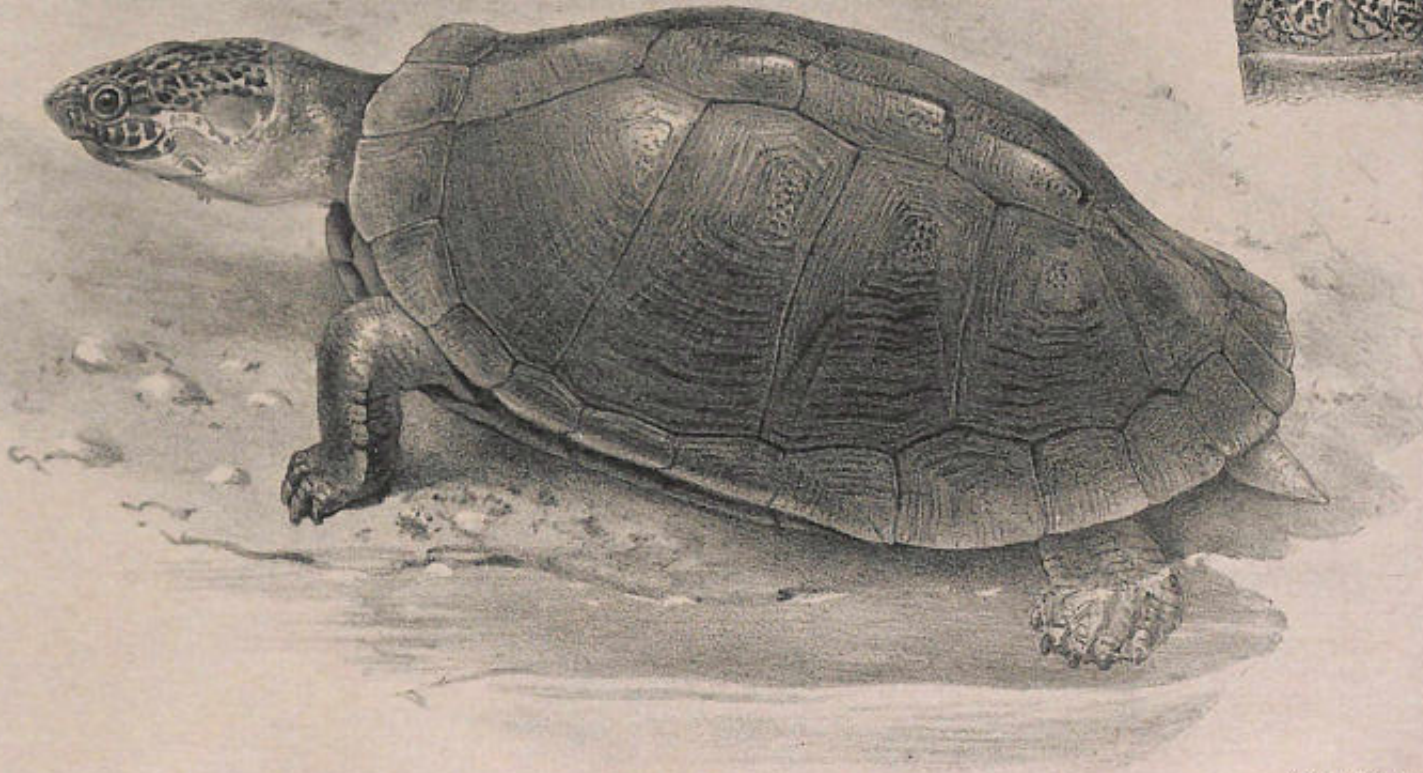
Vertebræ 12+14. First and second with slender epipleurals attached to the neural arch; third, fourth, and fifth with strong sessile ribs with epipleurals attached at a considerable distance from their base; from the sixth vertebra, the ribs are borne by parapophyses which gradually increase in length; the last three præcaudal parapophyses connected ventrally by a bridge; the last two epipleurals attached to the parapophyses of the eighth and ninth vertebræ. Ribs much dilated, especially the last three, with broad inner crest. First interhæmal suspended from the first caudal vertebra.

The vertebral formula, as tabulated on p. 115 of the 'Catalogue of Fishes,' is as follows:—

A.	B.	C.	D.	E.	F.	G.	H.
26	12	2	4	0	6	3	14

Two specimens are represented in the drawing now exhibited (Plate LII.), the upper figure being taken from the stuffed Californian specimen described above, the lower from a photograph of the type of *Megaperca ischinagi*, from Japan, preserved in the Berlin Museum.





P.J.Smit. del. et lith.

Mintern Bros. imp.

STERNOTHÆRUS OXYRHINUS.

3. Description of a new Tortoise of the Genus *Sternothærus*.

By G. A. Boulenger, F.R.S.

[Received October 6, 1897.]

(Plate LIII.)

Among some living Tortoises from the Society's Gardens, recently submitted to me for identification, there was a specimen of *Sternothærus*, received on deposit on September 30th, which does not fall into the definition of any of the species hitherto described. Its locality is unfortunately unknown, but as it was accompanied by specimens of *Sternothærus adansoni* it probably came from some part of Tropical Africa.

Sternothærus oxyrhinus, sp. n. (Plate LIII.)

Carapace rather elongate, not serrated behind, with an interrupted keel terminating in a low knob on the second, third, and fourth vertebral shields; second and third vertebral shields as long as broad, fourth a little longer than broad; dorsal shields feebly areolate. Intergular shield large, twice as long as broad; suture between the abdominal shields once and two-thirds as long as that between the femorals, which equals that between the anals; pectoral shields forming together a very short suture; outer border of the pectoral shields much shorter than the humerals, equalling the length of the inner border of the latter shields. Hind lobe of plastron as broad as the front lobe, which is freely movable, with moderately deep crescentic notch posteriorly. Head large, triangular; snout as long as the orbit, pointed, strongly projecting; nostrils not visible from above; upper jaw neither hooked nor bicuspid; suture between the frontal shields a little longer than interorbital width, equal to length of mandibular symphysis. Two rather long mental barbels. Shell black; head black above, with yellowish-brown marblings; labial region yellow, with black vertical streaks; upper surface of neck, forearm and hand, and upper surface of leg and foot dark brown; the rest of the soft parts carneous white. Iris dark grey.

Length of shell 165 millimetres.

This species is nearest related to *S. derbianus*, from which it is well distinguished by the pointed and more prominent snout.

December 14, 1897.

Lt.-Col. H. H. Godwin-Austen, F.R.S., Vice-President, in the Chair.

The Secretary read the following report on the additions made to the Society's Menagerie during the month of November 1897:—

The registered additions to the Society's Menagerie during the month of November were 130 in number. Of these 59 were acquired by presentation, 33 by purchase, 35 were received on deposit, and 3 were bred in the Gardens. The total number of departures during the same period, by death and removals, was 139.

Amongst the additions special attention may be called to a young male Gazelle from Djiboutil, Abyssinia, presented by Dr. L. de Gébert on November 17th, which appears to be referable to Speke's Gazelle (*Gazella spekii*), being the first individual of this species received alive by the Society.



Head of *Gazella spekii*, ♂ jr.

I exhibit a drawing of the head of this animal, showing the protuberance of the nose, which is perceptible even at this young stage.

Mr. G. A. Boulenger, F.R.S., read the following note:—"In order that I might satisfy myself as to the possibility of the small fish *Vandellia cirrhosa* penetrating into the human urethra (see above, page 901), Prof. C. Stewart kindly took me to St. Thomas's

Hospital on the 7th inst., when I was able to introduce without difficulty a no. 12 catheter, 5½ millim. in diameter, into the urethra of a male subject lying for post-mortem examination. The calibre of the fish being only 3 to 4 millim., no doubt can be raised as to its being able to enter the orifice of the urethra in the manner that has been described by various travellers in Brazil."

A communication was read from Dr. E. A. Goeldi, C.M.Z.S., Director of the Pará Museum, on his recent discovery of Lepidosiren (*Lepidosiren paradoxa*) on the Lower Amazon. From 1894 up to the date of his paper he had obtained five specimens, of which one had been found in the island of Marajó at the mouth of the river, one near Santarem, and the remaining three in the neighbourhood of Obydos. One of the specimens from Obydos was alive, and Dr. Goeldi had been able to keep it under observation for about four months.

Of the five specimens, four were females, the fifth and male showing on its one remaining hind limb the peculiar papillæ described and figured by Prof. Lankester in the Society's 'Transactions.' Dr. Goeldi gave the dimensions of his specimens and alluded to the asymmetric position of the cloacal opening. As regards colour, amongst living animals, he believed, brown predominated, and he was of opinion that the great variation in the colour of preserved specimens was due to the action of alcohol. The limb-axis was found to be distinctly segmented.

The lateral-line system was shortly described. On each side of the body were three lines, of which the middle and lower ones were fairly continuous, the dorsal one consisting, on the other hand, of a series of short vertical lines one behind the other. What the precise relations of these were to the general metamerism of the animal Dr. Goeldi was unable to say.

In regard to the creature's habits, Dr. Goeldi stated that it was an inhabitant of submerged regions where the water was comparatively shallow. In the dry season it was found in small pools left by the retiring waters, and there it was fond of performing violent movements, lashing the water with its tail. In the dry season there was little doubt that the Lepidosiren remained hidden in the lower regions of the mud. The specimen in captivity had not been seen to feed, though offered a variety of food. It came to the surface at intervals to breathe in air, the intervals being shorter in a smaller and longer in a larger tank. The surface of the body gave off a gluey material, which formed whitish flakes in the water. In habits the creature was sluggish, unless disturbed, and then it performed elegant and varied evolutions in the water.

Dr. Goeldi's memoir will be published in full in the Society's 'Transactions.'

Mr. J. Graham Kerr, F.Z.S., gave a short account of his recent expedition to the Gran Chaco of Paraguay with the object of investigating the development of Lepidosiren. He was accompanied by Mr. J. S. Budgett, of Trinity College, Cambridge, and was assisted

by a grant from the Balfour Fund of Cambridge University. The two travellers left England in August 1896 and proceeded to Asuncion, the capital of Paraguay. From there they ascended the river Paraguay to a point slightly above the mouth of its affluent, the Aquidaban, and then struck out in a nearly westerly direction into the interior of the Chaco. They had as their objective a point named Waikthlatingmayalwa, where two English missionaries resided, and where Lepidosiren was in considerable abundance. Having arrived at this point they made it their headquarters for the next few months, Mr. Kerr devoting himself to the study of Lepidosiren, Mr. Budgett to general zoology, more especially to the Batrachians.

A short description of the habits and habitat of Lepidosiren was given, together with an outline of the more salient features in its development.

In size the specimens met with ranged up to 105 cm. in total length, the females being markedly larger on the average than the males. In numbers the two sexes appeared about equal, although from the manner of catching them more females were actually obtained. The ground-colour was extremely variable, as a rule very dark, nearly black, but with a greater or less extent of pale mottling, especially ventrally. Occasional specimens showed a deep brown in place of the usual slaty-black colour. The skin secreted a copious mucus which rapidly precipitated mud in suspension in the water. The males during most of the year showed the papillæ described by Lankester, but at the breeding-season these grew out into blood-red filaments one or two inches in length.

The eggs were large (7 mm. in diameter) and laid in an underground burrow, and apparently usually guarded by the male. The segmentation was in its later stages complete, but very unequal. The gastrulation recalled that of the Lamprey and of Amphibians. Eventually there hatched out a tadpole-like larva, devoid of pigments, the horny egg-shell undergoing a process of digestion before splitting. The larvæ were remarkable for the extremely well-developed sucker and the large external gills (strikingly Amphibian features said to be absent in *Ceratodus*). The external gills were four in number on each side. About six weeks after hatching the external gills atrophied, as did also the sucker; the creature assumed a much darker, almost black colour, and its habits became much more active. The young Lepidosiren remained in the nest till about 60 mm. long. For nearly three months it lived on the yolk in the walls of the enteron, but did not eat at all. About this time yellow spots appeared on the larva, and it remained so spotted till over one foot in length.

The young Lepidosirens had proportionally larger limbs than the adult, and used them much in irregular alternation in clambering through the mud.

A remarkable point was that during the night the black chromatophores all shrank up, so that the creature was of a nearly pure white with round yellow spots.

In habits the Lepidosiren was sluggish, wriggling about amongst the dense vegetation. It was in most cases nearly blind, merely distinguishing light and shade, and was very sensitive to vibrations in the water. It fed on large ampullarias and on masses of confervæ &c.

On the approach of the dry season it ceased to eat entirely: the muscles especially of its tail underwent fatty degeneration. It became sluggish in its habits, remaining in its burrow, and as the waters completely dried up it remained in the mud, breathing air by means of an air-hole.

The following papers were read:—

1. On a small Collection of Lepidoptera made by Mr. F. Gillett in Somali-land. By A. G. Butler, Ph.D., F.L.S., F.Z.S., &c.

[Received October 19, 1897.]

Examples of the following species were collected by Mr. F. Gillett in Somali-land during the present year (1897), and, although unhappily in poor condition, owing to the fact that they were attacked by mites, are of interest as adding to our knowledge of the Lepidopterous fauna of that country. No new species are represented in the collection.

RHOPALOCERA.

1. Limnas chrysippus, L.

Vars. *L. klugii* and *L. dorippus*.
Beichen, 22nd January, 1897.

2. Melanitis ismene, Cr.

Berbera, 13th January.

3. Charaxes achæmenes, Felder.

Dimoley, 23rd January.

4. Charaxes kirkii, Butler

♂, Dimoley, 23rd January.

5. Junonia sesamus, Trimen.

Sheik, 26th January.

6. Junonia boopis, Trimen.

Sheik, 26th January.

7. Junonia taveta, Roghf.

Dimoley, 23rd January.

8. Hypolimnas misippus, L.
♂ ♂, ♀ ♀, Dhobar, 21st, and Beichen, 23rd January.

9. Byblia acheloia, Wllgr.
Locality not on specimen.

10. Byblia ilithyia, Drury.
Dimoley, 23rd January.

11. Acræa bræsia, Godman.
Sheik, 26th January.

12. Pardopsis punctatissima, Boisd.
No exact locality recorded on specimen.

13. Azanus jesous, Guérin.
No exact locality noted.

14. Tarucus theophrastus, Fabr.
Sooksooder, 3rd January.

15. Castalius lactinatus, Butler.
No special locality recorded of this rare little species.

16. Hyreus ? sp.
Too much worn for identification.

17. Zeritis perion, Cramer.
No exact locality noted.

18. Myrina ficedula, Trimen.
No exact locality noted.

19. Spindasis bellatrix, Butler.
Beichen, 22nd January.
The type was described from Suakin.

20. Mylothris agathina, Cramer.
♀, Sooksooder, February 6th.

21. Teracolus calais, Cramer.
Beichen, 22nd January.

22. Teracolus phisadia, Godt.
No exact locality noted: the species is new to Somali-land.

23. Teracolus phillipsii, Butler.
Beichen, 22nd January.

24. Catopsilia florella, Fabr.
Dimoley, 23rd January.



J. Smit del. et lith. Mintern Bros. imp.

FUNISCIURUS LUCIFER.

25. Belenois mesentina, var. lordaca, Walker.

Dhobar, 21st, Beichen, 22nd January; Berbera, January.

26. Sapæa paradisea, var., Butler.

Dimoley, 23rd January.

27. Rhopalocampta anchises, Gerst.

Dhobar, 21st January.
Apparently a common species.

HETEROCERA.

All of these excepting one are referable to the *Noctuæ*.

28. Agrotis sp. (too bad for recognition).

Dhobar, 21st January.

29. Achæa melicerte, Drury.

Dhobar, 21st January.

30. Sphingomorpha monteironis, Butler.

No special locality recorded.

31. Orthodes tirhaca, Cramer.

Goolis Mountains, Galeed, 13th February.

32. Avatha leucoptera, Hampson.

Beichen, 22nd January.

33. Casama vilis, Walker.

Beichen, 22nd January
This is a *Liparid*.

2. On the Mammals obtained by Mr. A. Whyte in Nyasaland, and presented to the British Museum by Sir H. H. Johnston, K.C.B.; being a fifth Contribution to the Mammal-fauna of Nyasaland. By Oldfield Thomas.

[Received October 25, 1897.]

(Plate LIV.)

In June and July 1896 Mr. Alexander Whyte, the well-known collector, made an expedition into Northern Nyasaland for the purpose of investigating the fauna of that part of the territories administered by Sir Harry Johnston. The expedition proved remarkably successful, for besides the large number of specimens of other groups obtained, Mr. Whyte brought back the fine collection of mammals of which the present paper gives an account.

The chief localities where Mr. Whyte collected were the Nyika Plateau (about 10° 30′ S., and 33° 30′ E.), the Masuku Plateau, slightly further northwards, and Fort Hill (about 9° 40′ S., 33° 20′ E.), these localities all lying just to the west of the north end of Lake Nyasa, and at altitudes of from four to seven thousand feet. A few odd specimens were also obtained at Karonga and Ruarwe on the lake shores.

I have also included in the list some few additional specimens from Zomba and the south end of the lake, and among others the very interesting results of a trip made by Mr. Whyte to Mount Malosa, just north of Mount Zomba, in November, where he obtained examples of several species not previously recorded from Nyasaland.

Now that Mr. Whyte has retired from his labours in the tropics, it is only fitting that in this, the last paper that will appear on his Mammals, special reference should be made to the great value of the services he has rendered to zoology in general, and to our knowledge of mammals in particular, and to the way in which, during the past six years, he has utilized the opportunities given him by the generosity and public spirit of Sir Harry Johnston.

As in previous papers, a few specimens are included which the Museum owes to other members of the Nyasa Administration, notably to Mr. Alfred Sharpe, and now that Mr. Sharpe has succeeded to Sir Harry Johnston's post, we may hope that by his help our knowledge of the riches of the Nyasa Protectorate will still continue to increase.

The northern region visited by Mr. Whyte proves to have a very close affinity with that explored by the German travellers Böhm, Reichard, and Kaiser south and south-west of Lake Tanganyika, the mammals collected by whom were worked out by Dr. Noack. Thus Mr. Whyte has obtained examples of several characteristic species described from their collections, notably *Rhynchocyon reichardi* and *Gerbillus böhmi*, both of which are forms quite new to the fauna of Nyasaland.

The following is a list of the new species contained in the present collection, those marked with an asterisk having been described in a previous preliminary communication[1] to the Society:—

Macroscelides brachyrhynchus malosæ.
Crocidura lixa.
Myosorex sorella.
**Funisciurus lucifer.*
Graphiurus johnstoni.
**Mus nyikæ.*
**Saccostomus elegans.*
**Georychus whytei.*
**Thryonomys sclateri.*

[1] *Suprà*, pp. 430–433. See "Abstract of Proceedings" for May 4th, 1897 (published May 7th).

1. Cercopithecus albigularis moloneyi, Scl.

a, *b*. Giant Forest on top of Masuku Plateau, 7/97.
c, *d*. 2 fœtus in spirit. Ditto.
e–*g*. No exact localities.

2. Colobus palliatus, Pet.

a–*c*. Skins. No exact localities.

2 *a*. Colobus, sp. inc.

a, *b*. 2 young skins, bought from natives. "From the mountain-ranges east of Fyfe Station."

3. Papio pruinosus, Thos. (?).

a. ♂. Fort Johnston. Shot and presented by Mr. H. C. McDonald.
b, *c*. ♂. Skin, and a separate skull, Zomba, 11/96.

These two specimens are coloured more like the ordinary E. African *P. thoth*, and I am not certain of their identity with the peculiar hoary-coloured *P. pruinosus*, although, on account of locality, they may be provisionally referred to that species.

I am informed by Dr. Rendall that the type specimen of *P. pruinosus* did not come from Fort Johnston itself, but from Lesumbwe, Monkey Bay, on the Livingstone Peninsula, Lake Nyasa.

4. Otogale kirki, Gray.

a, *b*. Young, Zomba, 11–12 Feb., 1897.

5. Xantharpyia straminea, Geoffr.

a–*d*. Mt. Malosa, 21–29 Nov., 1896.

6. Rhinolophus capensis, Licht.

a. ♂. Fort Hill, July 1896.

7. Nycteris capensis, Geoffr.

a. In spirit. Ruarwe, W. coast Lake Nyasa.

8. Pipistrellus, sp. (? *P. kuhli*, Natt.).

a–*c*. In spirit. N. Nyasa. "Label lost: either Nyika or Masuku."

I do not venture definitely to say that these Bats are *P. kuhli*, which is a native of the southern Palæarctic Region, and has never hitherto been found south of Abyssinia, but I can find no definite character on which to separate them. They even have the characteristic white edging to the wing-membrane so constantly found in the northern form.

9. Myotis [1] bocagei, Peters.

a–*d*. Four in spirit. Kondowe, near Karonga, N. Nyasa.

I am unable to distinguish these specimens from Peters's *Vespertilio bocagei*, originally described from Angola.

[1] *Vespertilio* auctorum, *nec* Linn. See Milier, Ann. Mag. N. H. (6) xx. p. 379 (1897).

10. Rhynchocyon reichardi, Reichenow.

a, *b*. ♂ ♀. Fort Hill, July 1896.

These specimens are the first examples of this beautiful *Rhynchocyon* that the Museum has received.

11. Rhynchocyon cirnei, Pet.

a. Mt. Zomba, 5000 ft., 24 Dec., 1896.

12. Petrodromus tetradactylus, Pet.

a. ♀. Zomba, Aug. 1896.

Attention may be directed to the differences which distinguish from each other the East-African *Petrodromus* (*P. sultan*[1]), that occurring on the Rovuma R. (*P. rovumæ*), and the typical Zambesi form. (See above, p. 434.)

13. Macroscelides brachyrhynchus, Smith.

a–*f*. Nyika Plateau, 6000–7000 ft., June, July, 1896.
g–*i*. In spirit. Nyika Plateau, 6000–7000 ft., June, July, 1896.
j–*k*. Fort Hill, July 1896.

These specimens belong clearly to the same species as an Elephant-Shrew from Mashona and Matabili, of which the Museum possesses a considerable series, thanks to the efforts of Messrs. Darling, Selous, and Marshall.

For this species I had, until recently, considered that the proper name was *M. fuscus*, Peters, founded on a melanistic individual from Boror, near the mouth of the Zambesi, an individual which, Dr. Matschie is agreed with me, is specifically identical with the reddish specimens also obtained by Dr. Peters at Boror, Tette, and Senna. On sending one of the Nyika examples to Dr. Matschie I am assured by him that it is precisely identical with at least one of the Tette specimens (which are rather variable *inter se*), and may be accepted as representative of the typical non-melanistic coloration of *M. fuscus*.

But it has now been suggested to me by Mr. De Winton that this widely-spread Zambesi species is not really separable from Smith's *M. brachyrhynchus*, and after a careful comparison with Smith's types I cannot resist coming to the same conclusion. The two co-types have their hind feet slightly shorter than any of the examples of "*M. fuscus*," but otherwise I can find no reason for distinguishing them. At the same time I am assured by Dr. Matschie that Böhm's Marungu *Macroscelides*, referred by Noack to *M. alexandri*, Og., is also precisely similar to the Nyika example, a further instance of the resemblance between the faunas of these two localities.

14. Macroscelides brachyrhynchus malosæ, subsp. n.

a–*c*. Mt. Malosa, 5500 ft., 22–27 Nov., 1896. *a*. *Type*.

Besides the series of *M. brachyrhynchus* sent by Mr. Whyte from

[1] Misprinted *sultani* in the original description. The name is a substantive in apposition.

Northern Nyasaland, there are three examples decidedly different in colour from Mount Malosa, just to the north of Zomba, a locality where Mr. Whyte states that a great many peculiar forms are found.

Size and general characters as in ordinary Zambesi examples of *M. brachyrhynchus*, but the upper colour, instead of being pale rufous, is, in ordinary lights, grizzled greyish or mouse-colour, not far from the "hair-brown" of Ridgway. Looked at with the light behind one, and with the animal's head pointing almost directly away (a position which turns the pale rufous of *M. brachyrhynchus* into a silvery lilac), the colour turns nearly a pure ashy grey. Sides buffy, belly white. On the rump the hairs surrounding the naked area at the root of the tail are pale rufous, exactly as in *M. brachyrhynchus*, but owing to the difference in the dorsal colour they present a marked contrast to the rest, so that the rump is conspicuously different to the back. Face, like back, greyer than in *M. brachyrhynchus*; the whitish ring round the eye is slightly interrupted in the centre above, and broadly so at the posterior canthus, where a blackish streak or smear is formed, running backwards from the eye; the hairs in the same position in *M. brachyrhynchus* are not darker than the rest of the face.

Skull apparently not markedly different from that of *M. brachyrhynchus*, allowing for the range of variation found in that animal. It is, perhaps, rather narrower across the brain-case, the nasals are slightly broader for their middle third, and the teeth, especially the premolars, seem to average rather smaller.

Measurements of the *type*, an adult ♀ in skin:—

Head and body (stretched) 144 mm.; tail 103; hind foot 29; ear 17·5.

Skull: basal length 29·8; greatest length 34; greatest breadth 17·4; interorbital breadth 5·6; breadth of brain-case 13·4; front of $i.^1$ to back of last molar ($m.^3$) 16·5.

Hab. Mount Malosa, 5500 ft. Coll. 22 Nov., 1896.

Type. B.M. No. 97. 10. 1. 41.

In his report on one of these specimens sent to him for examination, Dr. Matschie tells me that the four Tette *Macroscelides* examples in the Berlin Museum are very variable in colour, ranging from the ordinary rufous of *M. brachyrhynchus* to a much darker shade, and it is owing to this fact that I now consider the Malosa form as merely a subspecies. The type of *M. fuscus*, as already noted, is a melanistic example, still in milk-dentition, of the ordinary Zambesi form. That it is not *M. b. malosæ* is shown at once by the dark colour of its belly and eye-rings.

15. Crocidura (Cr.), sp. inc.

a. ♂. Fort Hill, July 1896.

A large species, apparently allied to *C. anchietæ*, Boc.

16. Crocidura (Cr.), sp. inc.

a–c. Kombe, Masuku Range, 7000 ft., July 1896.

d, *e*. Nyika Plateau, 6000–7000 ft., June, July, 1896.

f–i. In spirit. Nyika Plateau, 6000–7000 ft., June, July, 1896.
j, k. Zomba, Aug. 1896, and 6 Feb., 1897.
l–n. Mt. Malosa, 22–26 Nov., 1896.
o. Mt. Milanji, 27 Nov., 1896.

Medium-sized Shrews, allied to *C. hirta* and *C. annellata*, Peters.

17. Crocidura (Cr.), sp. inc.

a. Nyika Plateau, June 1896.

A small species, allied to *C. silacea*, Thos.

A specimen of this same Shrew was sent from Zomba by Mr. Whyte in 1894.

18. Crocidura (Pachyura) lixa, sp. n.

a. ♂. In spirit, Nyika Plateau. *Type* (No. 97. 10. 1. 62).
b. ♀. In spirit. "N. Nyasa, Nyika or Masuku."

A small *Pachyura* with tail of medium length, the second unicuspid smaller than the third.

Size about the same as in the last species. General colour pale greyish, but spirit-specimens only examined. Belly-hairs slaty basally, white terminally. Lateral gland well developed in male, small in female, just level with the wrist when the arm is laid backwards. Upper surface of hands and feet white. Tail longer than the body without the head, pale brownish above, white below, the usual long hairs distinct.

Anterior upper incisor rather short, well hooked, its posterior cusp about half the height of the second incisor, the anterior unicuspid. Third unicuspid decidedly larger than the second, which is unusually small, but little larger than the well-developed fourth [1].

Dimensions of the type, an adult male in spirit:—

Head and body 67 mm.; tail 51; hind foot 12.

Skull: basal length 17·2; greatest length including teeth 20·1; greatest breadth anteriorly 6·2, posteriorly 8·7; interorbital breadth 4·4; palate length from gnathion 8·1.

Specimen *b*, ♀, has its head and body 64 mm.; tail 50 and hind foot 12 mm.

19. Myosorex (?) sorella, sp. n.

a. ♂. In spirit, Masuku Plateau, 6000 ft. *Type* (No. 97. 10. 1. 64).

A small Shrew with a very long tail; number and proportions of teeth as in *C.* (*Pachyura*) *lixa*.

Size very small, scarcely larger than in *C. varilla*. Form slender. General colour above dull slaty grey, so far as can be made out in the spirit-specimen; under surface, at least on chest, buffy white, the bases of the hairs slate. Hands and feet very slender, their upper surfaces pale brown. Lateral gland indistinguishable. Tail exceedingly long for a Shrew, nearly half as long again as the

[1] The relative proportions of the unicuspids are not unlike those of *C. dayi*, as figured by Dobson, Mon. Insect. pl. xxviii. fig. 6.

head and body, short-haired, brown above, rather paler below; no longer hairs seem to be intermixed with the short ones, but owing to the partial loss of the hair it cannot be stated with absolute certainty that this is the case.

Skull fairly broadly built. Anterior incisors rather short, their posterior basal cusp very sharply pointed, reaching to scarcely one-third the height of the succeeding tooth so far as the latter's anterior edge is concerned. First unicuspid long and slender, third about half its length; second and fourth quite small, subequal, about half the height of the third. Last upper molar of the squarish form found in *Myosorex varius*. Anterior lower incisors slender, their upper edges indistinctly notched.

Measurements of the type, an adult male in spirit:—

Head and body 60 mm.; tail 85; hind foot 14·5.

Skull: basal length 15; greatest length, including incisors, 18·1; greatest breadth anteriorly 5·8, posteriorly 8; interorbital breadth 4·1; palate length from gnathion 7·2.

Hab. Masuku Plateau.

On the basis of Dobson's work, I have provisionally placed this distinct little Shrew in the genus *Myosorex*, as it seems allied by characters both of teeth and tail to the species he termed *M. morio* and *M. johnstonii*; but I am by no means convinced that these species are really congeneric with *M. varius*, the type of the genus, and that they ought not to be considered simply as *Pachyura*. The length of the tail of *M. sorella* will distinguish it at once from any South-African Shrew hitherto described.

20. Nandinia gerrardi, Thos.

a. Native skin, Masuku Plateau.

It is unfortunate that this skin, like the two original ones, is native made and without a skull. The cranial characters of this striking species are therefore still unknown.

21. Herpestes gracilis, Rüpp.

a. Karonga, Lake Nyasa, July 1896.
b. Lakangala, Zomba, 22 Feb., 1897.

22. Crossarchus fasciatus, Desm.

a. Yg. ♀. Mt. Malosa, 8000 ft., 20 Nov., 1896.

23. Lycaon pictus, Temm.

a, *b*. 2 ♀ (young). Mt. Zomba, 5/12/96.

Shot by Mr. Alfred Sharpe, high up on Mount Zomba.

Both specimens retain their milk-dentition, although they have nearly reached their full size.

24. Pœcilogale albinucha, Gray.

a. Kombe, Masuku Range, 7000 ft., July 1896.
b. Separate skull.

25. Sciurus mutabilis, Pet.

a. Nyika Plateau, June 1896.
b, *c*. Kombe Forest, Masuku Range, July 1896.
d–*g*. Lakangola, Zomba, 23–28/2/97.

26. Funisciurus lucifer, Thos. (Plate LIV.)

Xerus (*Paraxerus*) *lucifer*, above, p. 430.

a, *b*. Kombe Forest, Masuku Range, 7000 ft., July 1896. *a*. *Type* (B.M. No. 97. 10. 1. 80).
c. Chidewah Mt., two days N.W. of Mt. Waller, 6000 ft., June 1896.

This splendid Squirrel is at the same time the most beautiful and the most distinct of all the mammalian discoveries made during the recent explorations in Nyasaland, and I have therefore thought it worthy of a figure. So distinct is it that it is difficult to say to what species it is most nearly allied. On the whole its nearest relation may be considered *F. pyrrhopus*, in spite of the extent to which its brilliant rufous coloration recalls *F. palliatus*. As it has been already sufficiently described, no further account of it is here necessary, but an explanation of the generic name adopted is required.

When using in the original description the term *Xerus*, subgenus *Paraxerus*, I was contented to accept provisionally Dr. Forsyth Major's arrangement of the family [1], wherein he assigned about half of the species commonly termed "*Sciurus*" to *Xerus* and half to *Sciurus*, dividing each of these groups into several subgenera. This general arrangement being founded on such a careful and highly competent examination of the skulls and teeth, it was evident that it could not be ignored, and that systematic workers would have to consider how best they could utilize Dr. Major's invaluable contribution to the subject. Previous classifications had only sorted the Squirrels according to geographical distribution, size, or colour-markings, so that there was the greatest need of such a scientific revision as that now referred to.

But further consideration has convinced me that it would be most inconvenient, even if the world in general could be brought to do so, to accept the arrangement exactly in its present form, with *Tamias* a mere subgenus of *Sciurus*, with the peculiar, spiny-furred typical *Xeri* placed in the same genus as such very different forms as the little soft-furred "*X.*" *isabella*, and with many other difficulties which would present themselves to every worker on the subject.

This being the case, I would now venture to suggest that all the subgenera (with the exception of "*Atlantoxerus*") in Dr. Major's scheme should be recognized for ordinary systematic purposes as full genera, especially as all of them have long been considered as perfectly natural groups, and have been arranged as such in the revisions of Trouessart and other authors.

[1] P. Z. S. 1893, p. 189.

Unfortunately the names of these genera cannot stand as in Dr. Major's scheme, for (being busy with more important matters) he has ignored nomenclatural rules and has attached provisional names of his own to nearly all the subgenera. But these names being antedated for the most part by the terms of Gray or Trouessart must necessarily give way to the latter.

Using mainly Gray's revision of 1867[1], and Trouessart's of 1880[2], and, without making prolonged nomenclatural investigations, the following appear to be the names which the different groups of Squirrels should bear:—

1. *Rheithrosciurus*, Gray, 1867. Type, *R. macrotis*.
2. *Protoxerus*, Maj. 1893. Type, *P. stangeri*[3].
3. *Xerus*, Hempr. & Ehr. 1833. Type, *X. rutilus*.
   Geosciurus, A. Smith, 1834. Type, *X. capensis*.
   Atlantoxerus, Maj. 1893[4]. Type, *X. getulus*.
4. *Funisciurus*, Trouess. 1880. Type, *F. isabella*.
   Paraxerus, Maj. 1893. Type, *F. cepapi*.
5. *Funambulus*, Less. 1832. Type, *F. palmarum*[5].
   Rhinosciurus, Gray, 1843. Type, *F. laticaudatus*.
   Laria and *Palmista*, Gray, 1867. Types, *F. insignis* and *palmarum*.
   Eoxerus, Maj. 1893. Type, *F. laticaudatus*.
6. *Ratufa*, Gray, 1867. Type, *R. indica*.
   Rukaia, Gray, 1867. Type, *R. macrura*.
   Eosciurus, Trouess. 1880. Type, *R. bicolor*.
7. *Sciurus*, Linn. 1758. Type, *S. vulgaris*.
   Macroxus, G. Cuv. 1825. Type, *S. æstuans*.
   Callosciurus, *Baginia*, and *Erythrosciurus*, Gray, 1867. Types, *S. prevostii*, *notatus*, and *ferrugineus*.
   Heterosciurus, *Neosciurus*, *Parasciurus*, *Echinosciurus*, *Heliosciurus*, and *Tamiasciurus*, Trouess. 1880. Types, *S. erythræus*, *carolinensis*, *niger*, *hypopyrrhus*, *annulatus*, and *hudsonius*.

The limits of the genera would be those indicated in Dr. Major's paper.

27. Funisciurus cepapi, A. Sm.

a. ♂. Monkey Bay, Lake Nyasa, July 1896.

This is the furthest locality northwards that the true *F. cepapi* has been recorded from, the East-African forms of the same group having been shown to be specifically distinct (see De Winton, Ann. Mag. N. H. (6) xix. p. 573, 1897).

[1] Ann. Mag. N. H. (3) xx. p. 270 (1867).
[2] Le Nat., Oct. 1880.
[3] As Dr. Major has not selected types for his group names, I have, as the "next reviser," ventured to do so for him, choosing in each case the species he has placed first.
[4] May be considered as a subgenus of true *Xerus*.
[5] 'Illustrations de Zoologie,' text to pl. xliii. (1832). Lesson's *Funambulus indicus* is the Palm Squirrel, not the big *Ratufa indica*.

28. Graphiurus murinus, F. Cuv.

a, *b*. 2 ♂. Nyika Plateau, 6000–7000 ft., June and July 1896.

On distributional grounds these specimens should represent Noack's *Eliomys microtis* [1], whose description applies better to them, so far as colour is concerned, than to the pigmy Dormice of the group to which the next species belongs. The nasals of *E. microtis* are, however, rather short for the *murinus* group, if the measurements published by Reuvens [2] are to be depended upon.

29. Graphiurus johnstoni, sp. n.

a. ♀. Zomba, Mar. 12, 1897. *Type* (No. 97. 10. 1. 86).

Size very small, as in *G. parvus*, *nanus*, and *smithii*. Fur rather short and close. General colour greyish buff, the hairs slaty grey with short buff-coloured tips. Under surface greyish white, the tips of the hairs being dull whitish; but this colour is not snowy white, as in the allied species, nor does it extend so high up on the sides of the neck and body. Eyes surrounded by a brownish ring, not strongly defined, and not continued on towards the ears. Ears short, practically naked. Hands and feet dull white above, the proximal part of the metatarsals slightly brownish. Tail broad, apparently much as in *G. smithii*, much broader than in *G. nanus*, the longest hairs about 15 or 16 mm. in length; pale brown above and below, a few of the proximal hairs only tipped with white.

Skull small and delicate; nasals extending backwards to the level of the premaxillary processes; brain-case less broad than in the allied species.

Molars rather large for the size of the animal, much larger than in *G. nanus*. Incisors unusually narrow, not flattened or grooved in front.

Dimensions of the type, an adult female, in skin :—

Head and body 81 mm.; tail, without hairs (c.) 58, with hairs 74; hind foot (moistened) 16.

Skull: tip of nasals to front of interparietal 21·6; greatest breadth (c.) 12·5; nasals 8·5 × 2·7; interorbital breadth 4; anteorbital foramen, height 2·4; distance between outer corners of the two foramina 7·1; palate, length from henselion 8; diastema 5·1; palatal foramina 2·6 × 1·7; length of upper molar series 3·5.

This pretty little Dormouse is clearly most closely allied to *G. nanus* and *G. smithii*, but, among other characters, it may be distinguished from both by its shorter fur, less snowy belly, and larger molars and narrower incisors.

From *G. microtis*, Noack, said to be synonymous with *G. murinus*, *G. johnstoni* differs by having no darker mark connecting the eye and ear, nor any lighter mark behind the latter, and there are several discrepancies in the detailed measurements of the skull. *G. microtis* came from Marungu, where the fauna seems to be very like that of the Nyika Plateau, and equally unlike that of Southern Nyasaland.

[1] Zool. Jahrb. ii. p. 248 (1887).

[2] Myoxidæ, p. 43 (1890).

The type specimen of *G. johnstoni* is evidently undergoing its autumn increase of fur, for the fine buff tips of the new hairs are to be distinguished halfway down in the fur among the old ones. The hairs are growing up evenly all over the body, and not in patches. On the other hand, in a specimen of *G. murinus* in the spring moult (Rustenberg, Transvaal, September 1895; coll. H. P. Thomasset) the moult is taking place in patches, so that we have in these animals (so far as the evidence of two specimens is to be trusted) a similar method of change to what we see in some of our own northern animals, *e. g.* the Squirrel, in which the spring moult is equally done in patches, while the autumn growth takes place uniformly all over the body.

30. Gerbillus (Tatera) leucogaster, Pet.

a–f. Fort Hill, July 1896.
g–j. In spirit. Fort Hill, July 1896.
k–m. Karonga, July 1896.
n–q. Mt. Malosa, 5000 ft., 21–27 Nov., 1896.

31. Gerbillus (Gerbilliscus [1]) böhmi, Noack.

a. ♀. Fort Hill, July 1896.

This interesting Gerbille is no doubt in a general way allied to Lataste's subgenus *Tatera*, to which *G. leucogaster* belongs, but the marked difference between its incisors and those of the other subgenera seems to render advisable a special group for its reception. The unusual breadth of the incisors, their slight bevel, and their flatness (the two faint grooves being scarcely perceptible) render them quite unlike those of any other Gerbille. The type of the species was described from Qua Mpala, Marungu.

32. Otomys irroratus, Bts.

a–l. Nyika Plateau, 6000–7000 ft., June and July 1896.
m. Fort Hill, July 1896.
n, o. Zomba, Aug. 1896.

33. Dendromys mesomelas, Bts.

a–d. Nyika Plateau, 6000–7000 ft., June and July 1896.
e. Fort Hill, July 1896.

34. Dendromys pumilio, Wagn.

a–d. Nyika Plateau, 6000–7000 ft., June and July 1896.
e, f. In spirit. Nyika Plateau, 6000–7000 ft., June and July 1896.
g, h. Fort Hill, July 1896.
i–k. Zomba, Aug. 1896.
l–n. Mt. Malosa, 5000 ft., Nov. 1896.

Some of the specimens from Nyasaland previously recorded by me as *D. mesomelas* are also *D. pumilio*, hitherto (but, as I now think, erroneously) united with *D. mesomelas*.

[1] Above, p. 433.

35. Steatomys pratensis, Pet.

a–c. Fort Hill, July 1896.

36. Mus arborarius, Pet.

a–c. Nyika Plateau, 6000–7000 ft., June, July, 1896.
d. Fort Hill, July 1896.
e, f. Zomba, August and November 1896.

37. Mus chrysophilus, De Wint.

a–j. Nyika Plateau, June, July, 1896.
k, l. Fort Hill, July 1897.

38 & 39. Mus, spp.

a. Ruarwe, Lake Nyasa, June 1896.
b. Nyika Plateau, June, July, 1896.
c–n. Fort Hill, July 1896.
o, p. Karonga, July.
q. Kombe, Masuku Range, July.
r, s. Zomba, August.
t–y. Mt. Malosa, November.

A large number of specimens belonging to the two groups characterized respectively by their numerous mammæ (multimammate) and by having the mammary formula 3—2=10. It is impossible to work them out more definitely at present.

40. Mus nyikæ, Thos.

See above, p. 431.

a–f. Nyika Plateau, 6000–7000 ft., June, July, 1896. *f*, the *type* (No. 97. 10. 1. 189).

This distinct new species seems to have no very near relations among described forms.

41. Mus rattus, L.

a. Ruarwe, June 1896.
b–f. Fort Hill, July 1896.

42. Lophuromys aquilus, True.

a–e. Nyika Plateau, 6000–7000 ft., June, July, 1897.

43. Dasymys kaiseri, Noack.

a–e. Nyika Plateau, 6000–7000 ft., June, July, 1896.
f. Fort Hill. July 1896.

There can be little doubt that Noack's *Mus kaiseri*[1] from Marungu is a *Dasymys*, and it seems to agree very closely with the present examples.

[1] Zool. Jahrb. ii. p. 228 (1887).

44. Saccostomus elegans, Thos.

Suprà, p. 431.

a. ♀. Karonga, Lake Nyasa, June 1896. *Type* (No. 97. 10. 1. 207).

45. Acomys selousi, De Wint.

a–c. Nyika Plateau, 6000–7000 ft., June and July 1896.

This species was described by Mr. De Winton[1] from Matabililand, whence examples were sent by Mr. Selous. The present specimens do not seem to differ from the original examples in any important respect.

46. Arvicanthis dorsalis, A. Sm.

a. ♀. Nyika Plateau, June 1896.
b. ♀. Mt. Malosa, 5000 ft., 26 Nov., 1896.

47. Arvicanthis pulchellus, Gray.

a–c. Fort Hill, July 1896.
d. Kombe, Masuku Range, 7000 ft., July 1896.

48. Golunda pallax, Pet.

a, *b*. Nyika Plateau, June 1896.
c–j. Fort Hill, July 1896.
k–m. Mt. Malosa, Nov. 1896.

49. Georychus whytei, Thos.

Suprà, p. 432.

a. Old ♀. Karonga, Lake Nyasa, July 1896. *Type* (No. 97. 10. 1. 230).

b–l. Nyika Plateau, 6000–7000 ft., June, July, 1896.
m. In spirit. Nyika Plateau, 6000–7000 ft., June, July, 1896.
n–r. Fort Hill, July 1896.

50. Myoscalops argenteocinereus, Pet. (?).

a–e. 2 ad. and 3 yg. Mt. Malosa, 5500 ft., 20–29 Nov., 1896.

"This differs from our common Zomba species, and throws up enormous mounds of earth, larger than I have seen the others do.

"These animals bite severely, and are generally brought in with their incisors broken."—*A. W.*

In some respects these animals differ from the ordinary Nyasan *M. argenteocinereus*, as Mr. Whyte has noticed, and approach the East-African *M. albifrons*, but without further and better material it would be impossible to separate them definitely.

51. Thryonomys sclateri, Thos.

See above, p. 432.

a. Old ♀. Nyika Plateau, 6000–7000 ft., June 1896. *Type* (No. 97. 10. 1. 253).

[1] P. Z. S. 1896, p. 807.

The differences between this and its ally *T. gregorianus* have already been detailed (*l. c.*). In naming it I have ventured to associate with it the name of Mr. Sclater, the Society's Secretary, to whose influence and assistance the commencement and continuation of the Nyasa explorations have been so largely due.

De Beerst's *Aulacodus calamophagus* is said by Pousargues[1] to be larger, not smaller, than *T. swinderenianus*, a skull in the Paris Museum measuring 89 mm. in basal length by 68 in zygomatic breadth. While these dimensions do not exceed those of some of the British Museum examples of *T. swinderenianus* they prove conclusively that *T. calamophagus* has nothing to do with *T. sclateri*.

52. Lepus crassicaudatus, Geoffr.

a, *b*. ♂ ♀. Nyika Plateau, 7000 ft., June 1896.

"Hare shot on rocky ground on the highest peaks of the Nyika Plateau, at about 7000 feet. It is truly a 'rock-rabbit,' which term is generally wrongly applied here to the Dassies (*Procavia*). It has all the habits of the Dassies, living among rocks in absolutely bare and exposed places, and is very difficult to shoot as it dodges among the boulders. It is very local, living in colonies, and is only found in situations that suit its habits and mode of life."—*A. W.*

This Hare has only hitherto been recorded from the Cape, so that the present is a great extension of its known range.

53. Lepus whytei, Thos.

a, *b*. 2 young skins. Zomba, 12/95.

54. Procavia brucei, Gray.

a, *b*. ♀ and yg. Monkey Bay, Lake Nyasa, July 1896.

55. Potamochœrus choiropotamus nyasæ, Maj.

a–*c*. 3 young skins.

"Young wild-hogs caught near Zomba, and kept in captivity for a short time. The female forms a house or nest of grass in a burrow in thick grass-jungle."—*A. W.*

Dr. Major[2] has described the ordinary Nyasa River-Hog as a peculiar subspecies of the Cape animal, for which he finds the proper name to be *P. chœropotamus*, Desmoul.

56. Oreotragus oreotragus, Zimm.

a. Nyika Range, 6000 ft., 7/96.

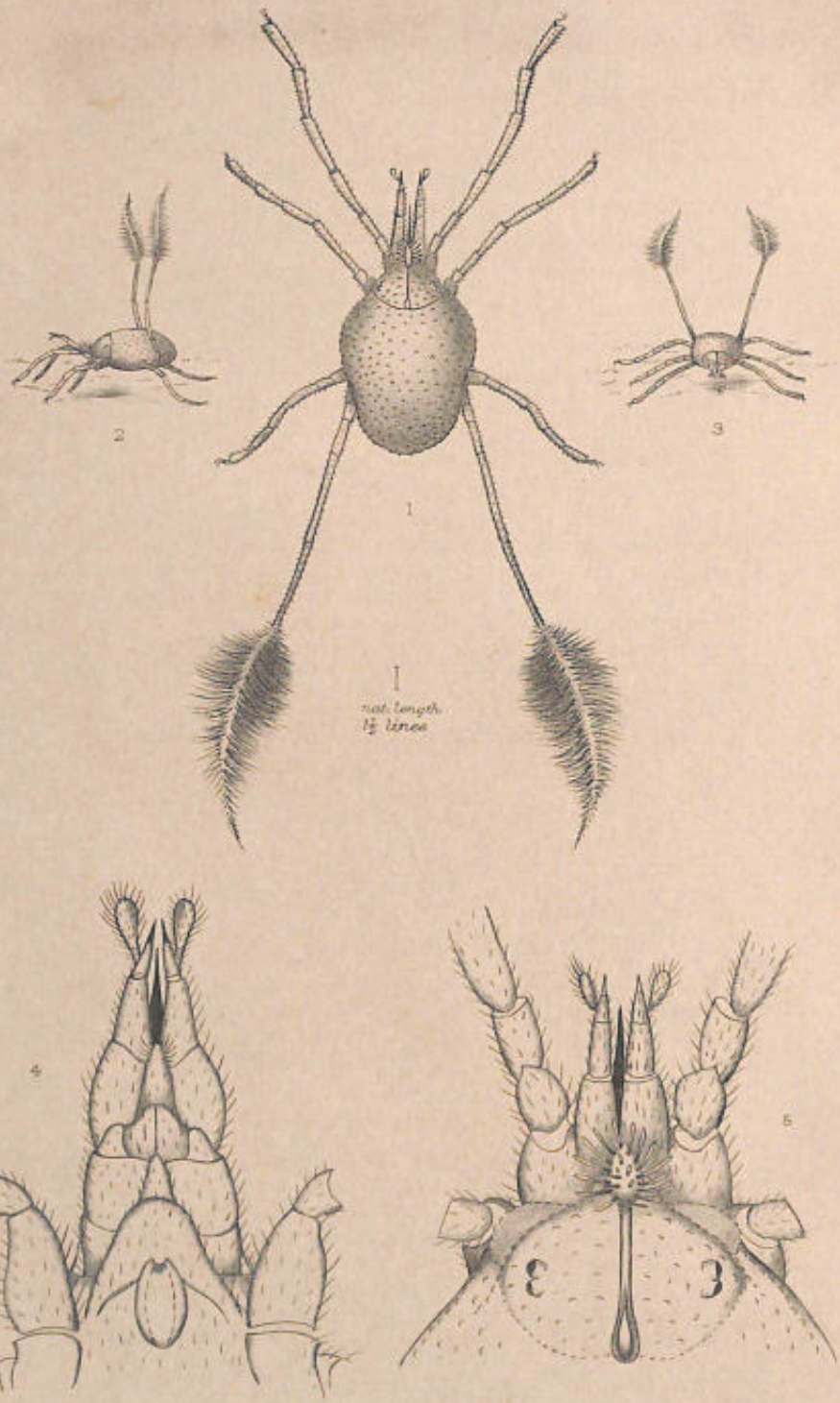
57. Ourebia hastata, Pet.

a. ♂. Zomba Plains, 12/96.

b. Young ♀. Plains S. of Shirwa, 27/10/96.

Specimen *a* was shot by Mr. Beswick. It is a very fine old male.

[1] Bull. Mus. Paris, 1897, p. 160.
[2] *Supra*, p. 367.



G.P. & P.C.P. Cambridge del. et lith.

West, Newman imp.

Eatonia scopulifera.

58. ÆPYCEROS MELAMPUS, Licht.

a. ♀. Zomba, 2/3/97.

Shot by Mr. J. Charles Casson.

59. HIPPOTRAGUS NIGER, Harr.

a. Ad. ♂. Zomba Plains, 10/10/96.

A very fine example, though the horns are unfortunately unsymmetrical.

60. TRAGELAPHUS ANGASI, Ang.

a. Imm. ♂. "Lower river."

Shot by Mr. Alfred Sharpe.

61. ORYCTEROPUS AFER, Pall.

a. Imm. ♂. Shirwa Plains, 15/10/96.

"This is the first 'Earth-pig' we have met with, though we have done our best to get it before. It is found on the plains, where it makes enormous burrows, and also inhabits caves under rocks. It seems lighter in colour than Cape specimens, and the hairs are but little bristly. Native name *Mbawe*."—*A. W.*

3. On a new Genus and Species of *Acaridea*.

By Rev. O. PICKARD CAMBRIDGE, M.A., F.R.S., &c.

[Received October 26, 1897.]

(Plate LV.)

The singular Acarid of the family Trombidiidæ now described was kindly sent to me by the Rev. A. E. Eaton, who found it, along with another, running on sandy ground amongst tamarisk bordering the river-bed near Biskra in Algeria. Mr. Eaton writes that "in running it elevates the hindermost legs, which being quickly agitated, the tufts of hairs on the metatarsi look like a pair of minute Diptera dancing attendance on the mite."

Gen. nov. EATONIA (nom. propr.).

Form obtuse-oval, tolerably and uniformly convex above. Caput and thorax coalescing with scarcely a trace of junction. A pointed nasiform process issues from near the middle of the anterior margin, and from this process to the hinder extremity of the caput is a deepish longitudinal furrow or indentation bisecting the caput.

Eyes 4, in two groups of two eyes each, seated on either side of the caput on geminated tubercles.

Legs slender, 1, 2, 3 short, 4 long. Two on each side issue

close together from the lower margin of the caput, and two others, equally near together, issue on either side from near the posterior end of the abdomen. Terminal tarsal claws 2, on a small claw-joint and unarmed. Beneath the tarsi of the first pair of legs is a scopula. The fourth pair are much the longest and slenderest, and their genua and metatarsi are furnished with a large, tolerably compact brush of long, black, prominent hairs of an elongate sharp-pointed knife- or dagger-shape.

Palpi short; basal and humeral joints very strong; the radial joint tapers, and terminates with a nail-like claw or spine; the digital joint, which issues from near the base beneath the radial, is of a clavate or racket-bat shape, and is as long or longer than that joint.

The mouth-parts are not easily traceable, closed up together as they are by the basal joints of the palpi; but they consist of maxillæ, labium, and falces, above which is the rostrum or beak, drawn out to an obtuse point, whence there issues a long, strongish, sharp-pointed spiny process.

EATONIA SCOPULIFERA, sp. n. (Plate LV.)

Adult female. Length 1½ lines.

Colour scarlet; body slightly broader in front than behind, where it is well rounded; it is thickly clothed with short, pale, strongly clavate hairs. Caput longitudinally bisected by a distinct furrow from the nose-like anterior extremity to the thorax, where it ends in a roundish pit or fovea, in which is a small, somewhat tuberculiform, round boss. The nose-like projection is furnished with numerous obtuse and slightly clavate, spine-like, prominent hairs, some longer, some shorter.

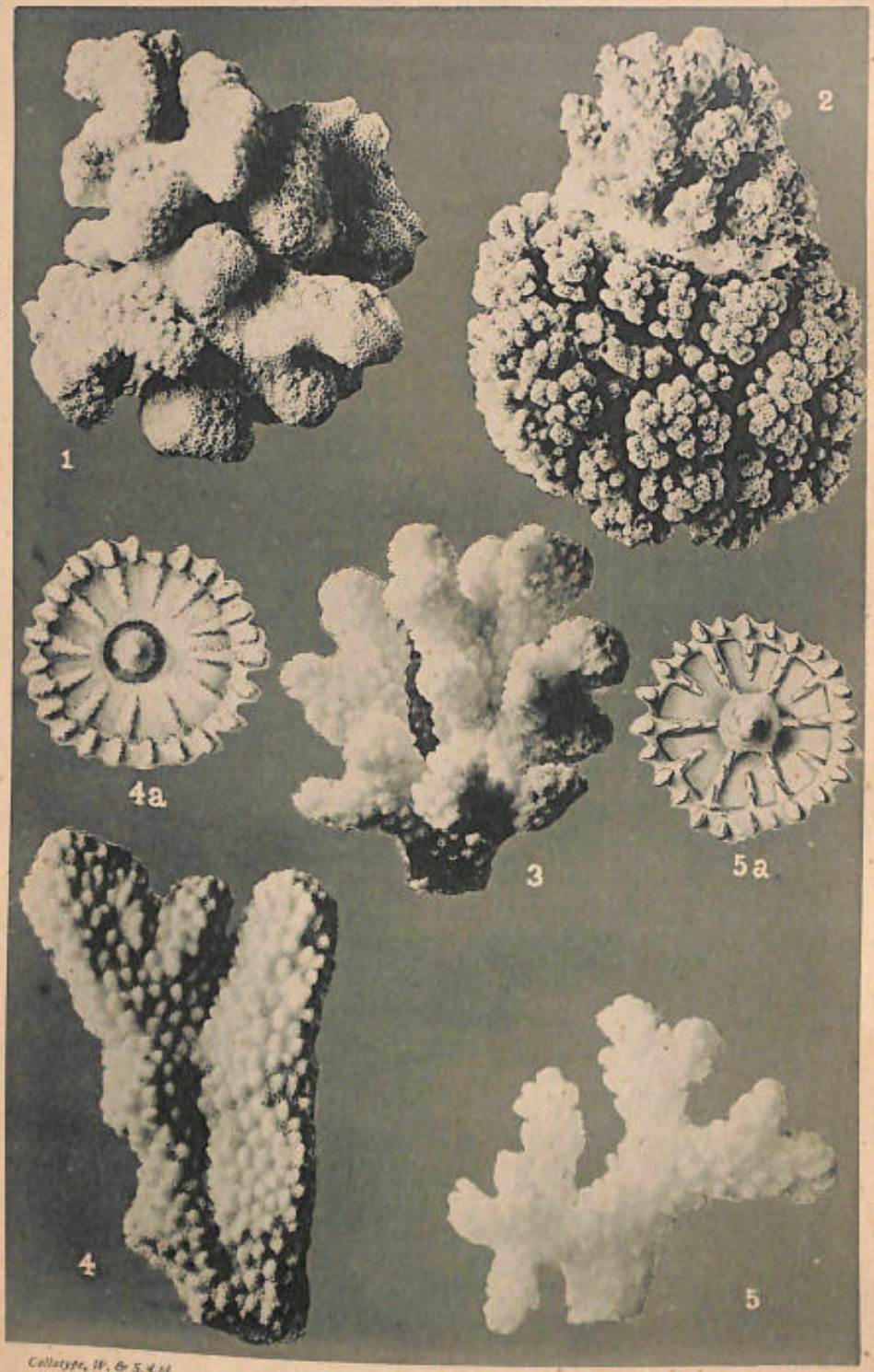
The *legs* of the first three pairs are of nearly uniform length, and are furnished with (besides hairs) distinct spines at the fore extremity of the metatarsi; the fourth pair are much the longest and slenderest, and the genua and metatarsi are thickly furnished with long, strong, lanceolate, black hairs, forming a large brush, much like those used in the cleaning of bottles.

The *eyes* are small and of a reddish hue, in two groups; those of each group well separated from each other on tubercles whose bases are united.

The genital aperture consists of a longitudinal cleft on the summit of a strong oval prominence underneath the anterior extremity of the abdomen, between the basal joints of the first pair of legs.

Hab. Biskra, Algeria.

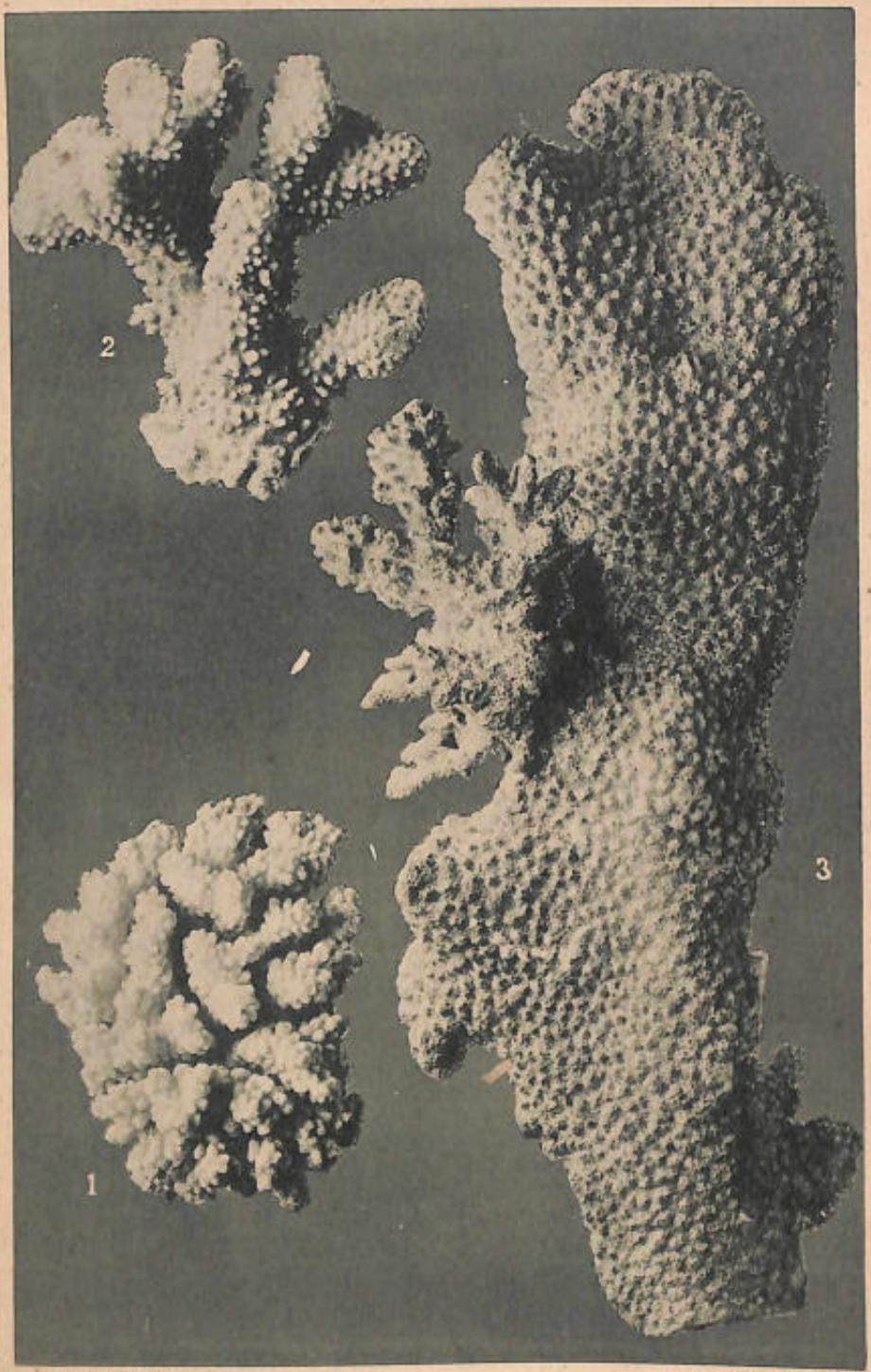
A closely-allied, but I think quite distinct, species has been described and figured by A. Birula from Russian Armenia (Hor. Soc. Ent. Ross. xxvii. p. 388, pl. vii., 1893), under the genus *Rhyncholophus*. The structure, however, of these two curious Acarids appears to require a new genus for their reception, and



Collotype, W. & S. & L.

Edwin Wilson, Cambridge.

CORALS FROM THE SOUTH-WEST PACIFIC.



Calliope, W. & S. Ltd. Ingalls Wilson, Cambridge.

CORALS FROM THE SOUTH-WEST PACIFIC.

I have conferred on it the name of the Rev. A. E. Eaton, by whom the Algerian species was discovered.

Eatonia plumifera, Birula, and *E. scopulifera*, Cambr., may be thus distinguished:—

Body slightly broader in front than behind; nasal prominence furnished with but few spiniform hairs; rostrum devoid of terminal spine ..... *E. plumifera.*

Body heart-shaped, much broadest in front; nasal prominence furnished with numerous long spiniform hairs of different lengths; rostrum armed with a long terminal, sharp-pointed, spiny process ..... *E. scopulifera.*

EXPLANATION OF PLATE LV.

Fig. 1. *Eatonia scopulifera*, sp. n., greatly enlarged.
2. Ditto, in profile, less enlarged.
3. Ditto, front view.
These two figures (2 & 3) show the mode in which the posterior legs are carried.
4. Underside of caput, greatly enlarged, showing genital aperture, mouth-parts, and palpi.
5. Upperside of caput, showing eyes, nasiform process, and palpi.

4. On some Collections of Corals of the Family *Pocillo-poridæ* from the S.W. Pacific Ocean. By J. Stanley Gardiner, B.A., Gonville and Caius College, Cambridge[1].

[Received November 1, 1897.]

(Plates LVI. & LVII.)

The corals described were collected by the author in 1896–7 at Funafuti, Rotuma, and Fiji, and by Dr. A. Willey at Lifu, Loyalty Islands. I am indebted to Mr. Adam Sedgwick, F.R.S., for entrusting the latter collection to me and for his kindly interest; my thanks are also due to the authorities of the British Museum for allowing me free access to their types and to the 'Challenger' specimens.

The species represented in these collections are 21, viz. 20 *Pocillopora* and 1 *Seriatopora*. Of the former 5 are new, and it has been necessary to redescribe 4 old species. The comparison of the collection with specimens in the British Museum has shown me that several species of Verrill, Dana, and others are not really distinct and must be combined with other species.

[1] Communicated by Mr. W. Bateson, F.R.S., F.Z.S

Family Pocilloporidæ.

I. Genus Pocillopora, Lamarck.

Pocillopora, Lamarck, Hist. Anim. sans Vert. ii. p. 273.
Pocillopora, Duncan, Rev. Madrep., Jour. Linn. Soc., Zool. vol. xviii. p. 47.

The classificatory characters of the species in this genus by means of the corallum are extremely unsatisfactory. In the collections there are over 50 specimens, either whole colonies or branches from different colonies, and in addition I have examined a very large number of specimens in the British Museum. These show an almost complete series from *P. acuta* to *P. madreporacea*; and any division into subgenera does not seem to me to be admissible, nor do there appear to be any characters running through a limited number of species which will serve to divide up the genus in any way for classificatory purposes. The examination of the polyps in such widely separated species as *P. suffruticosa*, *P. favosa*, and *P. grandis* has failed to show me any differences in their macroscopic anatomy; and I am doubtful whether all these so-called species should not rather be described as varieties of one species, the characters of which would be the characters of the whole genus.

The growth of the colony is much more vigorous toward the summits of the branches, and to this is due the angular character of the calices here and their very thin walls. The complete absence of verrucæ on the tops of the branches and their incrassate form in such a species as *P. grandis* are due to the ends of the branches having reached the low-tide level, and, being unable to grow further upwards, increasing in both thickness and breadth. Although this is by far the most common species of Madreporaria on the reef at Funafuti, I never found any of its branches with their summits dead, even though they reach almost invariably to the low-tide level. The colonies exhibit generally a very marked growth towards the light, and the under surfaces of horizontally growing branches of clumps are often completely bare of verrucæ. The living colonies are usually green or pink when the polyps are expanded, but if retracted are nearly colourless.

1. Pocillopora paucistellata, Quelch.

Pocillopora paucistellata, Quelch, Challenger Report on Reef-Corals, p. 65, pl. i. figs. 3–3*a*.

A few small pieces were dredged which agree well with Quelch's description. The corallum is rather more delicate and branched than the type. The calices are surrounded by short spines, and the primary septa are visible as spinulous projections in some of the subterminal corallites.

Funafuti; 5 and 7 fathoms.

2. Pocillopora suffruticosa, Verrill.

Pocillopora suffruticosa, Verrill, Bull. Mus. Comp. Zool. Cambridge, U.S.A., vol. i. p. 60.

Pocillopora suffruticosa, Quelch, Challenger Report on Reef-Corals, p. 65.

Four low clumps 5–7 cms. high were obtained, which agree well with Verrill's description and the 'Challenger' specimen referred to this species by Quelch. The calices vary from ·5–1 mm. in diameter; primary septa usually distinct spinulous lamellæ in the calices of the terminal branchlets. Columella low but quite distinct and spinulous. Colour of the living colony usually pink.

Funafuti; outer reef and 7–20 fathoms.

The ends of the branches of this species are much galled by a species of *Harpalocarcinus*.

3. Pocillopora cespitosa, Dana.

Pocillopora cespitosa, Dana, Zoophytes, p. 525, pl. 49. fig. 5.

A small specimen was obtained which corresponds very closely with Dana's figure and description.

Wakaya, Fiji; outer reef.

4. Pocillopora septata, n. sp. (Plate LVI. figs. 5, 5*a*.)

I have been obliged to refer a small horizontally growing branch, about 6 cms. long, to a new species. The colony probably forms rather loose hemispherical clumps, arising from an incrusting base with branches dichotomizing very regularly about every 15–20 mms. and about 12 mms. in diameter, 5 cms. below the apices, which are generally very blunt. The upper surface of the type is covered with low rounded verrucæ about 2 mms. in height and diameter, formed by 6–8 cells, nearly their own diameter distant from one another. The terminal calices are thin-walled, without septa or columella, and show clearly the formation of the tabulæ; the calices of the verrucæ are round, about 1 mm. in diameter, but between the verrucæ they are seldom more than ·6 mm. The cœnenchyma is everywhere well developed, and is about ·4 mm. thick between the calices of the upper surface of the branch, and about 1 mm. between those of the underside; it is covered everywhere very evenly by low pointed unbranched spines, which on the cell-walls of the verrucæ may form regular striations. The primary and secondary septa are exceedingly well developed, thick and bluntly spinulous in the calices of the verrucæ, but in the calices of the branch are less developed. The calices generally are shallow, being much filled up below by stereoplasm; not only the directives, but often the whole of the primaries fuse below with the columella. The latter is small, round, somewhat rough but exceedingly prominent, in the calices between the verrucæ often projecting slightly above their margins.

Funafuti; 30 fathoms.

5. Pocillopora damicornis, Esper.

Madrepora damicornis, Esper, Pflanz. Forts. i. p. 43; Madrep. pl. xlvi. A.

Pocillopora damicornis, Quelch, Challenger Report on Reef-Corals, p. 66.

A small clump and a large number of fragments were obtained, which correspond closely to Esper's description and to the 'Challenger' specimen. The lower branches in the clump tend to anastomose freely. The columella varies from a large oval to a round low projection, covered with short blunt spines.

Rotuma; outer reef.

6. Pocillopora brevicornis, Lamarck.

Pocillopora brevicornis, Lamarck, Hist. Anim. sans Vert. ii. p. 275.

Pocillopora brevicornis, Dana, Zoophytes, p. 526, pl. 49. fig. 8.

There are three low rounded clumps of this species 5–7 cms. high, and almost flat-topped. A Loyalty Islands specimen differs from the type in having shorter and rounded verrucæ. Delicate spinulous striations can be distinguished in most of the calices of the verrucæ, and represent the septa.

Funafuti; outer reef. Lifu, Loyalty Islands.

7. Pocillopora pulchella, Brüggemann.

Pocillopora pulchella, Brüggemann, Journ. Mus. Godeffroy, Bd. iii. p. 203.

A single branch was obtained, which resembles very closely in all respects the type specimen of this species in the British Museum.

Rotuma; outer reef.

8. Pocillopora lobifera, Milne-Edwards & Haime.

Pocillopora lobifera, Milne-Edwards & Haime, Corall. iii. p. 304.

There are two specimens, which seem to represent the species thus named by Milne-Edwards and Haime. Corallum closely resembles that of *P. brevicornis* in its mode of growth, consisting of much crowded branches little enlarged or divided towards their summits, which are covered over by small narrow verrucæ, generally less than 2 mms. high: the verrucæ on the sides of the branches lower down are often much longer, but retain almost the same diameter. The calices of the ends of the branches are very small ·5–·7 mm. in diameter, angular and relatively very deep; on the verrucæ they are larger but seldom exceed ·9 mm. in diameter. The cœnenchyma between the corallites nowhere exceeds the half of their diameter in breadth; its surface is covered somewhat sparsely with low spines, which tend to form striations between the calices. Septa and columella can seldom be distinguished.

The stereoplasm is well developed in the cells, causing the corallum to be very dense and heavy.

Rotuma; outer reef.

The one specimen shows a fusion between the branches 3·5 cms. below their summits, the branches arising from this being roughly circular, 8–12 mms. in diameter. The other specimen, which is only about 3 cms. high, seems to represent a young colony, the growth of which has been checked by the apices of its branches reaching the low-tide level of the pit in the reef in which it probably grew, as they are somewhat flattened, and the lateral verrucæ are much elongated.

9. Pocillopora lacera, Verrill.

Pocillopora lacera, Verrill, Proc. Essex Inst. vol. vi. p. 100.

A clump about 9 cms. in diameter by 5 cms. high was obtained, which agrees closely with Verrill's short description. The verrucæ are few, narrow and elongate, and pass gradually into the branchlets, which are from 5–10 mms. long. Lateral calices round and shallow, ·7 mm. in diameter, distant about half their diameter from one another; terminal calices 1 mm. in diameter, somewhat angular in shape, thin-walled and deep. Septa 12 thin spiniform lamellæ; columella a large round low spinulous projection. Corallum dense; cœnenchyma covered with low, somewhat branched spines, which form distinct striations between the calices.

Rotuma; outer reef.

10. Pocillopora clavaria (Ehrenberg). (Plate LVII. fig. 1.)

Pocillopora clavaria, Ehrenberg, Die Corallenthiere des Rothen Meeres, p. 128.

I have referred a small clump 11 cms. in diameter by 5 cms. high to this species. The colony consists of rather short branches, which dichotomize regularly, and arise from a broad incrusting base; the branches, where they are given off, are about 13 mms. in diameter, and are somewhat incrassate at their apices. The branches are covered with very obtuse verrucæ about 3 mms. broad at their bases by about 2·5 mms. high; on the sides of the branches they are much appressed. In places between the terminal verrucæ of the branches the calices are angular and thin-walled, but on the verrucæ they are round, about 1 mm. in diameter, and relatively thick-walled, the cœnenchyma being generally well developed and granular. The septa are very variable, in some calices being indistinguishable, but in others represented by spinulous lamellæ; the two directive septa cannot generally be identified. Columella small, distinct, and spinulous.

Funafuti; outer reef.

11. Pocillopora obtusata, n. sp. (Plate LVI. fig. 2.)

Corallum forming a low, broadly hemispherical mass, consisting

of short subequal, much branched stems, not more than 6 mms. apart, 7–15 mms. thick, rather compressed and lobed at the apices. The branches are covered over their summits with extremely obtuse and rounded verrucæ, many 5–6 mms. high and 4–5 mms. in diameter at their base; the verrucæ on the sides of the branches are scanty and somewhat appressed. The calices are everywhere from ·8–1 mm. in diameter and fairly round; they are generally surrounded by a distinct ring of somewhat flattened spines. The primary and secondary septa in many calices are distinct, rather thin, spiniform lamellæ; they are prolonged inwards and seem to fuse below with the columella, which is generally a distinct, low, broad, granular projection. The cœnenchyma is exceedingly well developed, even between the calices of the verrucæ, in which position it is marked by a distinct groove between the cells. The corallum is very dense, the stereoplasm completely filling up the cells below.

Sandal Bay, Lifu, Loyalty Islands.

The specimen is a clump 8 cms. in diameter by 4 cms. high; with it is growing a colony of *Madrepora violacea*, the increase of which has killed a part of its clump. The nearest ally to this species seems to be *P. clavaria*, but its characters are such as to separate it very distinctly from all previously described species.

12. Pocillopora favosa (Ehrenberg). (Plate LVI. fig. 3.)

Pocillopora favosa, Ehrenberg, Die Corallenthiere des Rothen Meeres, p. 127.

I have referred to this species after considerable hesitation several specimens, which agree fairly well with Ehrenberg's short description. The corallum forms clumps of much divided branches, which are generally more or less round, but may be slightly compressed and lobed towards their apices; diameter of the branch 10 cms. below the apex about 1·5 cms., 5 cms. below the apex about 1·1 cms. Apices of the branches usually about 1·1 cms. in breadth by ·7 cm. in width, completely covered with verrucæ, which here and immediately below are from 2–3 mms. high by 1–2 mms. broad, and contain from 6–9 calices. The verrucæ lower down on the branches get progressively lower, broader, and more obtuse, until on the main stems they form low projections about 1 mm. high by 4 mms. broad. The cells on the verrucæ near the ends of the branches are round or oval in shape, ·9–1·1 mms. in diameter; but between the verrucæ they are rather smaller, angular, very thin-walled and deep. The cœnenchyma is progressively more developed from the top to the bottom of the stems, and is covered by rough, compressed spines, which between the calices may form striations. The primary and secondary septa are well developed, especially in the calices of the verrucæ, but do not project far inwards; the primaries are especially thick and bluntly spined, the tertiaries are here and there visible. Columella low and bluntly spined, usually distinctly joined, deep

down in the calice, by one of the directive septa. Corallum usually heavy, the cœnenchyma between the cells and the stereoplasm within being well developed and very dense in the older parts of the colony.

Funafuti; 7 and 8 fathoms.

The colour of the living colony is green. The corallum of the lower stems of the colony is much stained with a dark red-brown pigment on the exterior. The form described by Klunzinger as *P. favosa* seems to me to belong to an entirely distinct species. I have described the species from three large fragments, apparently from the same colony, obtained from 7 fathoms. A clump 9 cms. in diameter by 8 cms. in height was obtained from 8 fathoms; it differs in having the septa rather thinner, the secondary less distinct. The base of the colony has round shallow calices about ·9 mm. in diameter.

13. Pocillopora aspera, Verrill.

Pocillopora aspera, Verrill, Proc. Essex Inst. vol. vi. 1868, p. 93.

Two small specimens correspond closely to Verrill's description of this species. The largest is about 7 cms. long, and is part of a considerable clump. The older branches are strongly compressed and have the summits somewhat bare, while the younger branches have their apices conspicuously verrucose. The verrucæ vary from 2–5 mms. in length by 1–3 mms. in breadth at the base, and arise obliquely, but are little appressed to the branches. The calices of the verrucæ are oval in shape, 1–1·3 mms. in long diameter; their primary and secondary septa are distinct, the directive septa more prominent and extending to a small, distinct, spinulous columella. The calices of the ends of the branches are angular in shape, about 1·1 mms. in diameter, with very thin walls, and are very deep; their septa and columella are not developed. In places at the sides of the branches the calices are very small, not more than ·8 mm. in diameter, round in shape and shallow, with distinct septa and columella; the cœnenchyma is well developed between these, and covered with low granular spines. The corallites of the base of the colony resemble the latter, but the cœnenchyma is better developed, and there are a few larger, round calices 1·3 mms. in diameter. The corallum of the base of the colony is stained a dark brown-red colour. The living colony is dark green.

Funafuti; 5 and 30 fathoms.

Var. danæ (Verrill).

Pocillopora danæ, Verrill, Bull. Mus. Comp. Zool. p. 59 (1864).
Pocillopora danæ, Verrill, Proc. Essex Inst. vol. vi. 1868, p. 93.

Two specimens correspond very closely to Verrill's description, but there is a third, which seems absolutely intermediate between this "species" and *P. aspera*, so that I have constituted it a variety. The septa and columella can be traced in many of the

upper calices of the branches, and in many of the lower are almost distinct.

Levuka, Fiji; 3 fathoms. Funafuti; 30 fathoms.

Two specimens, weighing 41 and 13 grams, were obtained from the chain of a buoy in Levuka Harbour, which had been cleaned less than 22 months before.

Var. LIGULATA (Dana).

Pocillopora ligulata, Dana, Zoophytes, p. 531, pl. 50. fig. 2.
Pocillopora ligulata, Verrill, Proc. Essex Inst. vol. vi. 1868, p. 95.

A small specimen closely resembles this "species" of Dana, but many of its calices are intermediate in their septa to *P. aspera*, and the colony also closely resembles in its growth that species. In some of its cells the tertiary septa can be traced, and in others the septa approach to those of *P. plicata* of Dana.

Funafuti; 7 fathoms.

Although I have only had the opportunity of examining a very limited number of specimens, as I can find no distinctive characters, I have no hesitation in combining *P. aspera*, *P. danæ*, *P. ligulata*, and *P. plicata* under one species with three varieties; I only doubt the propriety of characterizing varieties by their septa and columella, as it seems to me that the term "variety" should be kept in the Madreporaria for colonies the general growth of which differs in some important respect from that of the type.

14. POCILLOPORA VERRUCOSA (Ellis & Solander).

Madrepora verrucosa, Ellis & Solander, Zoophytes, p. 172.
Pocillopora verrucosa, Dana, Zoophytes, p. 529, pl. 50. figs. 3-3*a*.
Pocillopora verrucosa, Quelch, Challenger Report on Reef-Corals, p. 69.

I have referred a somewhat recumbent branch to this species. Its verrucæ are 4–5 mms. long by 2–3 mms. broad, and lie entirely on the upper surface of the branch. The septa are indistinct, but the columella is large and very spinulous.

Rotuma; outer reef.

15. POCILLOPORA SQUARROSA, Dana.

Pocillopora squarrosa, Dana, Zoophytes, p. 530, pl. 50. fig. 5.

I have referred three specimens to this species. The corallum forms loose clumps about 30 cms. in diameter by 18 cms. high. The species is well characterized by the low crowded verrucæ, which completely cover over the sides and the somewhat compressed and lobed apices of the branches. The surface of the cœnenchyma, which is fairly abundant, is completely covered over by short somewhat variable spines, and there are in the lower calices of the branches 12 very distinct septa, of which one

directive is often larger and prolonged to join the small, but distinct, columella.

Funafuti; outer reef and 20 fathoms.

This species seems to me to be distinct from *P. verrucosa*, but *P. nobilis* of Verrill will probably have to be merged in it.

16. Pocillopora mæandrina, Dana.

Pocillopora mæandrina, Dana, Zoophytes, p. 533, pl. 50. figs. 6–6 *a*.

There are five clumps, the largest 7·5 cms. in diameter by 4 cms. high, which correspond very closely to Dana's description. The branches are much compressed, and have very sinuous summits seldom more than 7 mms. broad, sometimes nearly naked, but generally covered by small verrucæ. The cœnenchyma is very little developed between the calices, and the stereoplasm fills up the cells but little, so that the corallum is noticeably light and cellular. Both the septa and columella are very indistinct.

Funafuti; outer reef.

17. Pocillopora coronata, n. sp. (Plate LVI. figs 4, 4 *a*.)

Corallum consisting of much flattened branches, which may anastomose with one another. The verrucæ over the tops of the branches are very small, but on the sides are somewhat obtuse, 2–3 mms. broad at the base by 1–3 mms. high, and arise almost at right angles to the stem; they are separated from one another by a distance of 1–3 mms. The summits of the branches are slightly flattened but not thickened, and are covered over and between the low verrucæ with small angular calices ·5–·8 mm. in diameter, with neither septa nor columella. The calices on the verrucæ and sides of the branches are usually round, and from ·8–1·2 mms. in diameter, with a ring of very thick, long, blunt, branched and knobbed spinules round their margins; these spinules between neighbouring calices are very large, much flattened, placed in rows, and to some extent continuous with the septa within. The primary and secondary septa are well developed and very thick, with spinulous edges projecting considerably into the cell. The columella is small but very prominent, round and knobbed. The cœnenchyma is very dense and compact, but nowhere very abundant between the corallites, which are almost completely filled up below by stereoplasm. The base of the corallum is of a dark brown-red colour; the living colony is green.

Rotuma; 3 fathoms.

The specimen is a much-flattened branch 9·5 cms. long, obtained by diving. At its base it is 21 mms. broad by 10 mms. thick. It divides dichotomously, 3 cms. above, into two flat branches, which, however, 1 cm. above have fused with one another for a distance of 2 cms. At its apex the one branch is 3·5 cms. broad by 5 mms. thick, and the other 1·4 cms. broad by 6 mms. thick. The cells on the sides of the branches and on the

verrucæ, owing to the crown of spines round them, are very distinct and appear rather deep.

This species is closely allied to *P. plicata* of Dana by its septa and columella, but it is at once distinguished by its mode of growth, numerous verrucæ, dense corallum, and large spines.

18. Pocillopora rugosa, n. sp. (Plate LVII. fig. 2.)

Corallum of rather short, very thick, arborescent branches, which tend at their summits to be somewhat lobed and incrassate, about 12 mms. thick by 25–40 mms. broad, with apices sparingly covered with low and small verrucæ with very angular, thin-walled cells between. The sides of the branches are sparingly covered by large verrucæ, which are always separated by spaces equal to their diameter from one another; they are generally about 5–6 mms. long by 2–3 mms. in diameter at their bases, are somewhat pointed, and stand out almost at right angles to the stems. The surface of the corallum is covered with low blunt spines, which form striations between the calices, which are generally shallow, from ·6–·9 mm. in diameter and round. The cœnenchyma is little developed between even the lowest calices. The septa are very indistinct. The columella is slender, and in the lower calices of the colony very prominent. The colony, when first obtained, had a most brilliant dark green colour.

Funafuti; 7 fathoms.

The specimen on which this species is founded is a colony 11 cms. high, arising from an incrusting base. It consists of one large stem 3 cms. in diameter, which has divided dichotomously above. Its nearest allies are *P. grandis* and *P. elegans*, but it is separated from these by its distinct columella and the arrangement of its verrucæ.

19. Pocillopora grandis, Dana.

Pocillopora grandis, Dana, Zoophytes, p. 534, pl. 51. figs. 2–2*c*.
Pocillopora elongata, Dana, Zoophytes, p. 531, pl. 50. figs. 4–4*b*.
Pocillopora elegans, Dana, Zoophytes, p. 530, pl. 51. figs. 1–1*a*.
Pocillopora eydouxi, Milne-Edwards & Haime, Corall. iii. p. 306, pl. F 4. figs. 1 *a–c*.

I have referred 13 specimens to this species, the description of which is somewhat vague. The colony is formed of large foliaceous branches, which generally are very compressed, often being 6–8 cms. wide by about 1 cm. thick at their apices; they are often, too, considerably ridged on the sides and lobed. The branches are completely covered over the sides and summits by generally considerably appressed verrucæ, about 3 mms. high by 2 mms. in diameter, usually about half their diameter distant from one another; on the sides of the branches a few cms. below the summits they are often larger and globose, and at the base of the colony very small or completely obliterated. The calices of the verrucæ are round, about 1 mm. in diameter; on the summits of the branches, and in places between the verrucæ, they are about

the same size, very deep, angular, and thin-walled, but generally between the verrucæ and low down in the colony they are round, about ·8 mm. in diameter. The cœnenchyma is well developed, and near the base of the colony generally separates the calices by about half their diameter; the surface is covered by low spines, which may form striations between the calices. The stereoplasm is usually little developed. Commonly 12 septa and a small columella can be distinguished, but the primary are often very distinct spiny lamellæ, one directive prolonged to meet a small, prominent columella, or both septa and columella may be indistinct. The living colony is colourless, pink or green.

Funafuti; outer reef. Rotuma; outer reef and 2 fathoms. Lifu, Loyalty Islands.

I have retained the name of *P. grandis* for this species to avoid a synonym, as I have no doubt that it is the same species as Dana described under this name. The colonies grow in the fissures of the outer reef in great abundance, and, where their branches reach and project above low tide, they tend to be thickened, flattened above, and bare. There is a good series between *P. elongata* of Dana and *P. grandis*, and some smaller specimens resemble closely *P. elegans* of Dana, so that I have been compelled to unite these species; in the description of *P. eydouxi* there do not seem to be any characters which would serve to separate it either. The same specimen is often in places very diverse in its growth and in the arrangement of its septa and columella, so that I do not think the differentiation of varieties advisable. I have referred to the same species a small incrusting clump 7 cms. broad by 3 cms. high, found in the breakers at Rotuma; its verrucæ and cells are similar to the type, and it seems to be the much stunted commencement of a colony.

The specimen nearest to *P. elongata* (Plate LVII. fig. 3) is a branch 21 cms. long by 3–4 cms. broad; its septa and columella are very distinct. It was growing out from under the overhanging edge of a fissure in the reef, and has its side towards the rock almost bare of verrucæ, which, however, cover the opposite side very evenly. There are two small branches coming off, which subdivide into numerous smaller branchlets, giving them quite a bushy appearance. Their verrucæ are larger than in the main branch; their calices, however, are of the same size and have a distinct star and columella, but the cœnenchyma between them is generally more developed.

20. Pocillopora glomerata, n. sp. (Plate LVI. fig. 1.)

Corallum a low, glomerate, slightly hemispherical, semi-incrusting mass, with a few lobe-like, somewhat compressed branches up to 2 cms. in length, 10–15 mms. thick. The apices and sides of the branches are generally bare, but some are sparingly covered by low, round, much appressed verrucæ. Calices of the verrucæ 1–1·2 mms. in diameter, round and rather deep, of the apices of the branches about ·8 mm., usually angular and thin-walled, and

of the base between the branches, where they are very crowded, about ·4 mm. Cœnenchyma well developed, the calices at the base of the branches being about their own diameter distant from one another; its surface is sparingly covered with low pointed spines. The stereoplasm is little developed, and the cells can be traced deep into the corallum. Septa 12, of which the primary are more distinct, and meet the broad, low, somewhat rough and spinulous columella.

Funafuti; outer reef.

The larger specimen, on which this species is founded, is about 8 cms. in diameter by 4 cms. high, and is quite distinct from all the other living species; it seems to form a connecting link to *P. madreporacea* of Lamarck, a fossil species from the Miocene formation of Turin.

II. Genus Seriatopora, Lamarck.

Seriatopora, Lamarck, Hist. Anim. sans Vert. ii. p. 282.

Seriatopora, Duncan, Rev. Madrep., Jour. Linn. Soc., Zool. vol. xviii. p. 47.

1. Seriatopora pacifica, Brüggemann.

Seriatopora pacifica, Brüggemann, Ann. & Mag. Nat. Hist. xix. 1877, p. 418.

A small specimen resembles very closely the type specimen of this species. Its branches are, however, rather more divaricate, probably owing to their greater part having been killed by incrusting nullipores.

Rotuma; boat-channel.

NOTE.

Since this paper was written examples of three more species of *Seriatopora* have come to hand, viz.:—

1. Seriatopora lineata (Linnæus).

Millepora lineata, Linnæus, Syst. Nat. ed. xii. 1766, p. 1283.

Seriatopora lineata, Klunzinger, Die Korallthiere d. Rot. Meeres, Th. ii. p. 71.

The specimen of this species is a large branch, which appears to have been broken off from a clump, and then to have gone on growing as it lay, supported by its branchlets, on the sea-bottom; the broken end has been covered over by the budding of the corallites round it, and two small branches have grown out, so that the fracture is almost completely obliterated.

Sandal Bay, Lifu, Loyalty Islands; 30–40 fathoms.

2. Seriatopora conferta, Quelch.

Seriatopora conferta, Quelch, Challenger Report on Reef-Corals, p. 63, pl. ii. fig. 1.

Funafuti; 20 fathoms. A fragment.

3. Seriatopora spinosa, Edwards & Haime.

Seriatopora spinosa, Edwards & Haime, Corall. iii. p. 312.
Seriatopora spinosa, Klunzinger, Die Korallthiere d. Rothen Meeres, Th. ii. p. 72.

Funafuti; 20 fathoms. A young colony.

EXPLANATION OF THE PLATES.

Plate LVI.

Fig. 1. *Pocillopora glomerata*, n. sp., ×½, p. 951.
Fig. 2. *Pocillopora obtusata*, n. sp., ×½, p. 945. In the upper part of the figure is a young colony of *Madrepora violacea*, Brook.
Fig. 3. *Pocillopora favosa* (Ehrenberg), ×½, p. 946.
Fig. 4. *Pocillopora coronata*, n. sp., ×½, p. 949. 4 *a*. Single calice of same, p. 949.
Fig. 5. *Pocillopora septata*, n. sp., ×½, p. 943. 5 *a*. Single calice of same, p. 943.

Plate LVII.

Fig. 1. *Pocillopora clavaria* (Ehrenberg), ×⅔, p. 945.
Fig. 2. *Pocillopora rugosa*, n. sp., ×⅔, p. 950.
Fig. 3. *Pocillopora grandis* (Dana), variety, ×⅔, p. 951.

5. On a Collection of Mammals from Morocco.

By W. E. de Winton, F.Z.S.

[Received December 1, 1897.]

Owing to the difficulty of entering the country on account of the inhospitality of the inhabitants, very little is known of the fauna of Morocco, and, as is usual, the least known are the Mammalia. Practically nothing has been done in the way of collecting during recent years, and such animals as are known have almost entirely been obtained alive for trade purposes, or have been collected in the neighbourhood of the coast-towns frequented by Europeans. It was with great pleasure therefore that I undertook, at the request of Mr. J. S. Whitaker, F.Z.S., the task of working out the present collection made by Mr. E. Dodson, a young naturalist, who went out on behalf of Mr. Whitaker in the spring of this year to collect birds and mammals in that country. Going inland from Tangier, the ordinary trade-route was taken to Fez, thence to Mekinez and back to the coast north of Rabat. Hence the coast-route was taken southward to Mazagan, thence striking inland to Morocco city.

From Morocco city Mr. Dodson first visited the Great Atlas range to the south at Amsmiz and penetrated to Imintella; then, retracing his steps to Amsmiz, he followed the northern slopes to Iminzat; from here the mountains were again visited, stays being made at Enzel, Zarakten, Tetula, and Glarvi (?Glauwi); thence he returned south of Morocco city *via* Fruga, Sierzet, and Ogadel to Mogador on the coast. Ras el Ain, in the Province of Haha, and Ecru were the most southerly points visited.

The collection consists of 64 specimens belonging to 13 genera and 21 species, of which three are new to science. The primary object of the expedition being birds, the collection of mammals is very creditable, but it is to be regretted that, owing to want of knowledge of what was rare, more persistent search was not made when novelties were hit upon. The skins are well prepared and most carefully labelled with data.

1. PIPISTRELLUS KUHLII (Natt.).

Vesperugo kuhlii, auct.

For the reason of change in the generic name of this Bat, see Miller, Ann. Mag. N. H. 1897, ser. 6, vol. xx. p. 383.

Two specimens, taken at Ras el Ain, Province of Haha, 31° N., 22nd June, 1897.

2. MYOTIS MYOTIS (Bechst.).

Vespertilio murinus, auct., nec Linnæus.

For change of name, see Miller, *loc. cit.*

Six specimens, all taken in a vault at Mekinez, 3rd April, 1897.

3. CROCIDURA (CR.) WHITAKERI, sp. n.

Colour drab-grey above, white beneath: tail drab-grey above, white beneath. Excepting the tail this animal agrees in colour with *Cr. fischeri*, Pagenstecher, Jahrb. d. Wissensch. Hamburg, ii. 1884, p. 34, pl. fig. i.; the size, however, is very much smaller.

Type ♂ (?). Sierzet, about halfway between Morocco city and Mogador, 5th June, 1897. Collector's measurements:—Head and body 62 millim.; tail 28; hind foot 11.

Skull, base damaged:—End of nasals to back of parietals (middle line) 13 millim.; greatest breadth 7·7; interorbital constriction 3·5; front of incisors to back of auditory bullæ 16; front of incisors to back of palate 8·3; tip of incisors to tip of large premolar 4·1; outside $\frac{\text{ms.}^2}{\text{———}}$ 5·6; mandible, back of condyle to front of $\frac{\text{i.}_2}{\text{———}}$ 8·5, height at coronoid 4·3.

Compared with *C. crossei*, Thos., from Asaba on the R. Niger, the new Shrew is smaller, the tail is much shorter in proportion, and the underparts white; the skull is smaller, the palate narrower, and shorter in the basicranial portion; the large upper incisor is stronger, more rounded in front and not so abruptly turned down.

The hindermost of the two small unicuspid teeth, which is both slightly shorter and smaller in cross-cut than the foremost, is much crowded between this tooth and the large premolar; whereas in *C. crossei* the two small teeth are nearly of the same size, and there is a clear space between the hindermost and the large premolar and no crowding.

With the exception of one species from Somaliland, *C. nana*, Dobson, this is the smallest true *Crocidura* known, and is a most interesting addition to the fauna of this region.

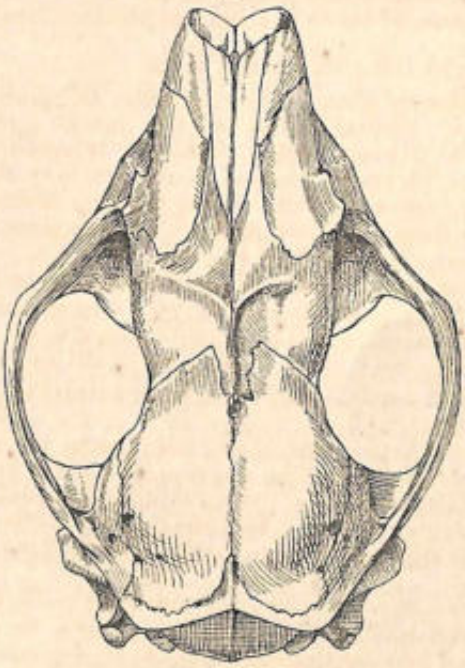
4. Erinaceus algirus, Duv. & Lereb.

Erinaceus algirus, Duvernoy & Lereboullet, Mém. Soc. Strasb. iii. 1840, fasc. 2, p. 4; Anderson, P. Z. S. 1895, p. 419.

2 specimens, ♂ ♀. Schaf el Kab and Ras el Ain, Haha.

The white forehead and underparts usually characteristic of this species cannot be taken as constant. The specimen from Schaf el Kab has the dirty drab-brown colouring generally found in *E. europæus*. The size and colour of the claws will always distinguish these species outwardly: in *E. algirus* the claws are narrower and pale horn-coloured in the dry skin, while in *E. europæus* they are stronger and black. There is no appreciable difference in the texture of the hair of the underparts, and certainly nothing to account for the stress laid by Duvernoy on the softness of the fur in the type specimen. The skulls of these two species are very readily distinguished. Viewed from above that of

Fig. 1.

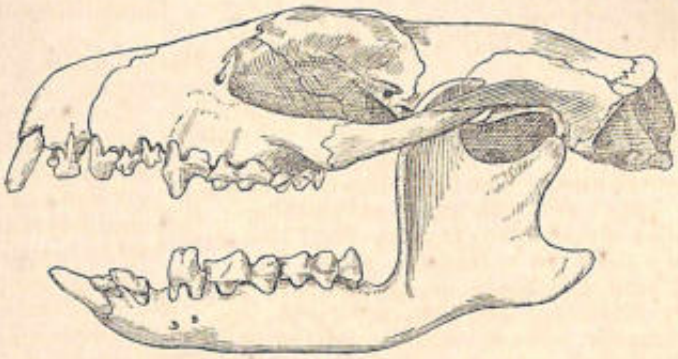


Skull of *Erinaceus algirus* (top view). 1¼ nat. size.

E. algirus (fig. 1) has much broader nasals, and the sagittal crest for attachment of the muscles extends on to the frontals to fully half their length in the middle line, while in *E. europæus* this ridge is confined to the parietals. Viewed from beneath, the palatal

bridge is broader in this species, owing to the postnarial aperture being somewhat boned over; they agree, however, in the form of the pterygoids and in the width and formation between the auditory bullæ. The dentition (fig. 2) shows considerable differences; the

Fig. 2.



Skull of *Erinaceus algirus* (side view). 1½ nat. size.

most marked are as follows:—the very small $\frac{i.\ 2}{}$ grows diagonally from behind, or on the inner side of $\frac{i.\ 3}{}$, so that when viewed from the side the base does not appear, and in aged animals when the teeth are somewhat worn looks simply like a horizontally projecting cusp of $\frac{i.\ 3}{}$ (the smallness of this tooth led the describers to suppose that in the type specimen it was abnormally backward in development); while in *E. europæus* this tooth $\frac{(m.\ 2)}{}$ is in the row and about $\frac{2}{3}$ of the size of $\frac{i.\ 3}{}$; the tall premolar in the lower jaw has only a very slight notch between the two outer cusps, and the inner cusp is almost entirely wanting. The most remarkable feature in the dentition of *E. algirus*, and which will distinguish it at once from *E. europæus*, is the number and form of the roots in the usually single-rooted teeth; in one specimen of the present collection $\frac{i.\ 3}{}$ has three distinct roots; the canines have two roots widely separated forming a distinct V, while in *E. europæus* it is the exception for this tooth to be double-rooted, and then the roots lie close together; the premolars are also two- or three-rooted, with the fangs widely divergent.

The British Museum contains a specimen of *E. algirus*, presented by Lord Lilford, said to have come from Andalusia; if this locality is correct (and there is every reason to suppose it is), the fact is of particular interest, adding another to the list of North-African species found in the Spanish Peninsula; and the interest is further enhanced because *E. europæus* certainly occurs in the neighbourhood of Seville. Thus these two forms would be living side by side.

5. Canis anthus, F. Cuv.

♂. Ras el Ain, Haha, 27th June, 1897.

Collector's measurements:—Head and body 760 millim.; tail 295; hind foot 165; ear 100.

6. Vulpes atlantica, Wagn.

Canis vulpes, var. *atlantica*, A. Wagner, Reisen Regentsch. Algier, v. M. Wagner, Bd. iii. p. 31 (1841).

Vulpes sp., F. Cuv. (Renard d'Alger) Mam. Lith. no. 177, vol. iii.

♀. Ras el Ain, Haha, 20th June, 1897.

Head and body 525 millim.; tail 345; hind foot 118; ear 85.

The fur of this single specimen is peculiarly free from the grizzling usually found in Foxes; the fore and hind legs and feet are bright red, with no black markings; the hind feet have a whitish stripe coming from the inner side of the heel and extending down the front of the foot to the toes. The general colour of the animal is bright orange-red, the tips of the underfur being very foxy-red. The belly is clothed with maroon-brown fur—a character, however, which would not be constant.

The skull-measurements are:—Extreme length 120 millim., breadth 65, basal length 112, front of canine to back of carnassial 42. The lower jaw shows an extra molar on both sides, that on the left side has two distinct complete crowns. These supernumerary molars are very rare in the Common Fox, as pointed out by Hensel, Morph. Jahrb. 1879, and Bateson in 'Variation,' p. 219 (1894); there is no instance among the series of *V. niloticus* in the British Museum. A good figure of the animal is given by F. Cuvier (*tom. cit.*).

7. Genetta genetta (L.).

♂. Ras el Ain, Haha, 4th July, 1897.

Head and body 460 millim.; tail 430; hind foot 90; ear 48.

8. Xerus getulus (L.).

Fourteen skins with skulls, 9 ♂, 5 ♀, Glarvi, Enzel, Ras el Ain, Haha, and Ecru, from April to July; the first two localities are on the Great Atlas range east of Morocco city, the last two near the coast south of Mogador.

A nice series of different ages. In old and young the belly is very thinly clothed with hair. Adult females show the mammæ very plainly; these are large and black, all on the belly and groins: thus the formula is 0—4=8. The young are darker in colour, showing less brown on the back, with the underparts sooty. The tail is very decidedly distichous; in the adult there are 4 light rings and 3 black, in the young 3 light and 2 black. The fur is less harsh and brittle than in the typical *Xerus*, but there is no underfur.

There are some interesting peculiarities in the construction of the palate and pterygoids of the young animal which do not seem

to have been recorded, not confined to this species, being common to all true *Xerus*, but not found, I believe, in any *Sciurus*. In the first place the middle of the palate is much arched and scooped out or concave, leaving a prominent ridge of bone on either side next the molar series. Secondly, the pterygoids are so peculiar that it is hard to follow the homologies of the perfect bones of the adult; there is a prominent wing-like ridge, apparently a continuation of the two ridges of the palate mentioned above; the inner face is concave and bowed inward, partially covering the pterygoid fossa; the apophyses at the back of the palate are very much lengthened, so that the postnarial foramen is almost boned over in the inter-pterygoid portion: the pterygoid processes, besides being winged and flattened, are very much thickened posteriorly, and are formed of very spongy porous bone: the bone is hollow in the centre, there being a triangular cavity. The whole structure is thus very unlike the form attained in the adult state. This condition of the palate is observed until the animal is almost full-grown, and the abnormal bone-covering appears to be absorbed about the time the permanent premolars are fully grown.

As is usual in Squirrels, the incisors are narrow and of a very pale honey colour in the immature, increasing in size and depth of colour with age till a fine orange-red is attained.

Mr. Dodson noticed these Ground-Squirrels always among rocks; their food seemed to consist entirely of the fruit and kernel of the Argand tree (*Argania sideroxylon*), and they were never found far away from these trees. It is believed that they sometimes congregate into troops of 100 or so and migrate to fresh pastures.

9. Gerbillus shawi, Duv.

(8), 1 ♂, 7 ♀. Morocco city (April), Mogador (June).

10. Gerbillus campestris, Levaill.

(7), 6 ♂, 1 ♀. Azimur, Dukalier, Alloo (April); Mogador, Ras el Ain (June).

11. Mus rattus, L.

(5) Ras el Ain, Schaf el Kab, Ecru. Both the black and brown forms represented.

12. Mus musculus, L.

(2) Schaf el Kab (March).

13. Mus musculus gentilis, Brants.

Mus gentilis, Brants, Muizen, 1827, p. 126.

	Head and body. mm.	Tail. mm.	Hind foot. mm.	Ear. mm.
♂. Enzel, 31st May	78	64	15	12
♂. Ras el Ain, Ahmar, 5th June.	77	55	14	13
♂. Sierzet, Ahmar, 5th June .	70	53	15	12

"Caught in thorn-bushes." "Among stones in olive-grove."

These Mice do not seem to differ in any way from those of Egypt or Asia, and I see no cause to separate them.

In 'The Zoologist' for 1896, p. 178, Mr. G. E. H. Barrett-Hamilton gives an account of the forms of this Mouse which occur in several countries. I have chosen the present subspecific name in preference to *bactrianus*, as being the earliest given to this form from Egypt, for which identification I have to thank Mr. Oldfield Thomas, who had examined Brants's type in the Berlin Museum.

There seems to be no doubt that *Mus spretus*, Lataste, from Algeria, is simply one of these white-bellied House-Mice which are found always *outside* houses. The cusp or claw spoken of by Lataste may be found in the front of the first upper molar of many examples of *Mus musculus*, and has no value as a specific character.

14. Mus sylvaticus, L.

(4) Schaf el Kab (March).

Cannot be separated from the common "Wood-Mouse" of Europe.

15. Mus peregrinus, sp. n.

Colour above grey washed with brownish yellow, less grizzled on the cheeks and sides; underparts white, not very sharply defined; tail very slightly darker above than below, practically naked.

The general colour of this Mouse is rather like the yellow *M. gentilis*, only the grizzling of the hairs is coarser, more resembling that of *M. sylvaticus*. Compared with the latter it is rather larger in size, the tail is very much less hairy, and the scales finer, in less regular rings.

Type, ♀. Ras el Ain, Haha, 24th June 1897.

Collector's measurements:—Head and body 97 millim.; tail 103; hind-foot 22; ear 18.

Skull.—Nasals 10·6 × 3·3; postorb. constr. 4·4; breadth of zygomata at junction with malar 12·3; length of palate 12·1, pal. foramina 6·5, upper molar series 4·5, diastema 7·3, outside $\frac{\text{ms. 1}}{}$ 5·5, inside $\frac{\text{ms. 1}}{}$ 3.

The single specimen, a young female, shows no sign of mammæ, but I feel little doubt that it will prove to be a northern representative of the well-known Ethiopian mice having more than 12 mammæ. As regards colour, its nearest ally is found in Matabeleland, but in size they differ, as also in the amount of hair on the tail; in fact this Morocco mouse has less hair on its tail than any of the smaller known mice that could be compared with it.

The skull, unfortunately very imperfect, shows undoubtedly close affinity with the "multimammate" group: the pattern of the molars is the same; the incisors above and below are unusually strong; the mandible is also rather stronger than most of its allies, with very short angular processes not extending so far back as the condylar processes.

The discovery of this animal adds another to the list of Ethiopian forms found in the Mediterranean Sub-Region.

16. ARVICANTHIS BARBARUS, L.

♀. Enzel on the Great Atlas range east of Morocco city, 31st May, 1897. "Caught in trap under thorn-bushes."

Head and body 113 millim; tail 127; hind foot 25; ear 16.

This animal, so well known in menageries, is very rarely obtained "wild killed;" it is much to be regretted that a full series was not procured.

17. HYSTRIX CRISTATA, L.

♀. Ecru, 18th June, 1897. Head and body 540 millim.; tail 80; hind foot 90; ear 30.

18. LEPUS ATLANTICUS, sp. n. (Skull, figs. 3 & 5, p. 961.)

Size very small; ears very long, considerably longer than the head. Colour light sandy over cinnamon, the fur almost entirely wanting the conspicuous black median band which gives the characteristic mottling to most species; the underparts are white, but there is no sharp line between the colours of the upper and under sides; tail long, jet-black in a broad line above, pure white beneath.

The fur is slate-grey for a considerable distance from the base, the underfur broadly tipped with cinnamon; on the back the grey is of less extent though well marked even there, the greater part of the fur being cinnamon-coloured, but much brighter at the ends; the coarser hairs have only a very narrow dusky median band, the tips tawny, though the extreme tips of some of the hairs are blackish. On the rump the general colour is greyer, the cinnamon colour being less conspicuous. The band on the chest is pale cinnamon, the hairs being dark slate-coloured for nearly their entire length and only tipped with the brighter colour. The nape is bright cinnamon. The fore and hind legs are red-fawn. The long ears have a well-defined black patch on the back of the tips, the inner margin is white, the outer margin golden fawn; whiskers black at the bases, white at the ends.

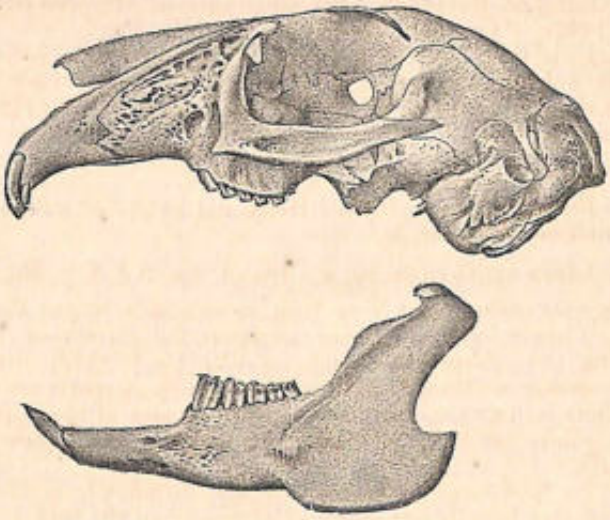
This Hare is unquestionably nearly allied to *L. kabylicus*, mihi[1], from Algiers, but is very much smaller, with longer ears in proportion to its size.

Skull.—Greatest length 76 millim.; greatest breadth (squamosals) 36, across front of zygomata 32; length of nasals in middle line 23, greatest length 28, greatest breadth 14·5, across narrowest part 10·5; intertemporal constriction 12; breadth across maxillæ below lachrymals 26; basal length 62; length of upper molar series 13; depth from nasals to palate immediately in front of molars 17, above front of palatal foramina 14; length of mandible (bone only) from back of condylar process to inner side of back of incisors 54·5; greatest height standing on table, perpendicularly to condyle, 31·5.

Type, ♂. Ras el Ain, Haha, 23rd June, 1897. Killed in Arab hunt.

[1] Ann. & Mag. N. H. 7) i. p. 155.

Fig. 3.



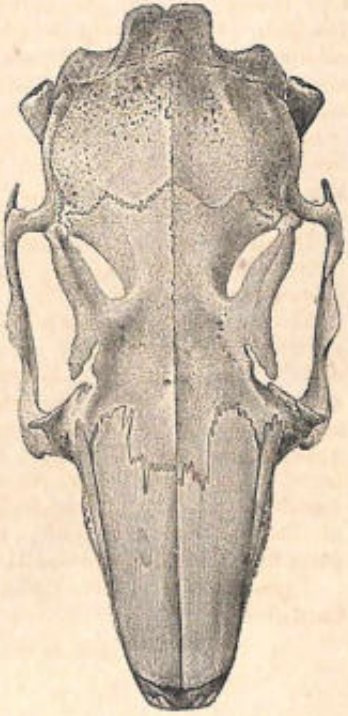
Skull of *Lepus atlanticus* (side view). Nat. size.

Fig. 4.



Skull of *Lepus schlumbergeri* (top view). Nat. size.

Fig. 5.



Skull of *Lepus atlanticus* (top view). Nat size.

Collector's measurements:—Head and body 377 millim.; tail 80; hind foot 100; ear (from notch) 115; in dried skin from the crown 127.

A second specimen, Glarvi, 28th May, 1897:—Head and body 406 millim.; tail 70; hind foot 110; ear (from notch) 120.

19. Lepus schlumbergeri, St. Loup, Bull. Soc. Zool. France, xix. p. 168. (Skull, fig. 4, p. 961.)

♂. Schaf el Kab, 2nd March, 1897. "Lives in burrows" (*E. D.*).

Collector's measurements:—Head and body 470 millim.; tail 50; hind foot 120; ear 103.

The Hare of the neighbourhood of Tangier was described in 1894; a fuller description will be found in the Ann. & Mag. Nat. Hist. for February 1898 by the present writer. The tail of this specimen seems to have been docked, the normal length being proportionately about that of the Common Hare.

20. Lepus cuniculus, L.

Skin and skull, ♂. Karia el Habessi, 19th March, 1897.

This specimen appears to me to agree in every particular with our common Wild Rabbit—an interesting fact, seeing that fresh blood and improving crosses have been so freely indulged in among our British stock.

21. Ovis tragelaphus, Desm.

♀ juv. Ecru, 17th June, 1897.

"Found lying under a rock; no others seen at the time, though several were met with during a 'drive' but not obtained" (*E. D.*).

APPENDIX.

LIST OF ADDITIONS TO THE SOCIETY'S MENAGERIE

DURING THE YEAR

1897.

Jan. 4. 1 Pig-tailed Monkey (*Macacus nemestrinus*), ♂. Presented by Mrs. Baillie.
1 Bennett's Wallaby (*Macropus bennetti*). Born in the Menagerie.
1 Rufous Rat-Kangaroo (*Æpyprymnus rufescens*). Born in the Menagerie.
1 Moluccan Kestrel (*Tinnunculus moluccensis*). From Triton Bay, New Guinea. Presented by the Hon. Walter Rothschild.
6. 2 Leopards (*Felis pardalis*), ♂ ♀. Presented by H.E. The Rt. Hon. Sir Joseph West Ridgeway, K.C.B., K.C.S.I.
2 Indian Dial-birds (*Copsychus saularis*), 2 ♂. Purchased.
7. 7 Common Squirrels (*Sciurus vulgaris*). Purchased.
2 Roseate Cockatoos (*Cacatua roseicapilla*). Presented by Richard J. L. Price, Esq., F.Z.S.
1 Yellow-backed Lory (*Lorius flavo-palliatus*). Presented by Miss A. M. Elwood.
8. 1 Derbian Zonure (*Zonurus giganteus*). Presented by J. E. Matcham, Esq., C.M.Z.S.
3 Angola Frogs (*Rana angolensis*). Presented by J. E. Matcham, Esq., C.M.Z.S.
11. 2 Patas Monkeys (*Cercopithecus patas*), ♂ ♀. Presented by Thomas W. Loy, Esq.
12. 1 Prairie Marmot (*Cynomys ludovicianus*). Presented by W. Hewlett, Esq.
2 Kestrels (*Tinnunculus alaudarius*). Presented by Miss Fanny D'Aeth.
2 Indian Pythons (*Python molurus*). Deposited.
3 West-African Pythons (*Python sebæ*). Deposited.
1 Pardine Lizard (*Acanthodactylus pardus*). From Biskra, Algeria. Presented by H. B. Hewetson, Esq., F.Z.S.
1 Scutellated Lizard (*Acanthodactylus scutellatus*). From Biskra, Algeria. Presented by H. B. Hewetson, Esq., F.Z.S.
15. 1 Greater Black-backed Gull (*Larus marinus*). Presented by W. Theobald, Esq.

Jan. 18. 2 Four-horned Antelopes (*Tetraceros quadricornis*), ♂ ♀. Presented by Col. W. W. Lean.
2 Buzzards (*Buteo vulgaris*). Presented by H. Edgar Thomas, Esq.
19. 2 Carrion-Crows (*Corvus corone*). Presented by Alfred Greaves, Esq.
20. 1 Goosander (*Mergus merganser*). Purchased.
1 Golden Eagle (*Aquila chrysaëtus*). From Greece. Presented by Dr. H. O. Forbes, F.Z.S.
25. 1 Bonnet-Monkey (*Macacus sinicus*), ♀. Presented by Miss E. Blanche Joyce.
28. 1 Black Lemur (*Lemur macaco*), ♀. Purchased.
30. 1 1 Kinkajou (*Cercoleptes caudivolvulus*). Deposited.
1 White-backed Piping-Crow (*Gymnorhina leuconota*). Presented by H. Brame, Esq.

Feb. 2. 1 Tantalus Monkey (*Cercopithecus tantalus*), ♀. From the Upper Benué River. Purchased.
1 Patas Monkey (*Cercopithecus patas*). Presented by A. F. Breysig, Esq. See P. Z. S. 1897, p. 311.
1 Red-eyed Ground-Finch (*Pipilo erythrophthalmus*), ♀. Deposited.
3. 1 Egyptian Monitor (*Varanus niloticus*). From the Transvaal. Presented by D. E. Erasmus, Esq.
4 Snow-Buntings (*Plectrophenax nivalis*). Purchased.
5. 1 Bonnet-Monkey (*Macacus sinicus*), ♀. Presented by Mr. E. James.
6. 1 Black-headed Lemur (*Lemur brunneus*), ♂. Purchased.
8. 1 Yellow-shouldered Hangnest (*Icterus tibialis*). Presented by W. H. St. Quintin, Esq., F.Z.S.
4 Varied Field-Rats (*Isomys variegatus*). Born in the Menagerie.
9. 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Miss M. Hewens.
13. 1 Rhesus Monkey (*Macacus rhesus*), ♀. Presented by Mr. C. W. Hutchings.
1 Ring-tailed Coati (*Nasua rufa*). Deposited.
14. 2 Painted Frogs (*Discoglossus pictus*). Received in Exchange.
16. 2 Uvæan Parrakeets (*Nymphicus uveensis*). Purchased. See P. Z. S. 1897, p. 311.
1 Upland Goose (*Chloëphaga magellanica*), ♂. Deposited.
17. 1 Grey Lemur (*Hapalemur griseus*). Presented by W. B. Dyer, Esq.
18. 1 Green Monkey (*Cercopithecus callitrichus*), ♂. Presented by John Laxson, Esq.
5 Azara's Opossums (*Didelphys azaræ*). Purchased.
10 Burrowing-Owls (*Speotyto cunicularia*). Purchased.
8 Guira Cuckoos (*Guira piririgua*). Purchased.
19. 1 Greater Vasa Parrot (*Coracopsis vasa*). Presented by F. H. Pedroza, Esq., Surg. Lieut.-Col.
1 Smew (*Mergus albellus*), ♀. Purchased.
20. 1 Rhesus Monkey (*Macacus rhesus*), ♀. Presented by W. H. Camm, Esq.
22. 6 Black-eared Marmosets (*Hapale penicillata*). Presented by John Russell, Esq.
2 Blood-breasted Pigeons (*Phlogœnas luzonica*). Presented by Lady Edmonstone.

Feb. 22. 2 Barred Doves (*Geopelia striata*). Presented by Lady Edmonstone.
1 Great-billed Rhea (*Rhea macrorhyncha*). Purchased.
23. 1 Bonnet-Monkey (*Macacus sinicus*), ♀. Presented by B. Dade, Esq.
1 Black Wallaby (*Macropus ualabatus*), ♂. Presented by G. J. Manders, Esq.
1 Bauer's Parrakeet (*Platycercus zonarius*). Purchased.
2 Graceful Ground-Doves (*Geopelia cuneata*), ♂ ♀. Purchased.
1 Shielded Death-Adder (*Notechis scutatus*). Purchased.
1 Black-handed Spider-Monkey (*Ateles geoffroyi*), ♀. Presented by Miss Radley.
1 Egyptian Jerboa (*Dipus ægyptius*). Presented by the Hon. Mrs. Brett.
1 Upland Goose (*Chloëphaga magellanica*), ♂. Presented by H. Birkbeck, Esq.
3 Royal Pythons (*Python regius*). Deposited.
25. 2 Himalayan Bears (*Ursus tibetanus*). Deposited.
2 Lataste's Frogs (*Rana latastii*). Presented by Count M. Peracca.
27. 1 Rough-scaled Lizard (*Zonurus cordylus*). Presented by J. E. Matcham, Esq., C.M.Z.S.
2 Cape Bucephalus (*Dispholidus typus*). Presented by J. E. Matcham, Esq., C.M.Z.S.
1 Hoary Snake (*Pseudaspis cana*). Presented by J. E. Matcham, Esq., C.M.Z.S.
1 Ring-hals Snake (*Sepedon hæmachates*). Presented by J. E. Matcham, Esq., C.M.Z.S.
2 Dunlins (*Tringa alpina*). Purchased.
1 Golden Plover (*Charadrius pluvialis*). Purchased.
28. 1 Hybrid Pleasant Antelope (bred between *Tragelaphus gratus* ♂ and *T. spekii* ♀), ♀. Born in the Menagerie. See P. Z. S. 1897, p. 311.

Mar. 2. 1 Yellow-bellied Liothrix (*Liothrix luteus*). Presented by Mdme. Caté.
3. 1 Tessellated Snake (*Tropidonotus tessellatus*). Presented by J. H. M. Furse, Esq.
4. 11 Scorpion Mud-Terrapins (*Cinosternon scorpioides*). Presented by Dr. Emil A. Goeldi, C.M.Z.S.
5. 1 Common Otter (*Lutra vulgaris*). Purchased.
2 Chipping Squirrels (*Tamias striatus*). Deposited.
1 Yellow-cheeked Amazon (*Chrysotis autumnalis*). Presented by Miss Annie Kattengell.
1 Sallé's Amazon (*Chrysotis ventralis*). Purchased.
6. 2 Egyptian Jerboas (*Dipus ægyptius*). Received in Exchange.
9 Egyptian Cobras (*Naia haje*). Received in Exchange.
2 Cerastes Vipers (*Cerastes cornutus*). Received in Exchange.
12 Egyptian Eryx (*Eryx jaculus*). Received in Exchange.
1 Clifford's Snake (*Zamenis diadema*). Received in Exchange.
2 Hissing Sand-Snakes (*Psammophis sibilans*). Received in Exchange.
2 Flowered Snakes (*Zamenis florulentus*). Received in Exchange.
8. 2 Secretary Vultures (*Serpentarius reptilivorus*). Presented by P. Myburgh, Esq.
2 Sacred Ibises (*Ibis æthiopicus*). Presented by — Almeda, Esq.

Mar. 9. 1 Herring-Gull (*Larus argentatus*). Presented by Charles L. Rothera, Esq.
1 Lesser Black-backed Gull (*Larus fuscus*). Presented by Charles L. Rothera, Esq.
10. 4 Common Rat-Kangaroos (*Potorous tridactylus*), 2♂, 2♀. Deposited.
2 Paradise Parrakeets (*Psephotus chrysopterygius*), ♂ ♀. Purchased.
1 Rose-crested Cockatoo (*Cacatua moluccensis*). Presented by Mrs. Anderson.
4 Brent Geese (*Bernicla brenta*), 2♂, 2♀. Purchased.
17 Lesueur's Water-Lizards (*Physignathus lesueuri*). Deposited.
11. 1 Bengalese Cat (*Felis bengalensis*). Purchased.
2 Red-crested Pochards (*Fuligula rufina*), 2♂. Purchased.
12. 3 Mandarin Ducks (*Æx galericulata*), 3♀. Purchased.
3 Summer Ducks (*Æx sponsa*), 3 ♀. Purchased.
2 Rosy-billed Ducks (*Metopiana peposaca*), 2♂. Purchased.
1 Japanese Teal (*Querquedula formosa*), ♀. Purchased.
5 Chiloe Wigeon (*Mareca sibilatrix*), 3♂, 2♀. Purchased.
2 Red-crested Pochards (*Fuligula rufina*), 2♀. Purchased.
1 Spur-winged Goose (*Plectropterus gambensis*), ♂. Purchased.
13. 2 Crested Porcupines (*Hystrix cristata*, jr.). From Morocco. Presented by Robert S. Hunter, Esq.
1 Griffon Vulture (*Gyps fulvus*). From Morocco. Presented by Robert S. Hunter, Esq.
15. 1 Chimachima Milvago (*Milvago chimachima*). Purchased.
2 Violaceous Night-Herons (*Nycticorax violaceus*). Purchased.
1 Common Quail (*Coturnix communis*). Purchased.
16. 2 Vulpine Phalangers (*Trichosurus vulpecula*), ♂ ♀. Presented by W. H. Stather, Esq.
17. 1 Indian Elephant (*Elephas indicus*), ♀. Deposited.
1 Rose-crested Cockatoo (*Cacatua moluccensis*). Deposited.
1 Common Rhea (*Rhea americana*), ♀. Purchased.
18. 1 Bornean Gibbon (*Hylobates muelleri*), ♀. Purchased.
2 Muscovy Ducks (*Cairina moschata*), 2♀. Presented by Mrs. Dade.
21. 2 Brown Mud-Frogs (*Pelobates fuscus*). Presented by Count M. Peracca.
22. 1 Chacma Baboon (*Cynocephalus porcarius*), ♂. Presented by J. E. Matcham, Esq., C.M.Z.S.
1 Levaillant's Cynictis (*Cynictis penicillata*). Presented by J. E. Matcham, Esq., C.M.Z.S.
1 Black-backed Jackal (*Canis mesomelas*). Presented by J. E. Matcham, Esq., C.M.Z.S.
1 Maximilian's Aracari (*Pteroglossus wiedi*). Purchased.
3 Indian Pigmy Geese (*Nettopus coromandelianus*), 2♂, 1♀. Presented by Frank Finn, Esq., B.A., F.Z.S. See P. Z. S. 1897, p. 370.
23. 2 Collared Fruit-Bats (*Cynonycteris collaris*). Born in the Menagerie.
1 Tessellated Snake (*Tropidonotus tessellatus*). Presented by W. R. Temple, Esq.
24. 2 Rosy-faced Love-birds (*Agapornis roseicollis*), ♂ ♀. Purchased.
25. 1 Alexandrine Parrakeet (*Palæornis alexandri*), ♂. Presented by Mrs. Randall.

Mar. 26. 1 Cheetah (*Cynælurus jubatus*). Presented by Col. W. H. Wylde, C.M.G.
27. 1 White-bellied Pangolin (*Manis tricuspis*). Presented by F. W. Marshal, Esq.
1 Severe Macaw (*Ara severa*). Presented by Mrs. J. Keser.
1 Natal Python (*Python sebæ*, var.). Presented by Luscombe Searelle, Esq.
3 Purplish Death-Adders (*Pseudechis porphyriacus*). Deposited.
1 Shielded Death-Adder (*Notechis scutatus*). Deposited.
2 Australian Banded Snakes (*Diemenia nuchalis*). Deposited.
1 Occipital Elaps (*Furina occipitalis*). Deposited.
30. 1 Black-headed Lemur (*Lemur brunneus*). Deposited.
2 Californian Quails (*Callipepla californica*), ♂ ♀. Presented by T. M. Howells, Esq.
1 Madagascar Boa (*Boa madagascariensis*). Deposited.
31. 2 Black-necked Storks (*Xenorhynchus australis*). Purchased.
2 Larger Tree-Ducks (*Dendrocygna major*). Purchased.
1 Ruddy Sheldrake (*Tadorna casarca*), ♂. Purchased.

April 1. 2 Canarian Pigeons (*Columba laurivora*). Deposited.
3. 4 Tufted Ducks (*Fuligula cristata*), 2♂, 2♀. Purchased.
5. 4 Tufted Ducks (*Fuligula cristata*), 2♂, 2♀. Purchased.
1 Argus Pheasant (*Argus giganteus*), ♀. Purchased.
1 Mouflon (*Ovis musimon*), ♂. Born in the Menagerie.
6. 1 Red-footed Ground-Squirrel (*Xerus erythropus*). Presented by Sir Archibald Lamb, Bart., F.Z.S.
1 Crested Porcupine (*Hystrix cristata*). Deposited.
1 Chacma Baboon (*Cynocephalus porcarius*), ♂. Presented by J. E. Matcham, Esq., C.M.Z.S.
2 Levaillant's Cynictis (*Cynictis penicillata*). Presented by J. E. Matcham, Esq., C.M.Z.S.
1 Jackal Buzzard (*Buteo jacal*). Presented by J. E. Matcham, Esq., C.M.Z.S.
1 Cape Grass-Owl (*Strix capensis*). Presented by J. E. Matcham, Esq., C.M.Z.S.
2 Hoary Snakes (*Pseudaspis cana*). Presented by J. E. Matcham, Esq., C.M.Z.S.
2 Yellow Cobras (*Naia flava*). Presented by J. E. Matcham, Esq., C.M.Z.S.
1 Puff-Adder (*Bitis arietans*). Presented by J. E. Matcham, Esq., C.M.Z.S.
7. 2 Red-backed Buzzards (*Buteo erythronotus*). Purchased.
2 Bar-shouldered Doves (*Geopelia humeralis*). Purchased.
1 Larger Tree-Duck (*Dendrocygna major*). Presented by Mr. W. Jamrach.
1 Indian White Crane (*Grus leucogeranos*). Deposited.
2 Barbary Turtle-Doves (*Turtur risorius*). Presented by W. S. Berridge, Esq.
9. 1 Markhoor (*Capra megaceros*), ♂. Received in Exchange.
1 Red-and-Blue Macaw (*Ara macao*). Deposited.
10. 6 Coypu Rats (*Myopotamus coypus*). Born in the Menagerie.
13. 1 Auriculated Dove (*Zenaida auriculata*). Captured at sea off Cape Horn. Presented by C. H. Crole Rees, Esq.
14. 1 Bauer's Parrakeet (*Platycercus zonarius*). Presented by Clement Godson, Esq., M.D.

Apr. 15. 2 Grey Ichneumons (*Herpestes griseus*). Presented by R. J. Davis, Esq.
4 Shovellers (*Spatula clypeata*), 1 ♂, 3 ♀. Purchased.
3 Common Teal (*Querquedula crecca*), 3 ♀. Purchased.
17. 2 Common Cassowaries (*Casuarius galeatus*, juv.). Deposited.
21. 1 White-fronted Capuchin (*Cebus albifrons*). Presented by Sir William Hoste, Bt.
1 White-crested Touracou (*Turacus corythaix*). Deposited.
22. 1 Crowned Lemur (*Lemur coronatus*), ♂. Purchased.
2 Pin-tailed Sand-Grouse (*Pterocles alchata*). Presented by W. H. St. Quintin, Esq., F.Z.S.
23. 1 Variegated Spider-Monkey (*Ateles variegatus*), ♀. Purchased.
1 Black-headed Gull (*Larus ridibundus*). Presented by W. H. Dobie, Esq.
2 Rufous-necked Weaver-birds (*Hyphantornis textor*). Presented by W. H. Dobie, Esq.
1 Cactus Conure (*Conurus cactorum*). Presented by Mrs. A. G. Scorer.
24. 3 Double-banded Sand-Grouse (*Pterocles bicinctus*), 1 ♂, 2 ♀. Purchased.
26. 1 Bonnet-Monkey (*Macacus sinicus*), ♂. Presented by Mrs. Douglas.
1 Rhesus Monkey (*Macacus rhesus*), ♂. Presented by S. A. Ledger, Esq.
1 Mongoose Lemur (*Lemur mongoz*). Presented by P. Baxter, Esq.
1 Hallowell's Tree-Snake (*Dendraspis viridis*). Presented by the Rev. J. Taylor Smith (Canon).
27. 1 Burrhel Wild Sheep (*Ovis burrhel*), ♀. Purchased.
1 Grey Ichneumon (*Herpestes griseus*). Presented by Surg.-Major C. Seymour.
1 Silky Cow-bird (*Molothrus bonariensis*), ♂. Purchased.
28. 1 Chimpanzee (*Anthropopithecus troglodytes*), ♀. Presented by H.E. Col. F. Cardew, C.M.G.
1 Black Gallinule (*Limnocorax niger*). Presented by H.E. Col. F. Cardew, C.M.G.
1 Reed-Buck (*Cervicapra arundinum*), ♂. From the Limpopo River. Purchased.
2 White-headed Woodpeckers (*Leuconerpes candidus*). Purchased.
2 Wreathed Hornbills (*Rhytidoceros undulatus*). Purchased.
1 Maugé's Dasyure (*Dasyurus viverrinus*). Presented by J. C. Chipper, Esq.
29. 2 Smith's Partridge Bronze-winged Pigeons (*Geophaps smithi*), ♂ ♀. Purchased. See P. Z. S. 1897, p. 430.
1 Black Stork (*Ciconia nigra*). Presented by W. H. St. Quintin, Esq., F.Z.S.
1 Peacock Pheasant (*Polyplectron chinquis*), ♂. Presented by J. Charlton Parr, Esq., F.Z.S.
30. 1 Orang-outang (*Simia satyrus*), ♂. Presented by Capt. Francis R. Pelly, R.N., H.M.S. 'Porpoise.'
1 Sing-Sing Water-Buck (*Cobus unctuosus*), ♂. Purchased.
1 Somali Wild Ass (*Equus somalicus*), ♂. Purchased. See P. Z. S. 1897, p. 430.
1 Somali Ostrich (*Struthio molybdophanes*), ♂. Purchased.
2 Himalayan Goldfinches (*Carduelis caniceps*), ♂ ♀. Presented by Frank Finn, Esq., F.Z.S.

Apr. 30. 2 Egyptian Geese (*Chenalopex ægyptiacus*), ♂ ♀. Presented by A. E. Speer, Esq., F.Z.S.
6 Pintail (*Dafila acuta*), 3 ♂, 3 ♀. Purchased.

May 3. 1 Malbrouck Monkey (*Cercopithecus cynosurus*), ♂. Purchased.
2 Black Storks (*Ciconia nigra*). Presented by W. H. St. Quintin, Esq., F.Z.S.
4. 3 Common Boas (*Boa constrictor*). From the Teffe River, Upper Amazons. Presented by H. C. Fernando Rohé, Esq.
1 Brazilian Tortoise (*Testudo tabulata*). Presented by H. C. Fernando Rohé, Esq.
5. 1 Nightingale (*Daulias luscinia*). Presented by W. H. St. Quintin, Esq., F.Z.S.
1 Phayre's Tortoise (*Testudo emys*). From Borneo. Presented by H.H. The Tuan Muda of Sarawak.
1 Phayre's Tortoise (*Testudo emys*). From Borneo. Deposited.
2 Phayre's Tortoises (*Testudo emys*). From Borneo. Purchased.
7. 1 Orang-outang (*Simia satyrus*), ♀. Presented by Lord Ashburton and the Earl of Crawford, F.Z.S.
1 Malayan Bear (*Ursus malayanus*), ♀. Presented by Lord and Lady Ashburton.
8. 2 Long-tailed Grass-Finches (*Poephila acuticauda*). Purchased.
1 Forsten's Lorikeet (*Trichoglossus forsteni*). Deposited.
1 Blue-faced Lorikeet (*Trichoglossus hæmatodes*). Deposited.
2 Perfect Lorikeets (*Psittenteles euteles*). Deposited.
1 White-crowned Mangabey (*Cercocebus æthiops*), ♀. Presented by Bernard A. Collins, Esq.
10. 1 Temminck's Snapper (*Macroclemmys temminckii*). Deposited.
11. 1 Kinkajou (*Cercoleptes caudivolvulus*), ♂.
1 Sharp-nosed Crocodile (*Crocodilus acutus*).
1 Rough-eyed Cayman (*Caiman sclerops*).
From the Caroni River, Trinidad.
2 West-Indian Geckos (*Thecadactylus rapicauda*). From Maraval, Trinidad.
1 Cuvier's Scolecosaure (*Scolecosaurus cuvieri*). From Port of Spain, Trinidad.
1 Green Lizard (*Lacerta viridis*).
1 Active Lizard (*Mabuia agilis*). From Maraval, Trinidad.
2 Tuberculated Iguanas (*Iguana tuberculata*). From Maraval River, Trinidad.
1 Black-pointed Teguexin (*Tupinambis nigropunctatus*). From Maraval River, Trinidad.
3 Thick-necked Tree-Boas (*Epicrates cenchris*).
1 Antillean Boa (*Boa diviniloqua*). From St. Lucia.
3 Common Boas (*Boa constrictor*).
5 Cooke's Tree-Boas (*Corallus cookei*).
From the Caroni River, Trinidad.
1 Anaconda (*Eunectes murinus*).
1 Boddaert's Snake (*Drymobius boddaerti*).
From St. Vincent.
} Presented by R. R. Mole, Esq., C.M.Z.S.

May 11. 1 Chequered Elaps (*Elaps lemniscatus*).
1 Mocassin Snake (*Tropidonotus fasciatus*).
1 Red-bellied Snake (*Coronella calligaster*).
1 Angulated Snake (*Helicops angulatus*).
} Presented by R. R. Mole, Esq., C.M.Z.S.

1 Anaconda (*Eunectes murinus*). Presented by F. W. Urich, Esq.

12. 3 Egyptian Weasels (*Mustela subpalmata*). Presented by A. R. Birdwood, Esq.

8 Shaw's Gerbilles (*Gerbillus shawi*).
1 Egyptian Jerboa (*Dipus ægyptius*).
3 Long-eared Hedgehogs (*Erinaceus auritus*).
1 Grey Monitor (*Varanus griseus*).
1 Common Skink (*Scincus officinalis*).
10 Ocellated Sand-Skinks (*Seps ocellatus*).
1 Defenceless Lizard (*Agama inermis*).
2 Egyptian Eryx (*Eryx jaculus*).
1 Rough-keeled Snake (*Dasypelta scabra*).
9 Egyptian Cobras (*Naia haje*).
8 Cerastes Vipers (*Cerastes cornutus*).
3 Clifford's Snakes (*Zamenis diadema*).
2 Hissing Sand-Snakes (*Psammophis sibilans*).
4 Cambayan Turtle-Doves (*Turtur senegalensis*).
2 Lesser Pin-tailed Sand-Grouse (*Pterocles exustus*).
} From Egypt. Received in Exchange.

13. 1 White-throated Capuchin (*Cebus hypoleucus*). Presented by Sir Henry A. Blake, K.C.M.G.
1 Pig-tailed Monkey (*Macacus nemestrinus*), ♀. Presented by W. B. Orme, Esq.

14. 6 Mexican Quails (*Callipepla squamosa*). Purchased.

15. 1 Egyptian Jerboa (*Dipus ægyptius*). Presented by F. Whitehouse, Esq.

17. 1 Alexandrine Parrakeet (*Palæornis alexandri*), ♀. Presented by Mrs. E. Hight.

18. 1 Japanese Deer (*Cervus sika*), ♂. Born in the Menagerie.
1 Patagonian Cavy (*Dolichotis patachonica*). Born in the Menagerie.

19. 1 White-tailed Gnu (*Connochætes gnu*), ♂. Received in Exchange.
1 Eland (*Oreas canna*), ♀. Born in the Menagerie.
3 Cocteau's Skinks (*Macroscincus corteaui*). From the Island of Raza, Cape de Verde. Presented by Boyd Alexander, Esq.

20. 2 Common Marmosets (*Hapale jacchus*). Presented by W. A. Bromwich, Esq.
1 Smooth-headed Capuchin (*Cebus monachus*) ♂, albino. Deposited.
1 White-throated Capuchin (*Cebus hypoleucos*), ♀. Presented by Mr. T. H. Rudkin.
2 Bonnet-Monkeys (*Macacus sinicus*), 2 ♀. Presented by Mrs. Hardisty.

21. 1 Cape Hunting-Dog (*Lycaon pictus*), ♂. Presented by the Royal Zoological Society of Ireland.
2 Bridled Wallabies (*Onychogale frenata*), 2 ♀. Purchased.
1 Australian Pelican (*Pelecanus conspicillatus*). Purchased.
2 Blue Penguins (*Eudyptula minor*). Purchased. See P. Z. S. 1897, p. 721.
1 West-African Python (*Python sebæ*). Presented by H.E. Col. F. Cardew, C.M.G.

22. 2 Green Monkeys (*Cercopithecus callitrichus*). Deposited.

May 22. 1 Vulpine Phalanger (*Trichosurus vulpecula*), ♀. Presented by J. Martin Kennedy, Esq., M.D.
1 Peregrine Falcon (*Falco peregrinus*). Presented by Mr. J. Kilpatrick.
1 Antillean Boa (*Boa diviniloqua*). Presented by Capt. Digby H. Barker.
24. 2 Japanese Deer (*Cervus sika*), 2 ♂. Born in the Menagerie.
1 Red Deer (*Cervus elaphus*), ♀. Born in the Menagerie.
25. 2 Red-topped Amazons (*Chrysotis rhodocorytha*). Purchased.
26. 1 Pleasant Antelope (*Tragelaphus gratus*), ♂. Deposited.
2 Cunningham's Skinks (*Egernia cunninghami*). Deposited.
11 Cunningham's Skinks (*Egernia cunninghami*). Deposited.
2 Punctulated Tree-Snakes (*Dendrophis punctulatus*). Deposited.
27. 3 White-eared Conures (*Pyrrhura leucotis*). Purchased.
1 West-African Sheep (*Ovis aries*, var.), ♂. Presented by H.E. Col. F. Cardew, C.M.G.
28. 1 Chimpanzee (young) (*Anthropopithecus troglodytes*), ♀. Presented by the Hon. Sir W. Grantham.
1 Alpaca (*Lama pacos*), ♂. Purchased.
1 Bhurrel Sheep (*Ovis bhurrel*), ♀. Born in the Menagerie.
1 Olive-brown Snake (*Phrynonax fasciatus*). Presented by R. R. Mole, Esq., C.M.Z.S.
29. 1 Broad-snouted Cayman (*Caiman latirostris*). Presented by C. L. Hutchings, Esq.
4 Royal Pythons (*Python regius*). Deposited.
31. 1 Brown Bear (*Ursus arctos*). Presented by William Forbes, Esq.
2 Red-fronted Gazelles (*Gazella rufifrons*), ♂ ♀. Deposited.
1 Long-legged Jackal (*Canis variegatus*). Received in Exchange.
3 North-African Jackals (*Canis anthus*). Received in Exchange.
1 Striped Hyæna (*Hyæna striata*). Received in Exchange.
1 Fennec Fox (*Canis cerdo*). Received in Exchange.
6 Egyptian Foxes (*Canis niloticus*). Received in Exchange.
1 Pale Genet (*Genetta senegalensis*). Received in Exchange.
3 Leith's Tortoises (*Testudo leithi*). Received in Exchange.

June 1. 1 Ring-tailed Lemur (*Lemur catta*). Deposited.
2 Black-headed Lemurs (*Lemur brunneus*). Deposited.
1 Patagonian Cavy (*Dolichotis patachonicus*). Born in the Menagerie.
1 Pied Mynah (*Sturnopastor contra*). Presented by B. H. Jones, Esq., F.Z.S.
1 Ring-necked Parrakeet (*Palæornis torquata*), ♀. Presented by Mrs. Doyne.
2. 1 Californian Sea-Lion (*Otaria californiana*), ♀. Purchased.
2 Ostriches (*Struthio camelus*), ♂ ♀. Purchased.
1 Harnessed Antelope (*Tragelaphus scriptus*), ♀. Deposited.
3. 2 Vervet Monkeys (*Cercopithecus lalandii*), ♂ ♀. Presented by J. E. Matcham, Esq., C.M.Z.S.
2 Crested Porcupines (*Hystrix cristata*). Presented by J. E. Matcham, Esq., C.M.Z.S.
4. 5 Common Chameleons (*Chamæleon vulgaris*). Deposited.
6. 1 Eland (*Orias canna*), ♂. Born in the Menagerie.
7. 1 Thar (*Capra jemlaica*), ♂. Born in the Menagerie.
8. 1 Eroded Cinixys (*Cinixys erosa*). Purchased.

June 9. 4 Black-footed Penguins (*Spheniscus demersus*). Received in Exchange.
1 Eyed Lizard (*Lacerta ocellata*). Presented by Lt.-Col. Willoughby Verner.
10. 1 American Flying-Squirrel (*Sciuropterus volucella*). Presented by Miss Lucy Sanderson.
11. 1 House-Sparrow (*Passer domesticus*, var.), ♀. Presented by W. B. Bingham, Esq.
14 Common Chameleons (*Chamæleon vulgaris*). Deposited.
12. 1 American Flying-Squirrel (*Sciuropterus volucella*). Presented by Miss Lucy Sanderson.
1 Grey Squirrel (*Sciurus griseus*). Presented by D. S. Miller, Esq.
3 Common Squirrels (*Sciurus vulgaris*). Purchased.
13. 1 Eyed Lizard (*Lacerta ocellata*). Presented by G. K. Gude, Esq.
14. 2 White Ibises (*Eudocimus albus*, jr.). Purchased.
2 Common Peafowl (*Pavo cristatus*), 2♂. Presented by Col. Stucley.
15. 1 Suricate (*Suricata tetradactyla*). Deposited.
1 Pennant's Parrakeet (*Platycercus pennanti*). Deposited.
1 Rose-Hill Parrakeet (*Platycercus eximius*). Deposited.
16. 2 Vervet Monkeys (*Cercopithecus lalandii*), ♂ ♀. Presented by Mr. J. W. Lincker.
1 Great Kangaroo (*Macropus giganteus*), ♂. Born in the Menagerie.
1 Rufous Rat-Kangaroo (*Æpyprymnus rufescens*), ♀. Born in the Menagerie.
2 Squirrel-like Phalangers (*Petaurus sciureus*), 2 ♀. Born in the Menagerie.
1 Short-headed Phalanger (*Petaurus breviceps*), ♂. Born in the Menagerie.
17. 1 Vervet Monkey (*Cercopithecus lalandii*), ♀. Presented by Alfred Beit, Esq.
1 Yellowish Capuchin (*Cebus flavescens*), ♀. Presented by H. C. Fernando Rohé, Esq.
1 Squirrel Monkey (*Chrysothrix sciurea*), ♀. Presented by H. C. Fernando Rohé, Esq.
1 Thar (*Capra jemlaica*), ♀. Born in the Menagerie.
2 Peaceful Ground-Doves (*Geopelia placida*). Purchased.
18. 2 Red Kangaroos (*Macropus rufus*), 2 ♀. Purchased.
22. 1 Japanese Deer (*Cervus sika*), ♀. Born in the Menagerie.
23. 1 Servaline Cat (*Felis servalina*). Presented by the Rev. Ernest Millar.
2 Bateleur Eagles (*Helotarsus ecaudatus*). Presented by Charles Palmer, Esq., C.M.Z.S.
2 Black-necked Herons (*Ardea atricollis*). Presented by Charles Palmer, Esq., C.M.Z.S.
2 Glossy Ibises (*Plegadis falcinellus*). Bred in the Menagerie.
2 King Penguins (*Aptenodytes pennanti*). Purchased.
1 Grey Monitor (*Varanus griseus*). Presented by Dixon Bey.
24. 2 Natal Pythons (*Python sebæ*, var.). Presented by Hon. R. Carnegie.
25. 1 Orang-outang (*Simia satyrus*), ♂. Deposited.
27. 1 Burchell's Zebra (*Equus burchelli*), ♀. Born in the Menagerie.
28. 1 Common Squirrel (*Sciurus vulgaris*). Presented by Lady Acland Hood.

June 28. 1 Red-crested Cardinal (*Paroaria cucullata*). Presented by Miss Edith M. Kemp-Welch.

8 Spotted Geckos (*Pachydactylus maculatus*).
24 Hispid Lizards (*Agama hispida*).
13 Rough-scaled Lizards (*Zonurus cordylus*).
2 Delalande's Lizards (*Nucras delalandii*).
2 Three-streaked Skinks (*Mabuia trivittata*).
2 Aurora Snakes (*Lamprophis aurora*).
2 Infernal Snakes (*Boodon infernalis*).
1 Lineated Snake (*Boodon lineatus*).
1 Smooth-bellied Snake (*Homalosoma lutrix*).
2 Rough-keeled Snakes (*Dasypeltis scabra*).
11 Rufescent Snakes (*Leptodira hotamboia*).
5 Rhomb-marked Snakes (*Trimerorhinus rhombeatus*).
8 Crossed Snakes (*Psammophis crucifer*).
1 Yellow Cobra (*Naia flava*).
Presented by J. E. Matcham, Esq., C.M.Z.S.

29. 1 Campbell's Monkey (*Cercopithecus campbelli*). From Appantoo, Coomassie. Presented by Dr. Thomas Pigg.
1 Vulpine Phalanger (*Trichosurus vulpecula*), ♀. Presented by M. A. Murray, Esq.
2 Palm-Squirrels (*Sciurus palmarum*). Presented by C. Ingram, Esq.
2 White-crested Jay Thrushes (*Garrulax leucolophus*). Presented by B. H. Jones, Esq., F.Z.S.
1 Indian Dial-bird (*Copsychus saularis*). Deposited.

30. 1 Orang-outang (*Simia satyrus*), ♀. Presented by Dr. H. Dohrn, C.M.Z.S. From Sumatra. See P. Z. S. 1897, p. 810.

July 1. 1 Bonnet-Monkey (*Macacus sinicus*), ♀. Presented by Mr. James Callingham.
1 Banded Ichneumon (*Crossarchus fasciatus*). Deposited.
1 Common Seal (young) (*Phoca vitulina*). Presented by Mr. Wetherhogg.

2. 3 Ruddy Finches (*Carpodacus erythrinus*). Purchased.
2 Black Cuckoos (*Eudynamis orientalis*). Purchased.
1 Tayra (*Galictis barbara*). Purchased.
6 Mandarin Ducks (*Æx galericulata*). Bred in the Menagerie.
3 Summer Ducks (*Æx sponsa*). Bred in the Menagerie.
2 Variegated Sheldrakes (*Tadorna variegata*). Bred in the Menagerie.
2 Ypecaha Rails (*Aramides ypecaha*). Bred in the Menagerie.
1 Salvadori's Cassowary (*Casuarius salvadorii*?). Deposited.
2 Gentoo Penguins (*Pygoscelis tæniatus*). Deposited.

3. 2 Babirussas (*Babirussa alfurus*), ♂ ♀. Presented by H.G. The Duke of Bedford, F.Z.S. See P. Z. S. 1897, p. 810.
1 Blackbird (*Turdus merula*, var.), ♂. Presented by Mr. A. Lawford Jones.

5. 1 Bonnet-Monkey (albino) (*Macacus sinicus*), ♂. Deposited.
1 Rock-hopper Penguin (*Eudyptes chrysocome*). From Antipodes Island. Deposited.
1 Thick-billed Penguin (*Eudyptes pachyrhynchus*). From Stewart Island. Deposited. See P. Z. S. 1897, p. 810.
1 Syrian Bear (*Ursus syriacus*), ♀. From the Hills north of Bagdad. Presented by B. T. Finch, Esq., C.M.Z.S.
1 Ring-tailed Coati (*Nasua rufa*). Presented by Mr. J. B. Gowing.

6. 2 Graceful Ground-Doves (*Geopelia cuneata*). Deposited.

July 6. 1 Osprey (*Pandion haliaëtus*). From Aberdeenshire. Presented by Major-Gen. Russell, M.P.
1 Dwarf Finch (*Spermestes nana*). Purchased.
7. 2 Common Bluebirds (*Sialia wilsoni*). Bred in the Menagerie.
4 White-backed Pigeons (*Columba leuconota*). Bred in the Menagerie.
2 Triangular-spotted Pigeons (*Columba guinea*). Bred in the Menagerie.
1 Spotted Pigeon (*Columba maculosa*). Bred in the Menagerie.
1 Crested Pigeon (*Ocyphaps lophotes*). Bred in the Menagerie.
1 Auriculated Dove (*Zenaida auriculata*). Bred in the Menagerie.
8. 1 Cayman-Island Amazon (*Chrysotis caymanensis*). Presented by C. Home Sinclair, Esq.
1 Common Chameleon (*Chamæleon vulgaris*). Presented by Miss Amy Meyer.
9. 1 Blue-fronted Amazon (*Chrysotis æstiva*). Presented by Mrs. Reynell.
2 Ganga Cockatoos (*Callocephalon galeatum*), 2 ♂. Purchased.
1 Shag (*Phalacrocorax graculus*). Presented by Edward Step, Esq., F.Z.S.
1 European Tree-Frog (*Hyla arborea*). Presented by Mrs. Nicholas Wood.
10. 2 Barred-shouldered Doves (*Geopelia humeralis*). Purchased.
2 Chinese Turtle-Doves (*Turtur chinensis*). Purchased.
11. 1 English Wild Bull (*Bos taurus*). Born in the Menagerie.
12. 1 Roseate Spoonbill (*Ajaja rosea*). Purchased.
13. 1 Thar (*Capra jemlaica*). Born in the Menagerie.
1 Common Peafowl (*Pavo cristatus*). Presented by A. Burnell Tubbs, Esq.
14. 1 Rhesus Monkey (*Macacus rhesus*). Presented by Master Ian B. Dickson.
1 Mozambique Monkey (*Cercopithecus pygerythrus*). Presented by A. E. Snooks, Esq.
1 Red-sided Eclectus (*Eclectus pectoralis*). Presented by Mr. Edward Hawkins.
1 Red Deer (*Cervus elaphus*). Born in the Menagerie.
16. 1 Black Lemur (*Lemur macaco*). Presented by R. A. Todd, Esq., F.Z.S.
1 Black-headed Lemur (*Lemur brunneus*). Presented by R. A. Todd, Esq., F.Z.S.
1 Grey Lemur (*Hapalemur griseus*). Presented by R. A. Todd, Esq., F.Z.S.
1 Common Cassowary (*Casuarius galeatus*). Deposited.
17. 1 Bonnet-Monkey (*Macacus sinicus*). Presented by Mr. W. Meears.
19. 1 Chacma Baboon (*Cynocephalus porcarius*). Presented by W. H. Stather, Esq.
20. 1 Harnessed Antelope (*Tragelaphus scriptus*), ♂. Presented by R. B. Llewelyn, Esq., C.M.G.
1 Bronze-winged Pigeon (*Phaps chalcoptera*). Purchased.
21. 1 King Vulture (*Gypagus papa*). Purchased.
1 Daudin's Tortoise (*Testudo daudini*). Deposited. See P. Z. S. 1897, p. 810.
1 Crowned Horned Lizard (*Phrynosoma coronatum*). Presented by C. H. Hastings, Esq.
22. 1 King Parrot (*Aprosmictus cyanopygius*). Presented by Mrs. R. L. Turner.

July 22. 1 West-African Python (*Python sebæ*). Deposited.
1 Peacock Pheasant (*Polyplectron chinquis*). Bred in the Menagerie.
23. 1 Purplish Death-Adder (*Pseudechis porphyriacus*). Presented by E. H. Bostock, Esq.
24. 1 Vulpine Squirrel (*Sciurus vulpinus*). Presented by Messrs. A. G. & R. Rawlins.
1 Brown Capuchin (*Cebus fatuellus*). Presented by D. Mackintosh, Esq.
26. 1 Wood-Brocket (*Cariacus nemorivagus*), ♀. Presented by C. Passingham, Esq.
27. 6 Bar-tailed Pheasants (*Phasianus reevesi*). Bred in the Menagerie.
3 Amherst Pheasants (*Thaumalea amherstiæ*). Bred in the Menagerie.
28. 1 Green-billed Toucan (*Rhamphastos dicolorus*). Purchased.
1 Grooved Tortoise (*Testudo calcarata*). Deposited.
29. 1 Rhesus Monkey (*Macacus rhesus*), ♀. Presented by J. Fleming, Esq.
1 Grooved Tortoise (*Testudo calcarata*). Deposited.
30. 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Mr. G. H. Cheverton.
31. 1 Purplish Death-Adder (*Pseudechis porphyriacus*). Presented by E. H. Bostock.
1 Brown Death-Adder (*Diemenia textilis*). Presented by E. H. Bostock, Esq.
1 Shielded Death-Adder (*Notechis scutatus*). Presented by E. H. Bostock, Esq.

Aug. 3. 1 Natal Python (*Python sebæ*, var.). Presented by W. Champion, Esq.
1 Green-necked Touracou (*Gallirex chlorochlamys*). Presented by W. Champion, Esq.
1 Feline Genet (*Genetta felina*). Presented by J. E. Matcham, Esq., C.M.Z.S.
4 Black-eared Marmosets (*Hapale penicillata*). Deposited.
1 Guinea Baboon (*Cynocephalus sphinx*), ♂. Presented by Dr. H. O. Forbes.
2 White-collared Mangabeys (*Cercocebus collaris*), ♂ ♀. Presented by Dr. H. O. Forbes.
1 Moustache Monkey (*Cercopithecus cephus*), ♂. Presented by Dr. H. O. Forbes.
4. 2 Tawny Owls (*Syrnium aluco*). Presented by T. Guittonneau, Esq.
5. 3 Bennett's Wallabies (*Macropus bennetti*), 2 ♂, 1 ♀. Born in the Menagerie.
6. 1 Green-cheeked Amazon (*Chrysotis viridigena*). Deposited.
2 Thurgi Terrapins (*Hardella thurgi*). Deposited.
1 Horned Lizard (*Phrynosoma cornutum*). Presented by G. J. W. Vickers, Esq.
7. 2 Common Chameleons (*Chamæleon vulgaris*). Presented by Major Spilsbury.
9. 1 Grey Lemur (*Hapalemur griseus*). Deposited.
1 Greater Vasa Parrot (*Coracopsis vasa*). Purchased.
1 Spotted Tinamou (*Nothura maculosa*). Bred in the Menagerie.
10. 3 Altai Deer (*Cervus eustephanus*), 1 ♂, 2 ♀. From the Altai Mountains. Deposited. See P. Z. S. 1897, p. 810.
1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Walter Chamberlain, Esq., F.Z.S.

Aug. 10. 4 Common Hedgehogs (*Erinaceus europæus*). Presented by Eveleyn Pelly, Esq.
1 Matamata Terrapin (*Chelys fimbriata*). Presented by W. J. Crummach, Esq.
12. 2 Viscachas (*Lagostomus trichodactylus*). Born in the Menagerie.
1 Caucasian Wild Goat (*Capra caucasica*), ♂. Received in Exchange. See P. Z. S. 1897, p. 811.
2 Ribbon Snakes (*Tropidonotus saurita*). Presented by J. H. Fleming, Esq.
7 Striped Snakes (*Tropinodotus ordinatus sirtalis*). Presented by J. H. Fleming, Esq.
4 Dekay's Snakes (*Ischnognathus dekayi*). Presented by J. H. Fleming, Esq.
2 American Milk-Snakes (*Coronella triangulum*). Presented by J. H. Fleming, Esq.
2 Grass-Snakes (*Contia vernalis*). Presented by J. H. Fleming, Esq.
13. 3 Barbary White Sheep (*Ovis tragelaphus*). Born in the Menagerie.
1 Slender-billed Cockatoo (*Licmetis nasica*). Presented by Mrs. M. D. Vibart.
16. 1 Black-eared Marmoset (*Hapale penicillata*). Presented by Samson Clark, Esq.
1 Yak (*Poëphagus grunniens*), ♀. Born in the Menagerie.
2 Saffron Finches (*Sycalis flaveola*). Bred in the Menagerie.
17. 1 Black-headed Lemur (*Lemur brunneus*), ♀. Deposited.
2 West-African Love-birds (*Agapornis pullaria*). Deposited.
1 Painted Terrapin (*Chrysemys picta*). Presented by C. R. Fisher, Esq.
1 Golden-crowned Conure (*Conurus aureus*). Purchased.
18. 1 Wapiti Deer (*Cervus canadensis*), ♂. Born in theMenagerie.
1 Laughing Kingfisher (*Dacelo gigantea*). Presented by W. L. Christie, Esq.
2 Triangular-spotted Pigeons (*Columba guinea*). Bred in the Menagerie.
2 Crested Pigeons (*Ocyphaps lophotes*). Bred in the Menagerie.
19. 1 Algerian Tortoise (*Testudo ibera*). Presented by Capt. Alfred Carpenter, R.N., F.Z.S.
23. 1 Brown Capuchin (*Cebus fatuellus*), ♀. Deposited.
5 Australian Bush-Rats (*Mus arboricola*). Presented by Edgar R. Waite, Esq.
1 Barbary Wild Sheep (*Ovis tragelaphus*). Born in the Menagerie.
2 Egyptian Kites (*Milvus ægyptius*). Presented by G. A. Ogilvie, Esq.
1 Mountain Ka-Ka or Kea (*Nestor notabilis*). Presented by Arthur Hope, Esq.
24. 2 Ravens (*Corvus corax*), ♂ ♀. Presented by W. B. Bingham, Esq.
1 European Pond-Tortoise (*Emys orbicularis*). Presented by F. F. Bastain, Esq.
25. 1 Mozambique Monkey (*Cercopithecus pygerythrus*), ♂. Presented by Mrs. A. Charlesworth.
26. 1 Turtle-Dove (*Turtur communis*). Presented by Miss Mallard.
2 Black-throated Weaver-birds (*Ploceus atrigula*). Purchased.
2 Bengal Weaver-birds (*Ploceus bengalensis*). Purchased.

Aug. 26. 4 Goliath Beetles (*Goliathus druryi*). Presented by W. Durham Hall, Esq.

1 Bird-spider (*Mygale*, sp. inc.). Presented by Rowland Ward, Esq., F.Z.S.

27. 1 Purple Sun-bird (*Cinnyris asiaticus*), ♂. From Calcutta. Presented by Frank Finn, Esq., F.Z.S.

1 Feline Genet (*Genetta felina*).
1 Delalande's Lizard (*Nucras delalandii*).
1 Puff-Adder (*Bitis arietans*).
1 Cape Bucephalus (*Dispholidus typus*).
1 Rough-keeled Snake (*Dasypeltis scabra*).
2 Rhomb-marked Snakes (*Trimerorhinus rhombeatus*).
1 Infernal Snake (*Boodon infernalis*).
2 Lineated Snakes (*Boodon lineatus*).
1 Rufescent Snake (*Leptodira hotamboia*).
3 Crossed Snakes (*Psammophis crucifer*).
} From Port Elizabeth. Presented by J. E. Matcham, Esq., C.M.Z.S.

28. 1 Tawny Owl (*Syrnium aluco*). Presented by G. Hastings Bostock, Esq.

2 Ring-necked Parrakeets (*Palæornis torquatus*). Presented by Miss M. Parsons.

1 Rough Fox (*Canis rudis*). Purchased.

30. 1 Large-eared Mouse (*Phyllotis griseoflavus*).
2 Chimachima Milvagos (*Milvago chimachima*).
3 Pileated Song-Sparrows (*Zonotrichia pileata*).
3 Yellowish Finches (*Sycalis luteola*).
2 Bay Cow-birds (*Molothrus badius*).
1 Yellow Troupial (*Xanthosomus flavus*), ♀.
3 West-African Love-birds (*Agapornis pullaria*).
} Presented by E. A. Fitzgerald, Esq.

Sept. 1. 1 Crested Porcupine (*Hystrix cristata*). Deposited.

3 White Storks (*Ciconia alba*). Deposited.

1 Greater Black-backed Gull (*Larus marinus*). Deposited.

1 Herring-Gull (*Larus argentatus*). Deposited.

1 Common Night-Heron (*Nycticorax griseus*). Deposited.

2 Buzzards (*Buteo vulgaris*). Deposited.

2 Ypecaha Rails (*Aramides ypecaha*). Deposited.

1 Huanaco (*Lama huanacos*), ♀. Presented by W. J. Huxley, Esq.

2. 1 Barbary Wild Sheep (*Ovis tragelaphus*). Born in the Menagerie.

2 Rough-legged Buzzards (*Archibuteo lagopus*). From Waigats Island. Presented by Col. H. W. Feilden, C.M.Z.S.

3. 1 Malabar Squirrel (*Sciurus maximus*). Presented by J. E. Sumner, Esq.

1 European Pond-Tortoise (*Emys orbicularis*). Presented by Mr. Duncan Dickers.

4. 11 Green Lizards (*Lacerta viridis*). Presented by C. W. Tytheridge, Esq.

1 Wall-Lizard (*Lacerta muralis*). Presented by C. W. Tytheridge, Esq.

2 Sand-Lizards (*Lacerta agilis*). Presented by C. W. Tytheridge, Esq.

Sept. 6. 1 Smooth-headed Capuchin (*Cebus monachus*), ♂. Presented by W. R. Routledge, Esq.
1 Ivory Gull (*Pagophila eburnea*). From Franz Josef's Land. Presented by Fred. G. Jackson, Esq.
1 Common Chameleon (*Chamæleon vulgaris*). Presented by Mr. H. du Domaine.
7. 1 Chilian Sea-Eagle (*Geranoaëtus melanoleucus*). Purchased.
1 Indian Civet (*Viverricula malaccensis*). Purchased.
8. 1 King Parrot (*Aprosmictus cyanopygius*), ♀. Presented by Dr. G. Granville Bantock.
10. 1 Ring-tailed Coati (*Nasua rufa*). Deposited.
1 Kinkajou (*Cercoleptes caudivolvulus*). Deposited.
1 Brown Capuchin (*Cebus fatuellus*), ♀. Presented by C. Hardy, Esq.
11. 1 Common Marmoset (*Hapale jacchus*), ♂. Presented by Mrs. C. J. Anson.
12. 1 Patagonian Cavy (*Dolichotis patachonica*). Born in the Menagerie.
13. 1 Chacma Baboon (*Cynocephalus porcarius*), ♂. Presented by the Earl of Orkney.
1 Common Marmoset (*Hapale jacchus*). Deposited.
1 Coypu (*Myopotamus coypus*). Presented by H. W. Garratt, Esq.
1 Levaillant's Amazon (*Chrysotis levaillanti*). Presented by Charles Strong, Esq.
1 European Pond-Tortoise (*Emys orbicularis*). Presented by Miss W. Fenwick.
14. 1 Water-Vole (black variety) (*Arvicola amphibius*). Presented by Master E. Hope Vere.
1 Arctic Fox (*Canis lagopus*). Presented by G. B. Collier, Esq.
4 Little Ringed Plovers (*Ægialitis curonica*). Purchased.
1 Hoopoe (*Upupa epops*). Purchased.
15. 1 Burchell's Zebra (*Equus burchelli*), ♀. Deposited.
2 Grey-breasted Parrakeets (*Myopsittacus monachus*). Presented by R. M. Copnall, Esq.
2 Gannets (*Sula bassana*). Presented by the Hon. Walter Rothschild, F.Z.S.
16. 1 Black Woodpecker (*Picus martius*). Purchased.
17. 1 Grey Ichneumon (*Herpestes griseus*). Presented by Harold Smith, Esq.
2 Red Foxes (*Canis fulvus*). Purchased.
1 Marabou Stork (*Leptoptilus crumeniferus*). Presented by Captain C. F. Beeching.
1 Raven (*Corvus corax*). Presented by the Rev. T. C. A. Barrett.
20. 1 Red-and-Yellow Macaw (*Ara chloroptera*). Presented by J. W. Drysdale, Esq.
1 Giraffe (*Giraffa camelopardalis capensis*), ♂. From Bechuanaland. Deposited by H.M. The Queen.
21. 1 Common Badger (*Meles taxus*). Presented by Mrs. Cheape.
1 Peregrine Falcon (*Falco peregrinus*). Presented by Major Hawkins Fisher.
22. 1 Lesser Sulphur-crested Cockatoo (*Cacatua sulphurea*). Presented by John Paget, Esq.
23. 1 Common Sandpiper (*Tringoides hypoleucus*). Purchased.
24. 1 Crowned Lemur (*Lemur coronatus*), ♀. Deposited.
1 Alexandrine Parrakeet (*Palæornis alexandri*). Deposited.
2 Red-fronted Gazelles (*Gazella rufifrons*), ♂ ♀. Purchased.

Sept. 25. 1 Macaque Monkey (*Macacus cynomolgus*), ♀. Presented by Mrs. B. Hudson.
27. 4 Rollers (*Coracias garrulus*). Deposited.
20 Marbled Ducks (*Marmaronetta angustirostris*). Deposited.
2 Pochards (*Fuligula ferina*). Deposited.
6 Black-bellied Sand-Grouse (*Pterocles arenarius*). Deposited.
2 Pin-tailed Sand-Grouse (*Pterocles alchata*). Deposited.
3 Stone-Curlews (*Œdicnemus scolopax*). Deposited.
12 Pratincoles (*Glareola pratincola*). Deposited.
9 Great Bustards (*Otis tarda*), 4 ♂, 5 ♀. Deposited.
4 Little Bustards (*Otis tetrax*). Deposited.
2 Slender-billed Gulls (*Larus gelastes*). Deposited.
1 Rufous Rat-Kangaroo (*Æpyprymnus rufescens*), ♂. Presented by Dr. J. S. Williams.
28. 1 Greater Black-backed Gull (*Larus marinus*). Presented by W. J. Simpson Ladell, Esq.
4 Lesser Black-backed Gulls (*Larus fuscus*). Presented by W. J. Simpson Ladell, Esq.
30. 2 Serrated Terrapins (*Chrysemys serrata*). Deposited.
4 Reeves's Terrapins (*Damonia reevesi*). Deposited.
1 Amboina Box-Tortoise (*Cyclemmys amboinensis*). Deposited.
1 Bell's Cinixys (*Cinixys belliana*). Deposited.
2 Adanson's Sternotheres (*Sternothærus adansoni*). Deposited.
1 Sharp-nosed Sternothere (*Sternothærus oxyrhinus*). Deposited.
1 Lesueur's Gecko (*Œdura lesueuri*). Deposited.
1 White's Skink (*Egernia whitii*). Deposited.
2 Cunningham's Skinks (*Egernia cunninghami*). Deposited.
2 Lesueur's Skinks (*Lygosoma lesueuri*). Deposited.
31 Decresian Skinks (*Lygosoma decresiense*). Deposited.
1 Musteline Skink (*Lygosoma mustelinum*). Deposited.

Oct. 2. 1 Macaque Monkey (*Macacus cynomolgus*), ♂.
1 Toque Monkey (*Macacus pileatus*), ♀.
1 Sooty Mangabey (*Cercocebus fuliginosus*), ♂.
1 White-collared Mangabey (*Cercocebus collaris*), ♂.
} Presented by W. S. Gilbert, Esq.
1 White-fronted Lemur (*Lemur albifrons*), ♂. Presented by George F. Gardner, Esq.
4. 1 Golden Plover (*Charadrius pluvialis*). Purchased.
1 Grey Plover (*Squatarola helvetica*). Purchased.
1 Ringed Plover (*Ægialitis hiaticula*). Purchased.
1 Bar-tailed Godwit (*Limosa lapponica*). Purchased.
1 Eyra (*Felis eyra*). Purchased.
1 Sœmmerring's Gazelle (*Gazella sœmmerringi*), ♂. Received in Exchange.
2 Striped Hyænas (*Hyæna striata*). Received in Exchange.
5. 1 Nightjar (*Caprimulgus europæus*). Presented by Mr. Richard Cotter.
6. 1 Crowned Duiker-Bok (*Cephalophus coronatus*), ♂. Presented by A. Nightingale, Esq.
1 Scarlet Snake (*Cemophora coccinea*).
3 American Black Snakes (*Zamenis constrictor*).
2 Testaceous Snakes (*Zamenis flagelliformis*).
1 Mexican Snake (*Coluber melanoleucus*).
1 Hog-nosed Snake (*Heterodon platyrhinos*).
1 King Snake (*Coronella getula*).
} Presented by J. H. Fleming, Esq.

Oct. 7. 1 Common Marmoset (*Hapale jacchus*). Presented by Mrs. A. H. Browne, F.Z.S.

9. 1 Dusky Parrot (*Pionus fuscus*). Presented by F. Scammell, Esq.

11. 1 Wapiti Deer (*Cervus canadensis*), ♂. Born in the Menagerie.
2 Collared Fruit-Bats (*Cynonycteris collaris*). Born in the Menagerie.
1 Spotted Eagle-Owl (*Bubo maculosus*).
1 Delalande's Lizard (*Nucras delalandii*).
3 Lineated Snakes (*Boodon lineatus*).
11 Rough-keeled Snakes (*Dasypeltis scabra*).
4 Crossed Snakes (*Psammophis crucifer*).
10 Rufescent Snakes (*Leptodira hotamboia*).
2 Rhomb-marked Snakes (*Trimerorhinus rhombeatus*).
} Presented by J. E. Matcham, Esq., C.M.Z.S.

12. 1 Geoffroy's Cat (*Felis geoffroii*, jr. ?). Presented by W. Brice, Esq.
1 Matamata Terrapin (*Chelys fimbriata*). Presented by W. Brice, Esq.

13. 1 Great Wallaroo (*Macropus robustus*), ♀. Purchased.

14. 1 White-collared Mangabey (*Cercocebus collaris*), ♀. Presented by Miss Daisy Kendall.
1 Banded River-Turtle (*Emyda vittata*). Presented by Mr. H Felix.

15. 1 Egyptian Ichneumon (*Herpestes ichneumon*). Presented by Ernest A. Dixon, Esq.
1 Cape Zorilla (*Ictonyx zorilla*). Deposited.
1 Beisa Antelope (*Oryx beisa*). From Somaliland. Presented by J. Benet Stanford, Esq.
2 Arabian Gazelles (*Gazella arabica*), 2 ♂. Presented by J. Benet Stanford, Esq.
1 Caffer Cat (*Felis caffra*, jv.). From Somaliland. Presented by J. Benet Stanford, Esq.
1 Red-River Hog (*Potamochærus penicillatus*), ♀. Purchased.
1 Leopard (*Felis pardus*), ♂. Presented by Capt. Humfrey.

16. 1 Zanzibar Antelope (*Nesotragus moschatus*), ♀. Presented by H. S. H. Cavendish, Esq.
1 Augur Buzzard (*Buteo augur*). Presented by H. S. H. Cavendish, Esq.
1 Chinchilla (*Chinchilla lanigera*), ♂. Presented by J. A. Wolffsohn, Esq.

18. 1 Crested Grebe (*Podiceps cristatus*). Purchased.

19. 1 Vulpine Phalanger (*Trichosurus vulpecula*), ♀. Presented by Miss Shone.
1 Green Monkey (*Cercopithecus callitrichus*), ♂. Presented by Miss A. E. Ard.
1 Vervet Monkey (*Cercopithecus lalandii*), ♀. Deposited.
1 Bennett's Cassowary (*Casuarius bennetti*). Deposited.

22. 1 Crowned Lemur (*Lemur coronatus*), ♀. Deposited.
1 Grey Lemur (*Hapalemur griseus*). Deposited.
1 Diademed Amazon (*Chrysotis diademata*). Deposited.
1 Wapiti Deer (*Cervus canadensis*), ♀. Born in the Menagerie.
2 Trumpeter Swans (*Cygnus buccinator*). Purchased.

23. 2 Weka Rails (*Ocydromus australis*). Presented by Forbes White, Esq.
1 Cardinal Grosbeak (*Cardinalis virginianus*), ♀. Presented by Mr. Aitchison.

Oct. 25. 1 Sambur Deer (*Cervus aristotelis*), ♀. Received in Exchange.
1 Hog Deer (*Cervus porcinus*), ♀. Received in Exchange.
2 Great-billed Rheas (*Rhea macrorhyncha*). Deposited.
26. 1 Common Chameleon (*Chamæleon vulgaris*). Presented by G. E. Gratton, Esq.
28. 1 Many-coloured Parrakeet (*Psephotus multicolor*). Purchased.
29. 6 Common Rheas (*Rhea americana*), juv. Purchased.
1 Pennant's Parrakeet (*Platycercus pennanti*). Deposited.
1 Alligator (*Alligator mississippiensis*). Presented by J. H. Renals, Esq.
30. 1 White-crested Tiger Bittern (*Tigriosoma leucolophum*). Presented by Dr. J. F. Dell.
3 Shaw's Gerbilles (*Gerbillus shawi*). Born in the Menagerie.

Nov. 1. 10 Paradise Whydah-birds (*Vidua paradisea*). Deposited.
3 Pin-tailed Whydah-birds (*Vidua principalis*). Deposited.
4 Crimson-eared Waxbills (*Estrelda phœnicotis*). Deposited.
2 Red-bellied Waxbills (*Estrelda rubriventris*). Deposited.
2 Yellow-rumped Seed-eaters (*Crithagra chrysopyga*). Deposited.
1 Singing Seed-eater (*Crithagra musica*). Deposited.
2. 1 Long-eared Owl (*Asio otus*). Presented by Major-Gen. Alex. A. A. Kinloch, F.Z.S.
3. 1 Levaillant's Darter (*Plotus levaillanti*). Purchased.
5 Tessellated Snakes (*Tropidonotus tessellatus*). Presented by Herr Carl Hagenbeck.
4. 1 Black Wood-Hen (*Ocydromus fuscus*). Deposited.
2 Jackass Penguins (*Spheniscus magellanicus*). Deposited.
1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by Miss Rachel Hunt.
1 Mediterranean Peregrine Falcon (*Falco punicus?*). Presented by Capt. Watson.
5. 2 Sloth Bears (*Melursus ursinus*), ♂ ♀. Presented by Sir Henry D. Tichborne, Bart.
1 One-wattled Cassowary (*Casuarius uniappendiculatus*). Deposited.
6. 2 Palm-Squirrels (*Sciurus palmarum*). Presented by Dr. G. H. Nowell.
7. 1 Salt-water Terrapin (*Malacoclemmys terrapin*). Presented by H. Arthur Clifton, Esq.
8. 1 Rosy-billed Duck (*Metopiana peposaca*), ♀. Purchased.
3 Himalayan Monauls (*Lophophorus impeyanus*). Bred in the Menagerie.
1 Gannet (*Sula bassana*). Presented by the Rev. G. H. Thompson.
2 Golden Plovers (*Charadrius pluvialis*). Purchased.
2 Dunlins (*Tringa alpina*). Purchased.
4 Common Gulls (*Larus canus*). Purchased.
9. 1 Whooper Swan (*Cygnus musicus*). Presented by W. H. St. Quintin, Esq., F.Z.S.
1 Night-Heron (*Nycticorax griseus*). Presented by W. H. St. Quintin, Esq., F.Z.S.
10. 1 Dwarf Chameleon (*Chamæleon pumilus*). Presented by Mrs. Wolterbuk.
12. 1 Californian Quail (*Callipepla californica*), ♂. Presented by Walter Robertson, Esq.

Nov. 12. 3 Anomalous Snakes (*Rhadinæa anomala*). Purchased.
13. 1 Common Seal (*Phoca vitulina*). Deposited.
16. 2 Ring-necked Parrakeets (*Palæornis torquata*), 2 ♀. Presented by Mrs. G. F. Cooper.
17. 1 Ring-tailed Lemur (*Lemur catta*), ♀. Deposited.
1 Speke's Gazelle (*Gazella spekii*), ♂. From Djiboutil, Abyssinia. Presented by Dr. L. de Gébert. See P. Z. S. 1897, p. 920.
18. 1 Macaque Monkey (*Macacus cynomolgus*), ♂. Presented by F. Greswolde-Williams, Esq., F.Z.S.
1 Macaque Monkey (*Macacus cynomolgus*), ♀. Deposited.
6 Rosy-faced Love-birds (*Agapornis roseicollis*). Purchased.
1 Malaccan Parrakeet (*Palæornis longicauda*), ♂. Purchased.
1 Loggerhead Turtle (*Thalassochelys caretta*). Purchased.
19. 1 Macaque Monkey (*Macacus cynomolgus*) (albino), ♂. Presented by James Coombs, Esq.
1 Bridled Wallaby (*Onychogale frenata*), ♂. Purchased.
2 Rhomb-marked Snakes (*Trimerorhinus rhombeatus*). Presented by J. E. Matcham, Esq., C.M.Z.S.
2 Oldham's Snakes (*Chlorophis hoplogaster*). Presented by J. E. Matcham, Esq., C.M.Z.S.
1 Puff-Adder (*Bitis arietans*). Presented by J. E. Matcham, Esq., C.M.Z.S.
20. 2 Double-spurred Francolins (*Francolinus bicalcaratus*). Presented by E. G. B. Meade-Waldo, Esq., F.Z.S.
4 Rosy Bullfinches (*Erythrospiza githaginea*). Presented by E. G. B. Meade-Waldo, Esq., F.Z.S.
2 Herring-Gulls (*Larus argentatus*). Presented by T. Hope Robinson, Esq., F.Z.S.
4 Siskins (*Chrysomitris spinus*). Purchased.
4 Lesser Redpolls (*Linota rufescens*). Purchased.
22. 1 Smooth Snake (*Coronella austriaca*). Presented by E. Penton, Esq.
1 Hawk-billed Turtle (*Chelone imbricata*). Presented by Dr. J. Bach.
2 Scorpion Mud-Terrapins (*Cinosternon scorpioides*). Presented by Dr. J. Bach.
11 Duméril's Grieved Tortoises (*Podocnemis dumeriliana*). Presented by Dr. J. Bach.
1 Electric Eel (*Gymnotus electricus*). Purchased.
23. 1 Common Marmoset (*Hapale jacchus*). Presented by G. Willison, Esq.
1 Flat-backed Terrapin (*Cyclemys platynota*). From Johore, Malay Peninsula. Presented by S. S. Flower, Esq., F.Z.S.
24. 2 Bridled Wallabies (*Onychogale frenata*), ♂ ♀. Purchased.
25. 1 Deer (*Cervus maral?*), ♂. From the Caucasus. Presented by The Duke of Bedford, F.Z.S.
1 Leopard Tortoise (*Testudo pardalis*). Presented by Miss E. Harrold.
26. 1 Mozambique Monkey (*Cercopithecus pygerythrus*), ♂. Deposited.
1 African Brush-tailed Porcupine (*Atherura africana*). Presented by Capt. W. C. Woollett.
27. 1 Short-tailed Wallaby (*Macropus brachyurus*). Presented by Mr. H. Lowe.
29. 2 Ring-tailed Coatis (*Nasua rufa*). Deposited.
1 Kinkajou (*Cercoleptes caudivolvulus*), ♀. Deposited.

Nov. 29. 1 Punctated Agouti (*Dasyprocta punctata*). Deposited.
1 Globose Curassow (*Crax globicera*), ♂. Deposited.
30. 2 Flat-backed Terrapins (*Cyclemys platynota*). From Johore, Malay Peninsula. Presented by S. S. Flower, Esq., F.Z.S.

Dec. 1. 1 Black-handed Spider-Monkey (*Ateles geoffroyi*), ♀. Presented by F. Colsell, Esq.
2 White-naped Weasels (*Pœcilogale albinucha*). From Natal. Presented by W. Champion, Esq. See P. Z. S. 1898, p. 1.
3. 2 Common Chameleons (*Chamæleon vulgaris*). Presented by Horace Dibley, Esq.
4. 2 Vervet Monkeys (*Cercopithecus lalandii*), ♂ ♀. Presented by L. B. Wright, Esq.
2 Scaup Ducks (*Fuligula marila*), ♂ ♀. Purchased.
6. 1 Dominicans' Cat (*Felis dominicanorum*). From the Province of Foo-chow, China. Presented by Messrs. C. B. Rickett and J. de La Touche. See P. Z. S. 1898, p. 1.
2 White-legged Falconets (*Microhierax melanoleucus*). From the Province of Foo-chow, China. Presented by Messrs. C. B. Rickett and J. de La Touche. See P. Z. S. 1898, p. 2.
1 Collared Jay-Thrush (*Garrulax picticollis*). From the Province of Foo-chow, China. Presented by Messrs. C. B. Rickett and J. de La Touche.
1 White-browed Laughing-Thrush (*Dryonastes sannio*). From the Province of Foo-chow, China. Presented by Messrs. C. B. Rickett and J. de La Touche.
7. 2 Black-necked Swans (*Cygnus nigricollis*), ♂ ♀. Purchased.
1 Crested Porcupine (*Hystrix cristata*). Born in the Menagerie.
8. 1 Arctic Fox (*Canis lagopus*). Presented by A. H. E. Wood, Esq.
9. 1 White-headed Sea-Eagle (*Haliaëtus leucocephalus*). From Newfoundland. Purchased.
1 Ocelot (*Felis pardalis*). Presented by Wm. Wethered, Esq.
10. 4 Burrowing-Owls (*Speotyto cunicularia*). Presented by Miss Sandys Lumsdaine.
1 Common Chameleon (*Chamæleon vulgaris*). Presented by Miss M. L. Peake.
13. 6 White Pelicans (*Pelecanus onocrotalus*). Deposited.
1 Crimson-eared Waxbill (*Estrelda phœnicotis*). Presented by Miss Aves.
14. 1 Blotched Genet (*Genetta tigrina*). Presented by J. E. Matcham, Esq., C.M.Z.S.
1 Binturong (*Arctictis binturong*). Presented by W. W. Skeat, Esq.
15. 1 Ruddy Ichneumon (*Herpestes smithi*), ♂. Presented by Col. F. Morison.
2 Grey Struthideas (*Struthidea cinerea*). Presented by R. Phillipps, Esq.
16. 1 Sykes's Monkey (*Cercopithecus albigularis*), ♂. Presented by Mr. Henry Curnow.
17. 3 Coscoroba Swans (*Coscoroba candida*). Purchased.
18. 1 Mandrill (*Cynocephalus mormon*, jv.), ♂. Presented by Dr. H. O. Forbes.
1 Mona Monkey (*Cercopithecus mona*), ♂. Presented by Dr. H. O. Forbes.
2 Green Monkeys (*Cercopithecus callitrichus*), 2 ♂. Presented by Dr. H. O. Forbes.

Dec. 18. 1 Lucan's Crested Eagle (*Lophotriorchis lucani*). Presented by Dr. H. O. Forbes. See P. Z. S. 1898, p. 2.
7 African Walking-fishes (*Periophthalmus koelreuteri*). Presented by Dr. H. O. Forbes.
1 Houbara Bustard (*Houbara undulata*). Purchased.
20. 1 Chacma Baboon (*Cynocephalus porcarius*), ♂. Presented by Major R. Haynes-Sadler.
1 Black-backed Jackal (*Canis mesomelas*), ♀. Presented by Major R. Haynes-Sadler.
1 Yellow-cheeked Lemur (*Lemur xanthomystax*). Deposited.
21. 1 Red-bellied Wallaby (*Macropus billardieri*). Presented by Mrs. Beaumont.
22. 6 Summer Ducks (*Æx sponsa*), 5 ♂, 1 ♀. Purchased.
1 Guillemot (*Lomvia troile*). Presented by John Pettitt, Esq.
23. 1 Marsh-Harrier (*Circus æruginosus*). Deposited.
27. 2 Noisy Pittas (*Pitta strepitans*). Purchased.
28. 1 Spectacled Bear (*Ursus ornatus*). From Colombia. Presented by William Crosley, Esq. See P. Z. S. 1898, p. 2.
1 Spotted Cavy (*Cœlogenys paca*). Presented by William Crosley, Esq.
3 Brown Capuchins (*Cebus fatuellus*). Deposited.
1 Blue-and-Yellow Macaw (*Ara ararauna*). Deposited.
1 Red-and-Yellow Macaw (*Ara chloroptera*). Presented by H. M. Collins, Esq.
29. 1 Naked-throated Bell-bird (*Chasmorhynchus nudicollis*). Purchased.
31. 1 Sooty Mangabey (*Cercocebus fuliginosus*). Presented by Mrs. R. H. Padbury.
1 Suricate (*Suricata tetradactyla*). Presented by Mrs. Soames.

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Printed by Taylor and Francis, Red Lion Court, Fleet Street.

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