

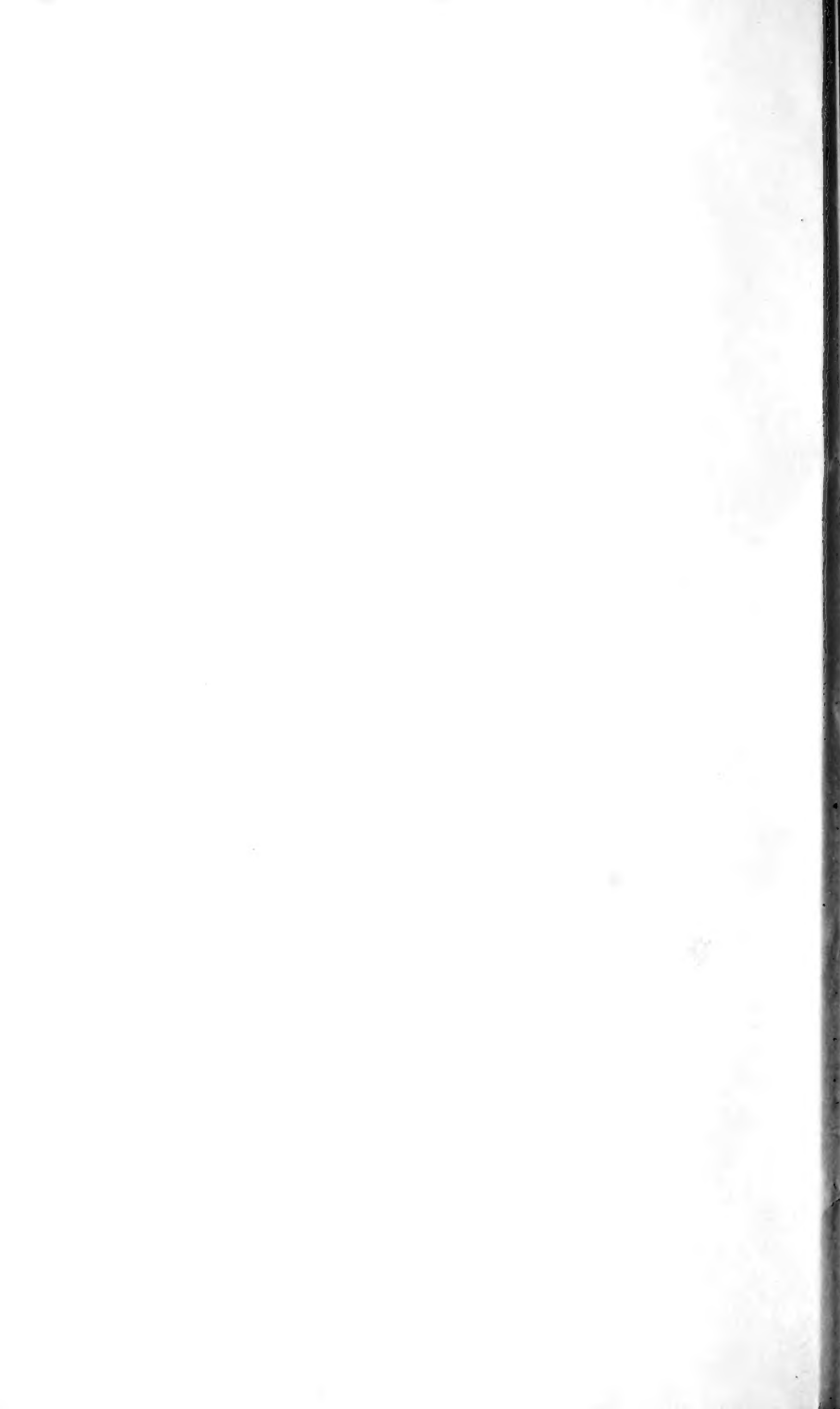
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THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY,

INCLUDING

ZOOLOGY, BOTANY, AND GEOLOGY.

(BEING A CONTINUATION OF THE 'ANNALS' COMBINED WITH LOUDON AND CHARLESWORTH'S 'MAGAZINE OF NATURAL HISTORY.')

CONDUCTED BY

ALBERT C. L. G. GÜNTHER, M.A., M.D., Ph.D., F.R.S.,

WILLIAM CARRUTHERS, F.R.S., F.L.S., F.G.S.,

AND

WILLIAM FRANCIS, JUN., F.L.S.

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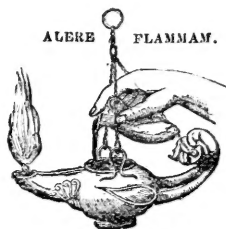
“Omnes res creatæ sunt divinæ sapientiæ et potentiæ testes, divitiæ felicitatis humanæ:—ex harum usu *bonitas* Creatoris; ex pulchritudine *sapientia* Domini; ex œconomiâ in conservatione, proportione, renovatione, *potentia* majestatis elucet. Earum itaque indagatio ab hominibus sibi relictis semper æstimata; à verè eruditis et sapientibus semper exulta; malè doctis et barbaris semper inimica fuit.”—LINNÆUS.

“Quel que soit le principe de la vie animale, il ne faut qu’ouvrir les yeux pour voir qu’elle est le chef-d’œuvre de la Toute-puissance, et le but auquel se rapportent toutes ses opérations.”—BRUCKNER, *Théorie du Système Animal*, Leyden, 1767.

. The sylvan powers
 Obey our summons; from their deepest dells
 The Dryads come, and throw their garlands wild
 And odorous branches at our feet; the Nymphs
 That press with nimble step the mountain-thyme
 And purple heath-flower come not empty-handed,
 But scatter round ten thousand forms minute
 Of velvet moss or lichen, torn from rock
 Or rifted oak or cavern deep: the Naiads too
 Quit their loved native stream, from whose smooth face
 They crop the lily, and each sedge and rush
 That drinks the rippling tide: the frozen poles,
 Where peril waits the bold adventurer’s tread,
 The burning sands of Borneo and Cayenne,
 All, all to us unlock their secret stores
 And pay their cheerful tribute.

J. TAYLOR, *Norwich*, 1818.

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THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

[SEVENTH SERIES.]

"..... per litora spargite muscum,
Naiades, et circum vitreos considite fontes:
Pollice virgineo teneros hic carpite flores:
Floribus et pietum, divæ, replete canistrum:
At vos, o Nymphæ Craterides, ite sub undas:
Ite, recurvato variata corallia trunco
Vellite muscosis e rupibus, et mihi conchas
Ferte, Deæ pelagi, et pingui conchylia succo."
N. Parthenii Giannettasi, Eccl. 1.

No. 25. JANUARY 1900.

I.—*Arctic Crustacea: Bruce Collection.* By the Rev. THOMAS R. R. STEBBING, M.A., F.R.S.

THE Crustacea collected by Mr. W. S. Bruce in Franz-Josef Land during 1896 and 1897, in connexion with the well-known Jackson-Harmsworth Expedition, have recently been described by Mr. Thomas Scott, F.L.S., in the 'Journal of the Linnean Society.' In 1898 Mr. Bruce made three new Arctic cruises: the first with Mr. Andrew Coats in his yacht 'Bleneathra' to Kolguev and Novaya Zemlya; the second with the same friendly sportsman "to Bear Island, Hope Island, across the Barents Sea almost to the north end of Novaya Zemlya, and to the Wiche Islands"; the third with the Prince of Monaco, on the 'Princesse Alice,' to Bear Island, Hope Island, several parts of Spitzbergen, and the Greenland Sea.

As might have been expected, Mr. Bruce made every possible use of his opportunities in the interests of natural science. The Malacostraca thus obtained he has, on the suggestion of Mr. Scott, submitted to me for determination, and the following catalogue is the result.

BRACHYURA.

Tribe OXYRRHYNCHA.

Fam. Maiidæ.

Genus HYAS, Leach, 1813-1814.

Hyas araneus (Linn.).

1758. *Cancer araneus*, Linn., Systema Naturæ, ed. x. (reprint, 1894), p. 628.
1790. *Cancer bufo*, Herbst, Naturg. Krabben u. Krebse, vol. i. pt 8, p. 242, pl. xvii. fig. 95.
1814. *Hyas araneus*, Leach, Edinb. Encycl. vol. vii. p. 431.
1816. *Hyas araneus*, Leach, Malacostraca Podophth. Britannia, pl. xxi. A.
1834. *Hyas aranea*, Milne-Edwards, Hist. Nat. Crust. vol. i. p. 312.
1851. *Hyas araneus*, Brandt, Middendorff's Sibirische Reise, vol. ii. pt. i. p. 76.
1853. *Hyas araneus*, Bell, British Stalk-eyed Crustacea, p. 31, fig. in text.
1864. *Hyas araneus*, Goës, Crust. podophth. Succia &c., in Cefv. Vet.-Akad. Förh. p. 161 (extr. p. 1).
1882. *Hyas coarctatus*, var., Hoek, Die Crustaceen des Willem Barents, in Nied. Arch. für Zool., Suppl. vol. i. p. 3, pl. i. fig. 1.
1887. *Hyas araneus*, H. J. Hansen, Dijnphna Krebsdyr, p. 234.

In regard to this abundant, widely distributed, and well-known species there is still an unsettled question. Leach in one work mentions and in another figures a specimen measuring 16 inches across between the tips of the extended legs. The carapace of the specimen figured is $3\frac{1}{2}$ inches long by a little over $2\frac{1}{2}$ broad. These dimensions, as Leach himself recognizes and as subsequent experience has shown, are very uncommon. From this form, capable of so large a development, the same author in 1815 distinguished, as *Hyas coarctatus*, a second species, of which a specimen is considered fine when the carapace is $1\frac{1}{4}$ inch long by $\frac{3}{4}$ inch wide. Leach did not, however, lay any stress on the difference in size, but on a character less easily appreciable, namely, that the acute lateral postorbital process of the carapace is tuberculate to the rear in *Hyas araneus*, whereas to the rear in *Hyas coarctatus* it is much dilated and unarmed. The latter species moreover, in accordance with its name, has the sides of its carapace constricted. It is not said, and it would not be true to say, that they are without constriction in the other form. The fact appears to be that the constriction forms a small pocket (as in the smaller of Leach's two figures of *Hyas coarctatus*) only in small specimens, but that, as specimens increase in size, it becomes a shallow emargination.

Brandt, in distinguishing the species, uses Leach's character of tuberculation, saying that the part of the carapace in question has about two or three warts in *Hyas araneus* and only about one or none in *Hyas coarctatus*. His words are "subternis vel subbinis" and "subunica vel nulla," of which the meaning seems plain, although the Latinity is not Ciceronian. He adds that in *Hyas araneus* the breadth of the front third of the carapace is a little less or more than half the extreme breadth, but that in *Hyas coarctatus* this front third has more than three fourths, or about four fifths, of the extreme breadth. The two species live in the same waters, so that, when it comes to determining matrimonial alliances, one cannot help wondering how they manage without compasses to prevent a narrow-fronted Romeo from winning the affections of a broad-fronted Juliet, since we, with all appliances and means to boot, can scarcely keep their rival clans from mixing. According to Bell, "In the young state it is very difficult to distinguish the two species, as the former [*Hyas araneus*] has, in its early age, the spreading form of the postorbital processes which distinguishes the present species [*Hyas coarctatus*] in its perfect adult condition, and which is gradually lost by the other." Bell dismisses Hailstone's *Hyas serratus* as undoubtedly only a very young form of *Hyas coarctatus*.

Sars, in the 'Crustacea of the Norwegian North-Atlantic Expedition' (Crust. pt. 2, p. 2, 1886), records both *H. araneus* and *H. coarctatus*, and, further, considers Brandt's var. *alutacea* of the latter "to be strictly entitled to specific distinction." Unfortunately he does not give the characters to be relied on for keeping the three forms apart. Most of the specimens assigned by him to *H. coarctatus* were young individuals. He notices, as earlier authors had done, that this form descends into much deeper waters than those frequented by *H. araneus*.

Brandt considers the *Hyas coarctata* of De Kay (Nat. Hist. of New York, 1843) to be a form intermediate between *H. araneus* and *H. coarctatus*. Professor S. I. Smith, in 'The Stalk-eyed Crustaceans of the Atlantic Coast of North America north of Cape Cod,' 1879, not only shows no doubt of the distinctness of these two species, but accepts a third from Stimpson. That author, he observes, in the Pr. Ac. Philadelphia, 1857, "describes a new species, *latifrons*, as common in Bering Sea, apparently using the same specimens which were a few months before referred to *H. coarctatus*. *H. latifrons*., though closely allied to *coarctatus*, is certainly

a good species or a very remarkable variety, and quite distinct from Brandt's variety *alutaceus*." Miers, on the other hand, in the 'Challenger' Brachyura, pronounces Stimpson's *H. latifrons* to be "very doubtfully distinct from *Hyas coarctata*," though he recognizes Dana's *Hyas lyratus* from the west coast of America as a very distinct species.

In 1882 Hoek, among the Crustacea of the 'Willem Barents' Expedition, describes and figures "*Hyas coarctatus*, Leach, var.," and lays stress on measurements of the male chelipeds. But these appear to be far too variable with age and size of specimen to admit of any reliance being placed upon them, and, moreover, as Hansen has pointed out ('*Dijmphna Krebsdyr*,' p. 235), it is clear that Hoek's species is a true *Hyas araneus*. Hansen's own conclusions are as follows:—"Specimens from the '*Dijmphna*' give the same result as that of Hoek's table of measurements, that the breadth of the carapace in front, compared with its breadth behind, is relatively greater in the small than in the large specimens, just as the breadth in front is in the small specimens greater in relation to the length than in the large individuals. Whether, all things considered, *Hyas coarctatus* is a valid independent species or only a variety of *H. araneus*, appears to me somewhat doubtful, although I have inspected a rather considerable number of animals at various ages and from various seas."

Into how many species the genus *Hyas* will eventually be divided it is impossible to foresee. Dana's *H. lyratus* should, it seems, stand by itself. Of the other forms as yet known how happily, *sua si bona norint*, may all of them live under the common name of *Hyas araneus*. But to expect that they will do so is utopian.

Mr. Bruce's specimens were obtained from off the north end of Kolguev Island at 12 fathoms, and from the western part of the Barents Sea, 76° 17' N., 21° 36' E., at 60 fathoms depth.

MACRURA.

Tribe ANOMALA.

Fam. Paguridæ.

Genus EUPAGURUS, Brandt, 1851.

Eupagurus pubescens (Krøyer).

1838. *Pagurus pubescens*, Krøyer, Danske Selsk. Skr. Afh. pt. 7, p. 314; Krøyer, Conspectus Crust. Grœnlandiæ, Naturh. Tidsskr. vol. ii. p. 251.

1846. *Pagurus pubescens*, Kröyer, Gaimard's Voy. du Nord, Crust., Atlas, pl. ii. fig. 1.
1851. *Eupagurus pubescens*, Brandt, Middendorff's Sibirische Reise, vol. ii. pt. 1, pp. 31, 34, 35.
1853. *Pagurus Thompsoni*, Bell, British Stalk-eyed Crustacea, p. 372, fig. in text.
1858. *Eupagurus pubescens*, Stimpson, and *Eupagurus Kröyeri*, Stimpson (both without description), Pr. Ac. Philad. pp. 75, 87.
1859. *Eupagurus Kröyeri*, Stimpson, Ann. Lyc. Nat. Hist. New York, vol. vii. p. 89.
1879. *Eupagurus pubescens*, S. I. Smith, Trans. Connect. Ac. vol. v. pt. 1, p. 47.
1879. *Eupagurus Kröyeri*, S. I. Smith, *ibid.* p. 48.
1882. *Eupagurus pubescens*, Sars, Forh. Selsk. Christian. no. 18, p. 42, pl. i. figs. 1-2.
1886. *Eupagurus pubescens*, Henderson, Crust. Decap. Firth of Clyde, p. 26.
1888. *Eupagurus pubescens*, var. *Kröyeri*, Henderson, Rep. Voy. 'Challenger,' vol. xxvii. p. 65.

In first establishing the species Kröyer assigned to it two distinctive characters, the long soft hairs clothing the chelipeds and the form of the left hand, which, however, he left undescribed. In the same year he gave another characterization as follows:—"Dorsal surface of the cephalothorax and the legs densely beset with yellow setæ, and a strong dentate carina of the right hand extending from the base of the finger to the outer carina of the wrist." This was followed by a comparison or contrast instituted between the new species and *Pagurus bernhardus*. No mention at all is made of the left hand; but Brandt is no doubt right in supposing that Kröyer by a slip of the pen wrote "dextræ" in place of "sinistræ."

Bell probably instituted his *Pagurus Thompsoni* in ignorance or forgetfulness of Kröyer's species, and he speaks of the small anterior leg (that is, the left cheliped) as "nearly linear," without noticing the characteristic carina. Stimpson found specimens which agreed with the figure in Gaimard's 'Voy. du Nord' in having the pubescence little demonstrative, and both he and afterwards Professor S. I. Smith concluded that Kröyer had mixed up two distinct species. Professor Smith finds numerous minute distinctions in the outline, position, and denticulation of the outer carina of the left hand in the two forms. But Professor Sars maintains that the two cannot possibly be separated specifically. He urges that the pubescence of body and legs is on the whole very variable, and that the form of the left chela varies a good deal in the two sexes—in the female fairly corresponding with Smith's account of *Eupagurus Kröyeri* and in the male with his *Eupagurus pubescens*. He finds the male as a rule more

strongly pubescent than the female. Professor Henderson contents himself with the compromise of accepting Stimpson's species as a variety of Kröyer's. In the feebleness of the pubescence Mr. Bruce's specimens make no very marked claim upon the original specific name, to which otherwise they may well have a right.

Localities. Off north end of Kolguev Island, 12 fathoms; Novaya Zemlya, 20 fathoms.

Tribe CARIDEA.

Fam. Crangonidæ.

Genus SABINEA, Owen, 1835.

Sabinea septemcarinata (Sabine).

1821. *Crangon septemcarinatus*, Sabine, Parry's Voyage, Appendix, no. x., Zoology, p. 58, pl. ii. figs. 11-13.

1835. *Sabinea septemcarinata*, Owen, Ross's 2nd Voyage, App., Zool. p. lxxxii.

1879. *Sabinea septemcarinata*, S. I. Smith, Tr. Connect. Ac. vol. v. pt. 1, p. 57, pl. xi. figs. 5, 9-13.

1890. *Sabinea septemcarinata*, Sars, Arch. Naturv. Christian. vol. xiv. p. 168, pl. v., pl. vi. figs. 1-13.

It has been pointed out by Professor Smith that two distinct species have sometimes been confounded under the name *septemcarinata*. The specimens to which that name properly belongs have the rostrum obtusely rounded at the tip and the telson subtruncate, its apex fringed with eight or more spines. On the other hand there are specimens of similar general appearance belonging to the species *Sabinea Sarsii*, Smith, 1879, which can readily be distinguished by the circumstance that the rostrum ends in an acute tip and that the telson likewise has its apex acute, with one or two spines on either side. Sars has pointed out that the *Myto Gaimardii* of Kröyer is in fact the first larval stage of *Sabinea septemcarinata*, and that in a very young post-larval condition that species is already sharply distinguished from *Sabinea Sarsii* by the character of the telson.

Mr. Bruce's specimens were obtained by the trawl off North Kolguev Island, at 12 fathoms and at 30 fathoms; and in the west of the Barents Sea, 76° 44'-76° 47' N., 30° 30'-29° 55' E., at 110 fathoms; at 76° 17' N., 21° 36' E., in 60 fathoms.

Genus *SCLEROCRANGON*, Sars, 1882.1882. *Sclerocrangon*, Sars, Forh. Selsk. Christian. no. 18, p. 45.1885. *Sclerocrangon*, Sars, Norwegian North-Atlantic Exp. vol. xiv., Crust. pt. 1, p. 14.*Sclerocrangon ferox*, Sars.1876. *Cheraphilus ferox*, Sars, Arch. Naturv. Christian. p. 339.1882. *Cheraphilus ferox*, Hoek, Ned. Arch. f. Zool., Suppl. vol. i. p. 9, pl. i. fig. 3.1885. *Sclerocrangon salebrosus*, Sars, Norwegian North-Atlantic Exp. vol. xiv., Crust. pt. 1, p. 15, pl. ii.1887. *Sclerocrangon ferox*, H. J. Hansen, Dijnphna Krebsdyr, p. 236.1890. *Sclerocrangon ferox*, Sars, Arch. Naturv. Christian. vol. xiv. p. 180.

The dentiform projections on the lower margins of the pleon-segments afford an easily observable distinction between this species and the *Sclerocrangon boreas* of Phipps. In *Sclerocrangon Agassizii*, S. I. Smith, the first pleon-segment has an obtuse tooth on the lower margin and the second has a slight tooth, but the following segments have the lower edges unarmed. Hansen points out that the *Crangon salebrosus* of Owen cannot be identified with the present species, since, besides other differences, it is described as having the carapace septemcarinate.

Mr. Bruce's specimens were obtained between 76° 24' N., 33° 43' E., and 76° 47' N., 29° 57' E., at depths of 100 and 110 fathoms; at 77° 14' N., in 76 fathoms.

Genus *SPIRONTOCARIS*, Spence Bate, 1888.*Spirontocaris polaris* (Sabine).1821. *Alpheus polaris*, Sabine, Parry's Voyage, Appendix no. x., Zoology, p. 60, pl. ii. figs. 5-8.1835. *Hippolyte polaris*, Owen, Ross's 2nd Voyage, App., Zool. p. lxxxv.1835. *Hippolyte borealis*, Owen, *ibid.* p. lxxxiv, pl. B, fig. 3.1842. *Hippolyte polaris*, Krøyer, Monogr. *Hippolyte's nordiske Arter*, p. 116, pl. iii. figs. 78-81, pl. iv. fig. 82.1842. *Hippolyte borealis*, Krøyer, *ibid.* p. 122, pl. iii. figs. 74-77.1879. *Hippolyte polaris*, S. I. Smith, Tr. Connect. Ac. vol. v. pt. 1, p. 80, pl. xi. figs. 1-4.1886. *Hippolyte polaris*, Kœlbel, Crustaceen von Jan Mayen, p. 11.1887. *Hippolyte polaris*, Hansen, Dijnphna Krebsdyr, p. 239.1890. *Spirontocaris polaris*, Scott, Journ. Linn. Soc. London, Zool. vol. xxvii. p. 63.

From Sabine onwards authors have noticed the great

variability in the number of the teeth of the rostrum both above and below. Professor Smith's conclusion that no specific distinction is tenable between *polaris* and *borealis* has been generally accepted. The American professor is also inclined to believe that *Hippolyte cultellata*, Norman, 1867, is another synonym, and Norman himself (Ann. & Mag. Nat. Hist. ser. 6, vol. xiii. p. 270) accepts it as such. It may be noticed that *cultellatum* is a word used by Kröyer in describing the rostrum alike of *polaris* and *borealis*. The variability in the pterygostomial spines (to disappearance) and in the number of dorsal aculei (from four to ten pairs) on the telson is fully discussed by Professor Smith. Kœlbel gives the branchial formula as comprising a podobranchia on the second maxilliped, an epipod on each of the five appendages from the first maxilliped to the second trunk-leg, and a pleurobranchia on each of the five successive trunk-legs. As this species has seven subdivisions to the fifth joint of the second trunk-legs, or, in brief, a seven-jointed wrist, it seems proper to include it in the genus *Spirontocaris*. Hansen mentions 77 millim. as the length of a very large male.

A large specimen (about 3 inches long), with others not so large, was obtained at 70° 03' N., 49° 10' E., in 20 fathoms. A small specimen (about 1½ inch long), with eight pairs of dorsal spines on the telson and eight apical spines, of which the median six are subequal, was taken at 76° 29' N., 19° 08' E., in 140 fathoms.

Spirontocaris spinus (Sowerby).

1805. *Cancer spinus*, Sowerby, British Miscellany, p. 47, pl. xxiii.
 1814. *Alpheus spinus*, Leach, Edinb. Encycl. vol. vii. p. 431.
 1815. *Alpheus spinus*, Leach, Trans. Linn. Soc. London, vol. xi. p. 347.
 1817. *Hippolyte Sowerbei*, Leach, Malac. Podophth. Britanniaë, pl. xxxix.
 1837. *Hippolyte Sowerbyi*, Milne-Edwards, Hist. Nat. Crust. vol. ii. p. 380.
 1842. *Hippolyte Sowerbei*, Kröyer, Hippolyte's nordiske Arter, p. 90, pl. ii. figs. 45-54.
 1879. *Hippolyte spinus*, S. I. Smith, Tr. Connect. Ac. vol. v. pt. 1, p. 68.
 1882. *Hippolyte spinus*, Hoek, Crust. Willem Barents, in Ned. Arch. für Zool., Suppl. vol. i. p. 15, pl. i. figs. 4-7.
 1886. *Hippolyte spinus*, Kœlbel, Crustaceen von Jan Mayen, p. 11.
 1888. *Spirontocaris spinus*, Bate, Rep. Voy. 'Challenger,' vol. xxiv. p. 596, pls. cvi., cvii.

The synonymy may with little doubt be amplified by the names *Hippolyte Liljeborgi*, Danielssen, 1861, and *Hippolyte securifrons*, Norman, 1863. Stimpson in 1860 adopts the

curious reading of the name, *Hippolyte spina*, as if *spinus* were an adjective. Spence Bate emphasizes the variability of the species by describing seven varieties. According to Kœlbel the branchial formula is the same as in *Spirontocaris polaris*, except for the additional epipod in the present species, which has one on the third trunk-leg, as observed by Krøyer.

Specimens were obtained at 76° 17' N., 21° 36' E., in 60 fathoms depth.

Spirontocaris Gaimardii (Milne-Edwards).

1837. *Hippolyte Gaimardii*, Milne-Edwards, Hist. Nat. Crust. vol. ii. p. 378.
 1842. *Hippolyte Gaimardii*, Krøyer, Hippolyte's nordiske Arter, p. 74, pl. i. figs. 21-29.
 1842. *Hippolyte gibba*, Krøyer, ibid. p. 80, pl. i. fig. 30, pl. ii. figs. 31-37.
 1864. *Hippolyte Gaimardii*, Goës, Crust. podophth. Suecicæ etc., (Efv. Vet.-Akad. Förh. p. 168 (extr. p. 8).
 1879. *Hippolyte Gaimardii*, S. I. Smith, Tr. Connect. Ac. vol. v. pt. 1, p. 67, pl. ix. figs. 8, 9.
 1882. *Hippolyte Gaimardii*, Hoek, Crust. Willem Barents, Ned. Arch. für Zool., Suppl. vol. i. p. 13.
 1886. *Hippolyte Gaimardii*, Kœlbel, Crustaceen von Jan Mayen, p. 12.
 1887. *Hippolyte Gaimardii*, Hansen, Dijnphna Krebsdyr, p. 238.
 1888. *Hetairus Gaimardii*, Bate, Rep. Voy. 'Challenger,' vol. xxiv. p. 611, pl. cix. fig. 2.
 1893. *Spirontocaris Gaimardii*, Stebbing, Hist. Crust., Internat. Science Series, vol. lxxiii. p. 235.
 1899. *Spirontocaris Gaimardii*, Scott, Journ. Linn. Soc. London, Zool. vol. xxvii. p. 63, pl. iii. figs. 1, 2.

This species is notable for the absence of the pair of spines so commonly found in this genus over the eyes at the base of the rostrum. According to Kœlbel the branchial formula is the same as that of *Spirontocaris polaris*. Goës has been followed by subsequent authors in uniting the forms *gibba* and *Gaimardii**. With these he united *Hippolyte Belcheri*, Bell (Belcher's 'Voyage,' p. 402, pl. xxiv. fig. 1), and was inclined to unite *Hippolyte pandaliformis*, Bell (Brit. Stalk-eyed Crust. p. 294). Hoek considers that they should both be regarded as synonyms of *Gaimardii*. A specimen measuring $2\frac{1}{2}$ inches in length was obtained by Mr. Bruce. It has the third pleon-segment dorsally produced over the next with a rather broadly rounded apex, above which, but not reaching beyond it, is a narrow, though not acute, median projection. The rostrum has four teeth below and eight above, in addition to three on the carapace. The dorsal spines of the telson

* Miss M. J. Rathbun, however, keeps them distinct, but without comment, in her recently published 'List of Crustacea known to occur on or near the Pribilof Islands.'

are not exactly paired, being six on one side and five on the other.

Locality. 70° 51' N., 53° E., at a depth of 20 fathoms.

Spirontocaris turgida (Kröyer).

1841. *Hippolyte turgida*, Kröyer, Naturhist. Tidsskr. vol. iii. p. 575.
 1841. *Hippolyte Phippsii*, Kröyer, *ibid.* pp. 575-576.
 1842. *Hippolyte turgida*, Kröyer, *Hippolyte's nordiske Arter*, p. 100, pl. ii. figs. 57, 58, pl. iii. figs. 59-63.
 1842. *Hippolyte Phippsii*, Kröyer, *ibid.* p. 106, pl. iii. figs. 64-68.
 1864. *Hippolyte Phippsii*, Goës, *Crust. podophth. Succieæ etc.*, *Œfv. Vet.-Akad. Förh.* p. 169 (extr. p. 9).
 1879. *Hippolyte Phippsii*, S. I. Smith, *Tr. Connect. Ac.* vol. v. pt. 1, p. 73.
 1882. *Hippolyte Phippsii*, Hoek, *Crust. Willem Barents*, *Nied. Arch. für Zool.*, Suppl. vol. i. p. 17.
 1899. ? *Spirontocaris Phippsii*, Scott, *Journ. Linn. Soc. Lond.*, *Zool.* vol. xxvii. p. 63, pl. iii. figs. 3, 4.

The suggestion made by Goës that Kröyer's *turgida* and *Phippsii* were respectively female and male of one species has been generally accepted. The priority of the name *turgida* has been as generally set aside, probably under the idea that the male was so obviously the superior animal that no rules of nomenclature could compete with its claim to preferential notice. Professor Smith includes in the synonymy the *Hippolyte vibrans* of Stimpson (*Ann. Lyc. Nat. Hist. New York*, vol. x. p. 125, 1871), and, with some doubt, *Hippolyte ochotensis*, Brandt, 1849.

Specimens were obtained by Mr. Bruce at 76° 17' N., 21° 36' E., in 60 fathoms depth.

SCHIZOPODA.

Fam. Euphausiidæ.

Genus RHODA, Sim, 1872.

1872. *Rhoda*, Sim, "Stalk-eyed Crust. N.E. Coast of Scotland," in *Scottish Naturalist*, sep. copy, p. 6 (*vide* Norman).
 1883. *Boreophausia*, Sars, *Forh. Selsk. Christian.* no. 7, p. 11.
 1886. *Boreophausia*, Norman, *Fourth Annual Rep. Fish. Board Scotland*, p. 156.
 1892. *Boreophausia*, Norman, *Ann. & Mag. Nat. Hist.* ser. 6, vol. ix. p. 461.
 1893. *Rhoda*, Stebbing, *Hist. Crust.*, *Internat. Science Series*, vol. lxxiv. p. 263.

Rhoda inermis (Kröyer).

1846. ? *Thysanopoda inermis*, Kröyer, Gaimard's Voy. du Nord, Crust. pl. vii. figs. 2 a-t.
 1882. *Euphausia inermis*, Sars, Forh. Selsk. Christian. no. 18, p. 51, pl. i. fig. 15.
 1885. *Boreophausia inermis*, Sars, 'Challenger' Reports, vol. xiii. Schizopoda, p. 64.
 1886. *Boreophausia inermis*, Sars, Norwegian North-Atlantic Exp., Crust. vol. ii. p. 13.
 1887. *Boreophausia inermis*, Hansen, Malac. Grœnl. œccid., Vid. Medd. p. 53.
 1892. *Boreophausia inermis*, Norman, Ann. & Mag. Nat. Hist. ser. 6, vol. ix. p. 461.
 1893. *Rhoda inermis*, Stebbing, Hist. Crust. p. 263.

Norman having identified the *Boreophausia Raschi* (M. Sars) with *Rhoda Jardineana*, Sim, 1872, it seems clear that the generic name *Boreophausia*, proposed by Sars in 1883, must give way to the much earlier name *Rhoda*.

Mr. Bruce's specimens of *Rhoda inermis* were taken on two occasions in July by the tow-net at night.

Fam. **Mysidæ**.

Genus **MYSIDEIS**, Sars, 1869.

1869. *Mysideis*, Sars, Undersøgelser over Christianiafjordens Dybvandsfauna, p. 28.
 1870, 1879. *Mysideis*, Sars, Monogr. Norges Mysider, pt. 1, p. 9, pt. 3, pp. 1, 110.

On page 9 of the 'Monograph' Sars assigns *Mysideis* to the group in which all the pleopods of the male are unlike those of the female, and to the division of that group which has the molar of the mandibles distinct, separating the genus from its companions by the character that the incisive lobes of the *first* maxillæ are only two instead of three. The full generic character in pt. 3, page 1, and the subsequent specific descriptions and figures, agree with the original account in 1869 in applying the character to the *second* maxillæ, to which alone it could be appropriate. From the type species, *Mysideis insignis*, the *M. grandis* of Goës is very clearly distinguished by the subacute or tubercular projection in the middle of the outer margin of the first maxillæ, as well as by the truncate apex of the telson.

Mysideis grandis (Goës).

1864. *Mysis grandis*, Goës, Crust. podophth. Sueciæ etc., Œfv. Vet.-Akad. Förh. p. 176 (extr. p. 16).

1879. *Mysideis grandis*, Sars, Monogr. Norges Mysider, pt. 3, p. 106, pls. xli., xlii.

A specimen, $1\frac{1}{5}$ inch in length, and two of smaller size, were obtained at $70^{\circ} 51' N.$, $53^{\circ} E.$, in about 20 fathoms depth, comparatively shallow water for this apparently rare species.

CUMACEA.

In this group the only captures observed were *Leucon pallidus*, Sars, from a depth of 60 fathoms, and some small specimens taken with the tow-net, probably belonging to *Lamprops fuscata*, Sars; but the lateral margin of the carapace is furnished with five or six denticles, the first joint of the inner branch of the uropods has only six spines, and the apex of the telson scarcely looked as if it could have been furnished with more than three spines, the full number in *L. fuscata* being five.

ISOPODA.

Tribe CHELIFERA.

Genus CRYPTOCOPE, Sars, 1880.

1880. *Cryptocope*, Sars, Isopoda Chelifera, Arch. Naturv. p. 49.

1886. *Cryptocope*, Norman and Stebbing, Trans. Zool. Soc. London, vol. xii. pt. 4, p. 106.

1896. *Cryptocope*, Sars, Crustacea of Norway, vol. ii. p. 33.

Cryptocope arctica, Hansen.

1887. *Cryptocope arctica*, Hansen, Dijnphna Krebsdyr, p. 209, pl. xxi. fig. 4; id. Malac. Grœnl. occid., Vid. Medd. p. 180, pl. vii. figs. 1-1 c.

This minute species, less than $\frac{1}{2}$ inch long, differs from the *Cryptocope Vöringii* and *Cryptocope abbreviata* in having setæ on the pleopods, of which the other two species are devoid. The setæ are apical in the specimen I have examined. It has the antennæ agreeing with those figured by Hansen in pl. vii. fig. 1 b for the female. Also apparently the outer branch of the uropod is two-jointed, in agreement with Hansen's figure of that microscopic appendage in the ovigerous female. According to Sars the outer branch is one-jointed in the female both of *C. abbreviata* and of the larger *C. Vöringii*, although in 1876, when describing the latter as *Tanais Vöringii*, he had stated that both branches of the uropods were two-jointed in the female.

Mr. Bruce's specimens came from a depth of 100 fathoms.

Tribo FLABELLIFERA.

Fam. Anthuridæ.

Genus CALATHURA, Norman and Stebbing, 1886.

1886. *Calathura*, Norman and Stebbing, Trans. Zool. Soc. London, vol. xii. pt. 4, p. 122.

1897. *Calathura*, Sars, Crustacea of Norway, vol. ii. p. 44.

To this genus Sars assigns three species—Stimpson's *Anthura brachiata*, his own *Paranthura norvegica*, 1872, and Bonnier's *Calathura affinis*, 1896. But the last of these three should be referred to the genus *Leptanthura*, Sars, 1897. It is, I think, quite certain that in the genus *Calathura* the inner ramus of the uropoda is not biarticulate, but, in accordance with the view separately propounded by Dr. Anton Dohrn for *Paranthura Costana*, and by Dr. Charles Chilton* for the Anthuridæ in general, only one-jointed. The outer ramus is articulated near the base of the peduncle and there is the possibility that the elongate peduncle includes a coalesced first joint of the inner ramus, but, at least in *Calathura*, the homology of such a first joint is not proved either by perceptible suture or power of movement.

Calathura brachiata (Stimpson).

1853. *Anthura brachiata*, Stimpson, Marine Invertebrata of Grand Manau, p. 43.

1874. *Anthura brachiata*, Harger, in Verrill and Smith's Invert. Vineyard Sound, p. 573.

1875. *Paranthura arctica*, Heller, Denk. Ak. Wien, vol. xxxvi. p. 38 (14), pl. iv. figs. 9-12.

1886. *Calathura brachiata*, Norman and Stebbing, Trans. Zool. Soc. London, vol. xii. pt. 4, p. 131, pl. xxvi. fig. 1.

1897. *Calathura brachiata*, Sars, Crustacea of Norway, vol. ii. p. 46, pl. xix. fig. 2.

Heller accurately describes the uropods in agreement with Dohrn and Chilton, but, like Gerstaecker, he regards the upper ramus as the inner instead of the outer, a problem in homology which, as Dr. Chilton suggests, can perhaps only be determined by an appeal to embryology.

A single specimen, 1 inch long, was obtained at or near 71° 31' N., 49° 12' E., in 76 fathoms.

* Trans. Linn. Soc. London, 2nd ser. Zool. vol. vi. pt. 2, p. 317.

Tribe VALVIFERA.

Fam. Idoteidæ.

Genus CHIRIDOTEA, Harger, 1878.

1878. *Chiridotea*, Harger, Amer. Journ. Sci. vol. xv. p. 374.

1880. *Chiridotea*, Harger, U.S. Fish. Comm. pt. 6, p. 337.

1882. *Glyptonotus* (part.), Miers, Journ. Linn. Soc. London, Zool. vol. xvi. p. 9; Hoek, Nied. Arch. für Zool., Suppl. vol. i. p. 29.

1897. *Chiridothea*, Sars, Ann. Mus. Zool. St. Pétersb., Extr. p. 21.

As pointed out by Sars, and earlier by Miers himself, though the latter did not regard the distinction of generic value, this genus is separated from *Glyptonotus* by the important character that it has the side-plates distinctly defined on six segments of the peræon, from the second to the seventh, while in *Glyptonotus* they are only defined on the last three.

Chiridotea Sabini (Krøyer).

1847. *Idothea Sabini*, Krøyer, Naturh. Tidsskr. ser. 2, vol. ii. pp. 394, 401.

1846? *Idothea Sabini*, Krøyer, Gaimard's Voy. du Nord, Crust., Atlas, pl. xxvii. figs. 1 a-o.

1875. *Idotea Sabini*, Heller, Denk. Ak. Wien, vol. xxxvi. p. 38 (14).

1882. *Glyptonotus Sabini*, Miers, Journ. Linn. Soc. London, Zool. vol. xvi. p. 15, pl. i. figs. 3-5.

1882. *Glyptonotus Sabini*, Hoek, Nied. Arch. für Zool., Suppl. vol. i. p. 29, pl. ii. figs. 11, 12.

1887. *Glyptonotus Sabini*, Hansen, Dijnphna Krebsdyr, p. 193.

1897. *Chiridothea Sabini*, Sars, Ann. Mus. Zool. St. Pétersb., Extr. p. 21.

A single specimen, 3 inches long, in full agreement with Krøyer's figures, was obtained near 77° 14' N., 38° 26' E., in 76 fathoms.

Tribe ASELLOTA.

Fam. Janiridæ.

Specimens of *Janira tricornis* (Krøyer) were obtained from depths of 20 and 27 fathoms.

Fam. Munnidæ.

Munna Fabricii, Krøyer, was taken from 60 fathoms depth.

Fam. Munnopsidæ.

Specimens of *Munnopsis typica*, M. Sars, in somewhat damaged condition, came up from 100 fathoms, and *Eurycope mutica*, Sars, from 60 fathoms.

AMPHIPODA.

Of these it may be sufficient to enumerate the species, most of them being well known and having been frequently discussed. I am aware that faunistic lists, without any particulars to guarantee the identification or to warn the reader of lurking errors, are of little value; but the attempt to give them value by adding descriptions would often make it impossible to give them at all.

Socarnes Vahli (Kröyer). From about 20 fathoms.

Anonyx nugax (Phipps). As usual in very great abundance. In small specimens, with acute angles to the upturned corners of the third pleon-segment, the knobbed spine of the first and second peræopods is quite as conspicuous as in *Anonyx Lilljeborgii*.

Hoplonyx similis, Sars.

Onisimus brevicaudatus, Hansen. From 76 fathoms.

— *plautus* (Kröyer).

Chironesimus Debruynei (Hoek). From 76 fathoms.

Pseudalibrotus littoralis (Kröyer). Taken in tow-net.

Orchomenella minuta (Kröyer). From 75 fathoms.

Andaniella pectinata, Sars.

Byblis longicornis, Sars. From 76 fathoms.

Proboloides Bruzelii (Goës).

Monoculopsis longicornis (Boeck). The rami of the third uropods in this specimen are quite devoid of spines, the telson apically rounded, some appendages abnormal, as if renewed after accidental injury, but the specimen is otherwise in exceptionally good preservation.

Acanthostepheia pulchra, Miers. Fragment.

Acanthonotosoma serratum (O. Fabricius).

Pardalisca cuspidata, Kröyer. From 60 fathoms.

Rhachotropis aculeata (Lepechin).

— *inflata*, Sars. From 60 fathoms.

Apherusa glacialis (Hansen). Taken in tow-net.

Atylus carinatus (J. C. Fabricius). From 17 fathoms.

Guernea coalita (Norman).

Melita dentata, Kröyer.

Gammarus locusta (Linn.).

Ischyrocerus anguipes, ♀, Kröyer.

Erichthonius (?) *Hunteri* (Bate). From 100 fathoms.

Caprella microtuberculata, Sars. Shore, east coast of Kolguev; ♀, the flagellum of the first antenna with only eleven joints, the dorsal tubercles of the body numerous, agreeing with Sars's description much better than with his figure in the 'Norwegian North-Atlantic Exp., Crust.,' p. 222, pl. xviii. fig. 3.

Euthemisto libellula (Lichtenstein). Taken in tow-net.

— *crassicornis* (Kröyer). Taken in tow-net.

— (?) *compressa* (Goës). Fragment.

Parathemisto oblivia (Kröyer). Taken in tow-net.

Besides the species above named, Mr. Bruce's collection may still afford some gleanings in the tubes of small mixed Amphipoda. One or two small species of Pantopoda were observed, and outside the limits of the Malacostraca some large masses of *Balani* were conspicuous. One or two species of *Macrura* procured while Mr. Bruce was with the Prince of Monaco do not come within the scope of the present report*.

* I may take this opportunity of announcing a new genus required in my revision of the Amphipoda.

Fam. Phliadidæ.

PALINNOTUS, gen. nov.

In general agreement with *Pereionotus*, but distinguished as follows:—Upper lip not bilobed. First maxillæ having a small spinule representing the palp. Maxillipeds with the outer plates reaching slightly beyond the three-jointed palp and minutely fringed on the distal half of the inner margin. The third pleopods, but not the second, with the inner side of the peduncle produced. The second uropods are developed in the female (male unknown), short, uniramous, and the third uropods are without distinction between peduncle and ramus, as in *Pereionotus*.

The type species is *Palinnotus Thomsoni*, Stebbing, previously referred to *Pereionotus*.

II.—*Descriptions of new Genera and Species of Aculeate Hymenoptera from the Oriental Zoological Region.* By P. CAMERON.

IN describing the new genera recorded in this paper, I have taken as a basis Kohl's admirable work "Die Gattungen der Sphegiden," Ann. d. k.-k. Hofmuseums, Wien, Band xi. 1896. In the sequence of the genera and species I have followed Col. Bingham in his 'Fauna of Brit. India,' Hymen. In addition to the genera here described for the first time, the genus *Agenia* is now added to the Indian fauna.

Scoliidæ.

Tiphia brevipennis, sp. n.

Nigra; alis brevis, flavo-hyalinis, nervis flavis; metanoto rugoso. ♀. Long. 14 mm.

Hab. Barrackpore (*Rothney*). Coll. Rothney.

Scape of antennæ thickly covered with long white hair, shining, punctured; the flagellum thickly covered with a pale down; the base pilose. Front and vertex shining, strongly and rather closely punctured and covered with pale hairs. Clypeus closely punctured. Mandibles broadly rufous in the middle; the palpi testaceous. Pronotum strongly punctured, its apex smooth, bare; the base thickly covered with long pale hair. Mesonotum bearing large deep scattered punctures, which are few in the middle; the scutellum similarly punctured round the edges and down the middle. Postscutellum closely and finely punctured; the scutellum is sparsely covered with long white hair. Median segment finely and closely rugosely punctured; the central keel does not reach quite to the apex, the outer ones are straight and converge towards the apex; the apex of the segment is slightly concave, smooth, indistinctly furrowed down the middle. The upper part of the propleuræ is strongly aciculated, the rest closely striolated, the lower part rugose; the middle of the mesopleuræ shining, punctured, thickly covered with white pubescence; metapleuræ shining, closely striated throughout. Mesosternum shining, sparsely punctured, sparsely covered with long white hair; the triangular apical area less shining, aciculated, sparsely punctured, deeply furrowed down the middle. Legs thickly covered with white silvery hairs; the calcaria pale, the tarsal spines pale fulvous. Wings short, not reaching much beyond the apex of the second

abdominal segment; yellowish hyaline, the nervures yellowish; the second transverse cubital nervure is oblique, slightly curved at the top; the second recurrent nervure is received near the base of the apical third; the base of the radius has two oblique curves, the latter being slightly the larger and not quite so uniformly straight. Abdomen shining, closely punctured, weakly on the second, strongly on the apical segments; the apical half of the pygidium is smooth in the middle; the petiole is sparsely punctured; the furrow on the base of the second segment is smooth in the middle. The basal neck of the underside is roundly raised in the middle; the apex of the raised part is oblique and does not reach to its apex.

Myzine ceylonica, sp. n.

Nigra; mesonoto lævi; alis fumatis, nervis fuscis. ♀.
Long. 9-10 mm.

Hab. Trincomali, Ceylon (*Yerbury*).

Scape of antennæ shining, sparsely covered with white hair; its apex rufous; the second joint is shining, punctured; the others are opaque and thickly covered with white pubescence. The ocellar region and the middle of the vertex behind impunctate, the rest of the vertex and the front bearing large, deep, clearly separated punctures; the vertex is bare; the front bears long black hairs; the antennal tubercles are smooth and shining. Face and clypeus closely punctured. The basal depression of the pronotum closely and finely rugosely punctured; the apex bears large deep elongated punctures. Mesonotum smooth; its sides with some punctures; on the apical half are two deep, wide, oblique furrows. Scutellum sparsely covered with large punctures; the postscutellum more closely and not so strongly punctured. Median segment opaque, irregularly closely rugosely punctured; the middle region with some distinct punctures; in the middle, extending from the base to near the apex, are two not very distinct longitudinal keels, which are wider apart at the base and the space between them is irregularly transversely striated; the apical slope is more coarsely rugose, more strongly at the sides than in the middle. Propleuræ strongly punctured, the apex closely longitudinally striated; on the upper part at the apex is an oval depression. Mesopleuræ rugose, distinctly punctured above; thickly covered with white hair. Metapleuræ closely striolated; the base depressed, the depression with a few stout keels. Mesosternum shining, sparsely covered with large deep punctures;

the metasternal process is triangular at the base, obscurely keeled in the middle; the apex is depressed broadly in the middle. Legs black, the tibiæ and tarsi thickly covered with glistening silvery-white hair; the tibial spines white; the apices of the tarsal joints are rufous. Wings fuscous-violaceous, the hinder pair only slightly paler in tint than the anterior; the nervures are fuscous; the second cubital cellule is distinctly shorter than the third; all the transverse cubital nervures are roundly curved. Abdomen shining, sparsely punctured, covered with long white hair; the narrowed base of the petiole is depressed in the middle above; the underside is finely rugose and is furrowed down the centre.

Comes nearest to *M. fuscipennis*, but is abundantly distinct. Characteristic is the almost impunctate mesonotum, which is, according to Bingham, more closely and coarsely punctured than the head in *M. fuscipennis*, but not according to Smith.

Pompilidæ.

Agenia diana, sp. n.

Nigra, basi mandibularum alba; apice clypei inciso; alis hyalinis, nervis stigmatæque nigris. ♀.

Long. 11 mm.

Hab. Khasia (Coll. Rothney).

Head alutaceous, below the antennæ thickly covered with silvery pubescence. Eyes slightly converging at the top. Clypeus roundly convex; its apex clearly separated, smooth, shining, glabrous, roundly, broadly incised, obliquely depressed. Mandibles at the base thickly covered with depressed silvery pubescence; the underside at the base pale yellow; before the apex they are ferruginous; the palpi black at the base; the apical joints pale; the hair-bundle on the maxilla ferruginous. Thorax alutaceous, pruinose; the median segment sparsely covered with fuscous hair. Wings clear hyaline; the stigma black; the nervures slightly paler; the first cubital cellule at the top is very slightly longer than the second; the transverse cubital nervures are curved; the first recurrent nervure is received shortly before the middle; the second at the apex of the basal third of the cellule. Legs black, pruinose; the anterior tibiæ and base of tarsi rufo-testaceous in front. Abdomen pruinose.

A distinct species. The genus *Agenia*, as defined by Kohl, has not been hitherto recorded from India. The females are easily separated from *Pseudagenia* by the maxilla having at the base a bunch of long stiff hair; but I am very much in

doubt if the males of the two groups can be always distinguished by characters which can be regarded as of generic value.

Ceropales parva, sp. n.

Nigra; pedibus abdomineque rufis, orbitis oculorum lineaque pronoti pallide flavis; alis hyalinis, apice fumatis. ♂.
Long. 4 mm.

Hab. Ceylon (*Yerbury*).

Antennæ black; the greater part of the scape bright, and the second and third joints below dark, red. Head smooth and shining; below the antennæ thickly covered with silvery pubescence; the hinder ocelli are separated from each other by the same distance they are from the eyes. The inner orbits to nearly opposite the lower ocellus are lined with yellow; the apex of the clypeus is reddish, the red projecting upwards on the sides. Apex of mandibles rufous; palpi rufo-testaceous. Thorax black, smooth, and shining; the pronotum behind broadly lined with pale yellow; the edges of the propleuræ behind are narrowly lined with yellow, and there is, near the middle of the base, a yellow mark, triangularly narrowed on the top. Median segment thickly covered with silvery pubescence. Wings hyaline, infuscated from the base of the radial cellule; the first and second transverse cubital nervures are roundly curved; the second is straight and oblique; the second cubital cellule on the top is about one third the length of the first. Legs rufous; the tarsi infuscated. Abdomen rufous, darker towards the apex.

This is the smallest of the known Indian species.

Sphegidaë.

Tachytes interstitialis, sp. n.

Nigra; ore, antennis, abdomine pedibusque rufis; abdomine nigro balteato; alis hyalinis, apice fumatis, nervo 1^o recurrente interstitiali. ♀.
Long. 15 mm.

Hab. Ceylon (*Yerbury*).

Antennæ rufous, thickly covered with a pale pile; the apical four joints black. Head black, thickly covered with golden pubescence. Eyes large, strongly converging above, where they are separated by the length of the fourth joint of the antennæ. The clypeus, labrum, and mandibles, except the apical third, rufous; the palpi are of a paler rufous

colour; the base of the mandibles covered with depressed golden pubescence. Thorax black; the tubercles rufous, covered with short golden pubescence; the mesonotum alutaceous; the metanotum and the pleuræ closely and finely punctured. Legs rufous, the coxæ broadly black at the base. Wings hyaline, with a slight fuscous tint; the apex of both wings smoky, the cloud commencing near the end of the radial cellule; the first cubital cellule is half the length of the second; the first transverse cubital nervure is sharply elbowed and bullated shortly below the middle, and is united to the first recurrent nervure. The basal three segments of the abdomen are rufous, marked with black on the apices, the third more broadly than the others, the fourth is still more broadly black; the last segment is rufous, suffused with black, and is strongly and closely punctured; the pile is golden. The ventral surface is similarly coloured but more suffused with black.

Comes nearest to *T. Yerburyi*, Bingham. Characteristic is the interstitial first recurrent nervure, a feature which does not occur in any of the other Oriental species. The apex of the radial nervure too is rounded, not straight or oblique as in most species; the appendicular cellule is almost obsolete, the nervure being almost obliterated.

Tachytes ceylonica, sp. n.

Nigra, abdominis basi late rufa; tibiis tarsisque anticis rufis; alis hyalinis, nervis testaceis. ♂.

Long. 7 mm.

Hab. Ceylon (*Rothney*). Coll. Rothney.

Head black, the oral region rufous; the front and face densely covered with pale golden pubescence; the front and vertex alutaceous; the ocellar region raised, furrowed down the middle. Mandibles rufous, black at the apex; the base covered with silvery pubescence. The eyes at the top are separated by fully the length of the third antennal joint. Thorax minutely punctured, rather thickly covered with silvery hair; the apex of the median segment has a steep, oblique slope and is closely transversely striated; the sides thickly covered with long white hair; the furrow on the upper half is wide, large, deep, and triangular at the apex. Pleuræ closely and minutely punctured. Wings clear hyaline; the costa and nervures pale testaceous; the second recurrent nervure is received shortly behind the middle; the second cubital cellule at the top is nearly double the length of the first; the apex of the radial cellule is obliquely truncated;

the two recurrent nervures are separated by a distinctly greater distance than the length of the second cubital cellule above. Abdomen black; the basal two segments rufous; the apical segments dark rufo-testaceous; the segments are thickly banded with silvery pubescence.

Comes nearest to *T. tarsata*, Sm., but that is a much larger species (15 mm.) and differs from it in many respects.

Tachytes brevipennis, sp. n.

Nigra, dense argenteo pilosa; alis brevis, costa stigmatæque rufo-testaceis, nervis fuscis. ♀.

Long. 12 mm.

Hab. Barrackpore (*Rothney*). Coll. Rothney.

Front and vertex alutaceous; the front and oral region thickly covered with silvery pubescence; the ocellar region raised, with a shallow furrow down its middle; the ocellus is broader than long; the depression behind is shallow, indistinct, and narrowed to a point behind. Clypeus shining, depressed, its apex depressed. Mandibles at base thickly covered with silvery pubescence; palpi dark testaceous. Thorax thickly covered with silvery pubescence and with long white hair; closely and minutely punctured; the metapleuræ obscurely striated at the base; the hair on the mesonotum has a golden tint; the sternal process wide and triangularly incised at the apex. Wings short, not much longer than the head and thorax united, not reaching much beyond the middle of the abdomen; hyaline, with a slight yellowish tint; the costa and stigma testaceous; the nervures darker; the first and second cubital cellules are almost equal in length and are as long as the space bounded by the recurrent nervures; the second recurrent nervure has a broad round curve below the middle. The furrow on the apex of the median segment is wide and deep in the middle, and does not reach to the top or bottom. Legs thickly covered with silvery pubescence; the spurs testaceous; the tibial spines pale; the apical two joints of the fore tarsi are rufous; the tarsal spines are long and white; the claws testaceous; the fore tarsi bear long white spines. The basal four segments of the abdomen are broadly fringed with silvery pubescence, which has a more golden tint towards the apex of the segment. Pygidium covered with stiff black, intermixed with bright golden, pubescence.

Tachytes aurifrons, sp. n.

Nigra; abdominis basi rufa, fronte aureo pilosa; apice tarsorum rufo; alis hyalinis, costa stigmatique testaceis. ♀.
Long. 8 mm.

Hab. Ceylon (*Rothney*), Trincomali (*Yerbury*). Coll. Rothney.

Antennæ black, covered with a pale down. Front and vertex closely punctured; the vertex with a shallow, the ocellar region with a wider and deeper longitudinal furrow; the latter is distinctly raised; the hair on the front is longish, thick, and bright golden, on the vertex it is thinner and shorter; the pubescence on the face and clypeus is silvery, intermixed with golden on the sides. The ocellus is broader than long and rounded at the sides. The apex of the clypeus is depressed and with a row of punctures on the sides. Thorax densely covered with silvery pubescence; that on the mesonotum has a golden hue; on the median segment it is long and thick. The base of the median segment is alutaceous; the furrow on the apex does not extend much beyond the middle; it is large, wide, rounded at the top, triangular at the apex; except at the top, the apex of the segment is closely transversely striated. Pleuræ closely and minutely punctured; the metapleuræ thickly covered with silvery pubescence. Legs black; the fore tibiæ for the greater part, the fore tarsi and the apices of the hinder tarsi, rufo-testaceous. Wings clear hyaline; the first cubital cellule at the top is not much, if any, longer than the second; the second recurrent nervure is received in the middle of the cellule. The basal segment of the abdomen is entirely red, the second except at the apex; the apices of the segments are thickly banded with silvery pubescence. Tegulæ testaceous. The apex of the scape of the antennæ is testaceous.

The only species with golden pubescence on the head is *auriceps*; but that is a larger species (11–12 mm.) and has the legs for the greater part red and differs in other respects.

Tachytes tabrobanæ, sp. n.

Nigra, dense aureo pilosa; femoribus, tibiis tarsisque rufo-testaceis; alis hyalinis, nervis testaceis. ♀.
Long. 12 mm.

Hab. Ceylon (*Yerbury*).

Antennæ black, inclining to brownish towards the apex. Head thickly covered with pale golden pubescence, which hides the texture, except on the vertex, which is sparsely

punctured. Mandibles rufous at the apex. Palpi testaceous. Eyes at the top separated by nearly the length of the second and third antennal joints united. Thorax thickly covered with pale golden pubescence. Median segment closely punctured; there is a distinct furrow in the middle at the base, which reaches to the middle of the basal division. Legs rufo-testaceous; the coxæ and trochanters black. Wings hyaline, with a slight yellowish tint; the costa and nervures testaceous; the apex of the radius rounded; the second cubital cellule is slightly longer than the first on the top; the first transverse cubital nervure is roundly curved; the second recurrent nervure is received shortly beyond the middle. Abdomen thickly covered with depressed golden pubescence, which forms broad bands on the apices of the segments; the penultimate segment is broadly rufous on the apex; the pygidium is thickly covered with stiff bright golden pubescence.

The only Indian species of *Tachytes* with golden pubescence on the abdomen is *T. monetaria*, which is otherwise very different from the species here described.

Tachytes maculitarsis, sp. n.

Nigra, dense argenteo pilosa; apicibus tarsorum anterioribus rufis; alis hyalinis, stigmatæ, costa nervisque rufo-testaceis. ♀.
Long. 8 mm.

Hab. Barrackpore (*Rothney*). Coll. Rothney.

Scape of antennæ densely covered with short, silvery pubescence; the flagellum with a pale pile. Vertex minutely punctured, the lower part broadly furrowed; it and the occiput are covered with long fuscous hair. The front (especially laterally), the face, and clypeus are thickly covered with pale golden hair; the anterior ocellus is broader than long, not dilated at base or apex. The base of the mandibles thickly covered with silvery pubescence; the apical joints of the palpi testaceous. The eyes at the top are separated by the length of the second and third antennal joints united. The apex of the pronotum is thickly covered with depressed silvery pubescence; the mesonotum with fulvous silvery pubescence and long dark fuscous hair. Scutellum minutely punctured and covered with long fuscous hair; the post-scutellum thickly with silvery pubescence. Median segment minutely punctured, the middle at the apex finely transversely striated; the furrow on the upper part wide and deep. Pleuræ thickly covered with white pubescence and with long pale fuscous hair; the metasternal area is stoutly keeled laterally,

and has a short, stout keel in the centre at the base. Legs thickly covered with silvery pubescence; the apical two joints of the anterior tarsi rufous; the apex of the posterior more or less rufous, as are also the claws; the tibial and tarsal spines are clear white; the calcaria are pale. Wings clear hyaline; the nervures testaceous; the first cubital cellule at the top is shortly, but distinctly, longer than the second; the second recurrent nervure is received very shortly beyond the middle. Abdomen shining; the apices of the basal four segments broadly banded with silvery pubescence; the pygidium is entirely covered with silvery pubescence; the fifth and sixth segments and, to a less extent, the base of the middle have a brownish sericeous pile.

Notogonia Chapmani, sp. n.

Nigra, facie metanotoque fulvo pilosis; alis flavo-hyalinis, apice fumato, nervis stigmatæque flavo-testaceis. ♀.

Long. 14 mm.

Hab. Himalayas.

Scape of antennæ thickly covered with fulvous pubescence. The front and vertex alutaceous; the ocellus is circular; behind the ocellar region is a triangular depression; the lower part of the front and the face thickly covered with fulvous, intermixed with longish silvery pubescence. Mandibles piceous beyond the incision; the base thickly covered with silvery pubescence. Palpi black, thickly covered with white pubescence. Thorax alutaceous; the sides of the apical slope with some stout, irregular, transverse striations; the mesonotum is thickly covered with fulvous pubescence; the hair on the rest of the thorax silvery; the furrow on the apical slope is deep and reaches to the middle. The sternal process is large, depressed at the base, narrowly keeled in the middle; the apical incision is small. The breast is thickly covered with fulvous pubescence. Wings distinctly yellowish hyaline, the apex slightly infuscated; the nervures yellowish fulvous; the first transverse cubital nervure is roundly curved; the first cubital cellule at the top is about two thirds of the length of the second; the second recurrent nervure is broadly rounded and is received shortly behind the middle of the cellule. The abdominal segments are banded with pale fulvous pubescence; the pubescence on the pygidium is stiff and dark golden or fulvous.

This species was given to me many years ago by my late friend, Mr. Thomas Chapman, of Glasgow. It comes near to *N. jaculatrix*.

Larra fuscinerva, sp. n.

Nigra, capite thoraceque dense argenteo pilosis; alis hyalinis, nervis fuscis. ♀.

Long. 11 mm.

Hab. Allahabad (*Rothney*). Coll. Rothney.

Scape of antennæ shining, sharply keeled on the middle beneath; the flagellum opaque, densely covered with a white microscopic pile. The vertex is shining, minutely punctured, sparsely haired; the ocellus has a triangular, clearly separated, part in front, the whole being distinctly longer than broad; in front of it is a wide longitudinal furrow. The face and clypeus are densely covered with silvery pubescence; the apex of the clypeus is bare, smooth, and shining; the base of the mandibles is thickly covered with silvery pubescence, the middle is broadly rufous; palpi black, densely covered with white pubescence. Pro- and mesonotum thickly covered with fulvous pubescence; closely minutely punctured, as are also the scutellum and postscutellum. Median segment opaque, its middle alutaceous, the sides irregularly, transversely, and somewhat widely striated; the basal three-fourths is finely furrowed down the centre; the apical slope is distinctly furrowed to near the apex and is transversely striated; the sides are thickly covered with silvery pubescence. Pro- and mesopleuræ alutaceous, thickly covered with silvery pubescence; the metapleuræ are obscurely, closely, obliquely striated. Legs thickly pruinose, the spines black. Abdomen thickly pruinose, as long as the head and thorax united; the pygidium smooth, shining, glabrous, impunctate.

Comes into Bingham's section b^2 on p. 197; *nana* may be known from it by the ocellus being round: *nigriventris* is a stouter built insect, has the wings more distinctly yellow, the clypeus more distinctly keeled in the middle; the frontal furrow in the present species does not bifurcate round the ocellus, the wing-nervures are darker, the apex is scarcely infuscated, and the abdomen is longer with the pygidium only very slightly punctured round the edges.

Larra iridipennis, sp. n.

Nigra, argenteo-pruinosa; alis flavo-hyalinis, nervis fuscis, cellula cubitali 2^a longiore quam 1^a. ♀.

Long. 11; alar. exp. 13 mm.

Hab. Barrackpore (*Rothney*). Coll. Rothney.

Scape of antennæ shining, covered with pale pubescence;

the flagellum opaque. Front and vertex alutaceous; the front thickly covered with silvery pubescence; the face and clypeus are densely covered with silvery pubescence. Mandibles with the apical half red, the basal thickly covered with silvery pubescence; the palpi dark testaceous. The apex of the pronotum has a band of golden pubescence, as have also the sides of the mesonotum. Mesonotum and scutellum closely and minutely punctured. The basal part of the metanotum alutaceous, the sides transversely striated; the apex is transversely striated, more distinctly above than below; the middle is furrowed; the sides thickly covered with pale golden pubescence. Pro- and mesopleuræ aciculated, covered with silvery pile; metapleuræ closely, minutely, obliquely striated, and covered with a sericeous pile. Mesosternum smooth, thickly covered with a sericeous pile: the metasternal process has an oblique slope at the base; it is depressed deeply at the apex of the slope. Wings flavo-hyaline, the nervures dark fuscous; the top of the first cubital cellule is fully one half the length of the second; the first transverse cubital nervure has an oblique slope at top and bottom, the angle in the middle being broadly rounded; the recurrent nervures are received distinctly behind the middle and are separated by one half the length of the top of the second cubital cellule. Legs thickly pruinose; the spines black. Abdomen not much longer than the thorax; pruinose; the pygidium shining, obscurely and minutely punctured on the sides.

Larra longicornis, sp. n.

Long. 10 mm. ♀.

Hab. Barrackpore (*Rothney*). Coll. Rothney.

Comes very near to *L. iridipennis*; may be known from it by the antennæ being longer, by the abdomen being longer compared with the thorax, by the first transverse cubital nervure having a more rounded gradual curve, by the second recurrent nervure being more sharply angled, its lower abscissa being quite straight and oblique, and the base of the metasternal process has not an oblique slope—not raised above the rest.

Antennæ rather longer than usual, longer than the head and thorax united. Front and vertex alutaceous, the front thickly covered with silvery pubescence; the ocellus somewhat triangular in front, irregular, obliquely furrowed near the middle; the face and clypeus are thickly covered with silvery pubescence; the apex of the clypeus smooth and glabrous. The base of the mandibles thickly covered with

silvery pubescence. Thorax alutaceous; the apex of the pronotum thickly covered with silvery pubescence; the mesonotum with a pale down. Scutellum minutely punctured. Median segment alutaceous, the sides transversely striated; the apex is closely transversely striated, the sides thickly covered with silvery pubescence; the furrow is longer than usual. Pro- and mesopleuræ alutaceous; the metapleuræ closely, finely, obliquely striated, the apex thickly covered with silvery pubescence. The metasternal keel is hollowed throughout; the central keel is ill-defined. Legs pruinose; the spines are black. Wings short, hyaline, the basal half yellowish; the first cubital cellule at the top is two-thirds of the length of the second; the first transverse cubital nervure is oblique at the top, the middle curve rounded; the second recurrent nervure is received distinctly behind the middle and is somewhat sharply elbowed. The abdomen is as long as the head and thorax united; the pygidium smooth, shining; the lateral keels distinct.

CÆNOLARRA, gen. nov.

Second cubital cellule shortly stalked. Radial cellule short, wide, the apical abscissa of the radius large, oblique. Inner eye-orbits with distinct folds. Eyes reaching to the base of the mandibles. The hinder ocelli obliterated. Mandibles incised on the lower side. The hinder edge of the pronotum not placed below the hinder edge of the mesonotum. Median segment as long as the mesothorax; its apex with an oblique slope. Tibiæ and tarsi sparsely spined; the tarsi long; the claws short, simple; the front tarsi not with long spines as in *Tachysphex*, &c.

The eyes converge a little above; the second joint of the antennæ is pilose; the top of the pronotum has oblique sides; the pygidium is pilose; the hinder tibiæ grooved; the pterostigma is small. The structure of the prosternum is rather peculiar; it is large, keeled down the middle; the sides project at the apex, the middle of the projection is depressed, so that there is thus formed two blunt rounded teeth.

This genus comes nearest to *Notogonia*, with which it agrees in the structure of the thorax, head, and abdomen; but may be readily separated from it by the transverse cubital nervures being united at the top and there shortly appendiculated. The only genus of *Larridæ* with an appendiculated cubital cellule with which it could be confounded is *Palarus*, but that is readily separated by the ocelli being complete.

The radial cellule is wide and hardly reaches to the apex of

the cubital; the appendiculate cellule is long; the pedicle is bullated; the form of the third transverse cubital cellule is as in *Notogonia*, not as in *Palarus*, the third transverse cubital nervure being parallel with the second, the third cubital cellule not being broader at the top than at the bottom. The head appears longer than usual and is wider than the mesothorax.

Cænolarra appendiculata, sp. n.

Nigra; fronte facieque dense argenteo pilosis; pro-mesonotoque aureo pilosis; alis hyalinis, apice fumatis, nervis fuscis. ♂.
Long. 6-7 mm.

Hab. Barrackpore (*Rothney*). Coll. Rothney.

Scape of antennæ shining, the lower side covered with microscopic silvery pubescence; the flagellum opaque, covered with a white down. Vertex alutaceous; the front thickly covered with silvery pubescence; the middle furrowed and closely transversely striated; there is a wide and deep furrow in front of the ocellus, which is triangularly produced in front. The face and oral region are thickly covered with silvery pubescence, as are also the mandibles broadly at the base. Palpi black, thickly covered with white pubescence. Thorax alutaceous; the pro- and mesonotum thickly covered with a short golden pile, as is also the basal part of the median segment on the base and sides; the apical part is widely furrowed in the middle and is transversely striated; the sides are thickly covered with silvery and golden pubescence. Pleuræ alutaceous, thickly covered with silvery pubescence. The prosternum is stoutly keeled down the middle; its apex has an oblique slope and is hollowed; the mesosternum is keeled down the middle; the metasternal process is wide, large; the basal half much more deeply depressed than the apical, whose lobes are somewhat triangular. Legs thickly pruinose; the tibial and tarsal spines are dark rufo-testaceous. Tegulæ rufous behind, pruinose. Wings hyaline, the apex from the end of the radial cellule smoky; the second recurrent nervure is elbowed backwards distinctly in the middle and is received shortly behind the middle of the cellule. Abdomen pruinose.

LEPTOLARRA, gen. nov.

Tarsi unusually long, the hinder twice the length of the tibiæ; the middle joints narrowed at the base, dilated towards the apex; the claws long and armed with a short tooth near the base. Front and vertex with depressions as in *Notogonia*, &c.; there is only one ocellus; eyes large, converging

above, below reaching to the base of the mandibles. Clypeus broader than long, its apex transverse. Mandibles broad at the base, the apex of the incision with a stout tooth on the lower side; the apex has one tooth. Scape of antennæ short, broad; the pedicle is covered thickly with pale pubescence. The pronotum behind rises to the top of the mesonotum. Median segment as long as the mesothorax; its sides at the apex rounded. Metasternal process depressed, its apex incised. Legs stout; the tibiæ sparsely, the tarsi more thickly spinose; their spines long and stout; the femora stout; the hinder pair have the apical half distinctly narrowed; the fore calcaria are curved, the hinder are half the length of the metatarsus. Wings as in *Larra*; the apical abscissa of the radius is straight, not curved, and has an oblique slope. Pygidial area shagreened, bare; the sides carinate. The head is distinctly wider than the thorax.

This genus is readily separated by the unusually long tarsi with their joints dilated towards the apex as in *Ampulex*, and by the long claws with the tooth near the base.

Leptolarra flavinerva, sp. n.

Nigra, dense argenteo pilosa; alis flavo-hyalinis, nervis flavo-testaceis; segmento mediali striolato. ♀.
Long. 15 mm.

Hab. Barrackpore (*Rothney*). Coll. Rothney.

Antennæ black, the scape keels rufous; the flagellum pruinose. The front, face, and oral region thickly covered with silvery pubescence; the vertex alutaceous, minutely punctured; the clypeus shining. Mandibles black, the base thickly covered with silvery pubescence; above each antenna is a smooth shining spot. Pro- and mesothorax alutaceous, covered with a silvery down. Scutellum more shining and more distinctly punctured. The basal region of the median segment is distinctly, irregularly, transversely striated, almost forming reticulations at the base; the striæ become weaker towards the sides, and down the middle is a longitudinal keel; the oblique apex is furrowed down the middle, above it is finely obliquely, below more strongly transversely striated. The furrows on the mesopleuræ are obscurely striated. The metasternal process is keeled down the middle. Metapleuræ closely, obliquely striated. Wings yellowish hyaline; the stigma and costa dark testaceous; the nervures yellowish; the first cubital cellule is as long as the second; the second recurrent nervure is received shortly behind the middle of the cellule and is roundly bent backwards in the middle; the first

has a rounded curve. Abdomen pruinose, longer than the head and thorax united; the apex of the pygidium is rufous, the apex of the hypopygium has the sides thickly covered with pale fulvous pubescence.

Leptolarra longitarsis, sp. n.

Nigra; alis fuscis, fere violaceis; metanoto striolato. ♀.
Long. 8-9 mm.

Hab. Barrackpore (*Rothney*). Coll. *Rothney*.

Scape of antennæ aciculate l, covered with a pale down; the underside with a smooth, shining, glabrous keel in the middle. Front and vertex shining, aciculate l; the depressions deep, there are three on the front; below the ocelli is a deep furrow. Face aciculated; the clypeus smooth and shining. The base of the mandibles aciculated, opaque; the apical part smooth and shining; palpi densely covered with white pubescence. Pronotum and mesonotum strongly aciculated, almost punctured, and covered with a minute pale down; the scutellum is closely punctured, but not quite so much so as the mesonotum; the postscutellum almost impunctate. Median segment strongly and closely transversely striated all over; down the middle is a narrow but distinct furrow; the oblique apex is more closely and finely punctured, except above; in the middle is a wide furrow, narrowed below. The base of the propleuræ is strongly aciculated and obscurely striated below; above near the apex is a curved furrow, thickly covered with white pubescence. Mesopleuræ strongly aciculated; in the middle on the basal half is a deep longitudinal furrow. Metapleuræ closely and finely longitudinally striated. Mesosternum furrowed down the middle, and with a transverse furrow behind the middle coxæ. Metasternum hollowed; the sides raised; in the middle at the base is a short, stout, keel; its apex is incised, the sides rounded. Legs pruinose; most of the tarsal spines are rufous. Wings hyaline, strongly iridescent, slightly fuscous; the nervures are black. Abdomen shining, pruinose; the apices of the segments with pale bands; pygidium aciculated, less strongly at the base; the penultimate ventral segment is strongly, but not very closely punctured; the hypopygium is more closely and finely punctured, except at the base.

Leptolarra reticulata, sp. n.

Nigra; alis flavo-hyalinis, nervis fuscis; metanoto reticulato. ♀.
Long. 8 mm.

Hab. Barrackpore (*Rothney*). Coll. *Rothney*.

Head alutaceous, the lower part of the front and the mouth region densely covered with silvery pubescence, the furrow below the ocelli is deep, and there is a similar furrow on the front, commencing near the top. Mandibles broadly rufous near the middle. Pro- and mesonotum closely punctured; the scutellum punctured, but not so closely. Median segment closely, irregularly reticulated, the reticulations more distinct at the base; the apex is transversely striated, the striæ are distinctly separated; the furrow is narrow but distinct. Propleuræ closely punctured; the mesopleuræ are distinctly, but not so closely punctured; metapleuræ obliquely striated all over. The sternal process has a distinct hollow at the base; the apex of the hollow is conical; the apical incision is triangular. Wings hyaline, with a yellowish tint at the base; the nervures blackish; the first cubital cellule is equal in length to the second; the upper (and larger) part of the first transverse cubital nervure has a sharply oblique slope; the recurrent nervures are separated by the length of one third of the top of the first cubital cellule. Legs pruinose; the calcaria black; the tarsal spines dark rufous. Abdominal segments pruinose on the apices.

SPANOLARRA, gen. nov.

Mandibles incised on the underside near the base. Antennæ long, slender; the second joint pilose. Eyes large, converging above, reaching to the base of the mandibles; the folds on front large; the ocellus elongate, triangularly produced in front. Tarsi long, the posterior twice the length of the tibiæ, which are sparsely spined; the tarsal spines long; the claws are long, longer than the apical joint of the tarsi, roundly curved, and without a tooth. Anterior femora roundly dilated, narrowed at base and apex. Radial cellule wide and truncated at the apex. Wings reaching to the apex of the abdomen. Apex of pronotum reaching to the level of the mesonotum. Median segment as long as the pro- and mesothorax united; there is no furrow on the mesopleuræ. Abdomen shorter than the thorax; the pygidium smooth, except at the apex, glabrous, except slightly at the apex; the sides are sharply keeled throughout.

The chief characteristics of this genus are the long antennæ and tarsi and the almost spineless tibiæ. In the form of the legs it comes close to the genus *Leptolarra* here described, but the tarsi want the tooth found on the claws in that genus, from which it differs further in the much longer antennæ, in the longer median segment, and in the apex of the pronotum

reaching to the level of the mesonotum. From *Larva* it may be known by the much longer antennæ, by the tibiæ not being thickly spined, and by the head being less strongly developed behind.

Spanolarra rufitarsis, sp. n.

Nigra: apice clypei, apice flagelli antennarum late tarsisque rufis; alis flavo-hyalinis, nervis stigmatæque flavo-testaceis. ♀.

Long. 10 mm.

Hab. Barrackpore (*Rothney*). Coll. Rothney.

Antennæ long, longer than the head and thorax united; the scape is thickly covered with white hair, its inner side is red; the flagellum is thickly covered with white pubescence. Vertex alutaceous; the ocellus is triangular behind; front covered with silvery pubescence; there is a short, wide furrow below the ocellus, a wide shallow one in the middle, and a narrow deep one over and between the antennæ. Face and clypeus thickly covered with silvery hair; the apex of the clypeus smooth, bare, rufous. Mandibles broadly red in the middle, the base thickly covered with silvery pubescence; there is a smooth bare line in the middle of the clypeus. Thorax thickly covered with silvery pubescence; the hair on the pro- and mesonotum has a slight golden tinge. The base of the metanotum is alutaceous and thickly covered with silvery pubescence; the apical slope is transversely striated laterally and in the middle near the apex. The prosternum is furrowed down the middle; the furrow is bordered by two keels; the apex has an oblique slope, is slightly hollowed and broadly margined above. Mesosternum thickly covered with white pubescence; the metasternal process is keeled in the middle at the base, and with a long, somewhat triangular incision on the apex. Legs black; the tarsi longer than usual, the apical four joints rufous; the tarsal spines are long and black; the claws long, curved, and rufous. Wings hyaline, with a slight yellowish tinge on the base; the stigma and nervures pale yellowish testaceous. The apical abscissa of the radius is long, straight, and slightly oblique; the first cubital cellule on the top is slightly shorter than the second; the first transverse cubital nervure is curved; the second recurrent nervure is roundly elbowed in the middle, and is received shortly behind the middle. Abdominal segments with broad pruinose bands on their apices; the pygidium shining, smooth, the apex punctured, the sides and apex sparsely haired; the hypopygium is sparsely punctured and rufous round the edges.

CRATOLARRA, gen. nov.

Ocelli distorted. Front raised near the eyes. First cubital cellule above much longer than the second. Median segment as long as the pro- and mesothorax united. Anterior tibiæ without spines; the tarsi with long spines. Pygidium strongly punctured, the punctures mostly in longitudinal rows, only sparsely pilose.

Eyes large, converging above; the upper part with a distinct inward curve; distinctly margined above and behind. Mandibles large, bearing a large tooth near the base beneath; the apex with one tooth. The top of the pronotum reaching to the top of the mesonotum. All the tarsi and the four posterior tibiæ are strongly spinose; the anterior femora dilated, narrowed towards the apex. The first transverse cubital nervure is straight, oblique; the apex of the radius is large, oblique; both the recurrent nervures are received behind the middle. The second antennal joint is large, smooth, and shining. The apex of the median segment has an oblique slope. Abdomen longer than the head and thorax united; the basal ventral segment has a large, raised, distinctly defined tubercle on the apex; this part is narrowed towards the apex of the segment laterally. The pygidial area is sharply keeled laterally; the sides inside the keel are depressed; there is a distinct, wide, deep furrow down the middle; the sides of the segment are broad; the lower and upper edges clearly defined, the middle hollowed.

The presence of the fold within the eye-margins separates this genus from *Tachytes* and *Tachysphex*; from *Larra* and *Notogonia* it may be separated by the strongly punctured pygidium, and by the first cubital cellule being longer than the second. In the latter respect it agrees with *Tachysphex*, but that genus, *inter alia*, wants the folds near the eyes.

Cratolarra femorata, sp. n.

Nigra; femoribus posticis rufis; capite lævi; thorace dense albo piloso; alis fusco-violaceis. ♀.

Long. 14 mm.

Hab. Khasia. Coll. Rothney.

Scape of antennæ smooth, shining, bare; the second joint shining, almost bare; the others thickly covered with short pale pubescence. Head smooth and shining, above almost bare; the face and clypeus thickly covered with white pubescence. Mandibles behind the apex and the middle of the basal tooth rufous; palpi fuscous black, thickly covered

with white hair. Thorax thickly covered with short white pubescence, closely punctured; the median segment closely transversely striated, the striæ strongest on the base; the furrow on the apical slope is wide and deep and extends to shortly beyond the middle. The metasternal process is depressed in the middle at the base; the sides have two keels; the middle has a narrow keel; the apex is bluntly bilobate. Legs black, except the hinder femora, which are red; the anterior calcaria and the base of the posterior are rufous; the tarsal spines are of a deeper rufous colour; the legs are covered thickly with a white down. Wings fusco-violaceous; the stigma and nervures black; the two recurrent nervures are received behind the middle of the cellule; the upper part of the second recurrent nervure is straight and oblique. Abdomen pruinose, shining; the pygidium haired only along the sides; the basal ventral segment is stoutly keeled laterally; the hypopygium punctured.

ODONTOLARRA, gen. nov.

Clypeus with three lateral, two central, and one intermediate teeth on the apex; it is broader than long, roundly convex in the middle. Mandibles large, narrowed, and with only one tooth on the apex; on the lower side, near the base, is a large rounded tooth. Antennæ placed low down, opposite the lower edge of the eyes. Eyes large, almost parallel on the inner side; they reach almost to the base of the mandibles; the three ocelli are distinct and are placed in a triangle; the ocellar region is slightly raised; the front has a shallow furrow. Occiput margined. Pronotum large, tuberculate in the middle behind; its apex not reaching to the level of the mesonotum; its middle deeply depressed. Mesonotum furrowed down the middle; the tubercles are large. Mesosternum furrowed down the middle, and with a transverse furrow in front of the middle coxæ. Median segment longer than broad. Legs stout; the tibiæ and tarsi spinose; the claws simple. Wings appendiculate at the apex; there are three cubital cellules, the second and third of almost equal length; the transverse basal nervure is interstitial. The basal segment of the abdomen is triangular; the second segment is the longest; the pygidium opaque and finely transversely striated.

Comes nearest to *Parapiagetia*: may be known from it readily by the large number of teeth on the apex of the clypeus; Kohl's genus has only four. The distinct ocelli, the vertex without any raised folds as in *Larra* &c., and the

toothed clypeus make the genus of easy recognition. I have not seen the male, and in my female the scape of the antennæ is broken off.

Odontolarra rufiventris, sp. n.

Nigra, dense pallide aureo pilosa; abdomine dimidio basali rufo; alis hyalinis, apice late fusco. ♀.

Long. 11-12 mm.

Hab. Khasia. Coll. Rothney.

Front densely covered with pale golden pubescence; the vertex with a sparse pile, shining, coarsely shagreened; there is a narrow longitudinal furrow on the outer side of the ocelli, and a broader, deeper one down the front; on the apex of the clypeus are two central teeth, and three teeth on either side of them, the lateral teeth being placed close together. Mandibles broadly red on the middle. Thorax covered with golden and silvery pubescence; the pronotum is roundly raised in the middle behind. Mesonotum alutaceous; the sides and hinder region covered with golden pubescence; the middle slightly and roundly raised. Metanotum covered with golden pubescence; the basal region narrowly furrowed in the middle; the upper half of the apical slope with a deep furrow. Propleuræ alutaceous; the middle obscurely striated. Mesopleuræ densely pilose; tuberculate above; a furrow below the raised part; the narrow apical furrow is finely striated. Metapleuræ finely and closely obliquely striated. Mesosternum thickly pruinose, furrowed down the middle; in front of the middle coxæ, on the central part, is a short transverse furrow. Legs thickly pruinose; the tibiæ spinose; the tarsal spines long and pale. Wings fuscous hyaline; the apex from the base of the stigma fusco-violaceous; stigma testaceous. Abdomen pruinose; the basal three segments red, the others black; the pygidium is bare, opaque, finely and closely striated, more coarsely towards the apex.

Sceliphron lineatipes, sp. n.

Nigrum; linea pronoti, apice metanoti, scapo antennarumque subtus flavis; ♂ clypeo flavo-bimaculato.

Long. 13-15 mm.

Hab. Khasia. Coll. Rothney.

The front and face densely covered with pale golden pubescence. Clypeus keeled in the middle, its apex broadly incised, the sides of the incision oblique. Mandibles and palpi black. Scape of antennæ yellowish beneath. Thorax thickly covered with longish pale hair and with silvery

pubescence; a line on the pronotum behind, a transverse line on the scutellum (transverse behind, dilated in the middle in front), the tubercles, a mark (broadly extended downwards) on the apex, an irregular mark under the hind wings, and the apex of the median segment, lemon-yellow. Mesonotum closely transversely striated; the scutellum longitudinally striated; the postscutellum closely rugose. Median segment closely and strongly transversely striated; the striæ on the central lobe more widely separated than on the sides; in the centre of the basal lobe is a narrow furrow. Propleuræ smooth; mesopleuræ closely horizontally striated; metapleuræ closely, obliquely, rugosely striated. Wings iridescent, hyaline, with a distinct fuscous tint; the apex with a narrow smoky cloud. Legs black, the femora more or less dark brown in front and below; the four anterior tibiæ yellow in front. Abdomen black; the apex of the basal segment dark brown; the other segments lined with lemon-yellow on the apices.

The amount of yellow on the abdomen and legs varies. The male wants the two yellow marks on the face, and in the female these may become amalgamated.

Allied to *S. tibiale*, Cam. (Ann. & Mag. Nat. Hist., July 1899, p. 53).

Ampulex pilosa, sp. n.

Cærulea; femoribus posticis late rufis; capite thoraceque dense longe pilosis; alis fusco-violaceis. ♀.

Long. 25 mm.

Hab. Khasia. Coll. Rothney.

Antennæ black, almost bare, opaque, the third joint not quite double the length of the fourth. Head densely covered with long black hair, strongly aciculated; the eyes at the top separated by slightly more than the length of the third antennal joint. Clypeus keeled in the middle, its apex broadly and roundly projecting; its sides bluntly and shortly toothed. Thorax green, mixed with indigo-blue; the pro- and mesothorax thickly covered with long black hair. Pronotum aciculated; its basal neck short; the apical part almost square and slightly depressed in the middle at the base. Mesonotum aciculated, without distinct punctures; the furrows broad and deep at the base, indistinct towards the apex. Scutellum flat, blue at the base, brassy at the apex; the postscutellum slightly depressed laterally. The central keel on the median segment is straight, and reaches to the base of the basal third of the segment; the inner lateral are of similar length and converge slightly towards

the apex; the basal parts more oblique and straighter than the apical, the part enclosed by them strongly transversely striated, this being also the case, but less strongly, with the outer side; the apex in the middle is smooth and has on either side at the base a round, deep fovea; at the apex, in the centre, the keels are raised, leaving a rounded depression between them. The apex of the segment is semi-perpendicular, stoutly transversely striated, and thickly covered with long black hair. Pleuræ impunctate, except the apex of the metapleuræ, which is stoutly obliquely striated. Mesosternum smooth, thickly haired; the middle depressed and with a black keel in the depression; in the centre of the lateral part is a shorter black keel. Wings fuscous violaceous, darker in the radial and cubital cellules. Abdomen blue; the narrow basal part of the petiole short, becoming gradually wider towards the apex; the transverse furrow at the base of the second segment is deep; the second segment is as long as the succeeding segments united.

The upper nervure in the apex of the radial cellule is roundly curved; the appendicular cellule is closed; the part of the radius bounding the second cubital cellule is nearly as long as that bounding the first; before the first recurrent nervure is a faint nervure, perhaps representing the transverse cubital. The claws are long, sharp, and with a sharp tooth near the base.

Ampulex pulchriceps, sp. n.

Viridis, vertice abdominisque dorso purpureis; antennis nigris; femoribus 4 posterioribus rufis; tibiis posticis purpureis; alis fusco-fumatis; stigmatibus nervisque nigris. ♂.

Long. 15 mm.

Hab. Khasia. Coll. Rothney.

Antennæ stout, about as long as the head and thorax united; the third and fourth joints equal in length. Head bluish green, the face with brassy tints, the vertex to the front ocellus purple; the vertex wide at the top, the eyes there separated by the length of the basal three joints of the antennæ united; the eyes almost parallel. Behind, the head is largely developed and roundly narrowed; the punctures on the vertex are distinctly separated; the hinder part of the vertex impunctate, except near the margin, where it is finely and closely punctured; the front is coarsely and irregularly reticulated. Clypeus projecting in the centre, which is flat, rounded at the base, gradually narrowed to near the apex, which becomes more widely depressed in the middle and at

the point bifid and purple; the basal part is keeled in the middle. Mandibles purplish black. Pronotum broader than long, roundly convex above, coarsely and closely punctured. The sides of the mesonotum strongly but not closely punctured; the base with the punctures more widely separated; the apex smooth. Scutellum smooth and marked all over with widely-separated punctures; the postscutellum closely and finely punctured, its central part with large deep punctures. There are only two central keels in the middle of the median segment; they form almost a triangle, the space enclosed by them is obliquely striated on either side at the base; the apex transversely striated; the rest is more finely transversely striated; the keel bordering the apex in the middle is slightly dilated; the middle of the dilatation transverse, its sides oblique; the apex of the segment above reticulated; the keels on the lower part not forming distinct areas, being widely waved. The part of the propleuræ above the keel has large scattered punctures all over; the lower part has a few punctures on the base; the apex on the lower side has some stout, oblique, irregular keels. Mesopleuræ with large, deep, distinctly separated punctures; metapleuræ reticulated in the middle, at the base and apex are a few curved irregular keels. The coxæ are green; the four posterior femora rufous, the anterior black, blue behind; the tibiæ on the inner side dull rufous; the pad on the penultimate tarsal joint does not reach to the middle of the next joint; the claws are bifid, the joints of almost equal length. The first transverse cubital nervure is obliterated entirely; the second is interstitial, with the apex of the nervure bounding the apex of the radial cellule; the first recurrent nervure is received in the middle, the second in front of the basal third of the cellule. Abdomen shorter than the thorax; above bright purplish blue; the apical segment dark green; the narrowed part of the petiole is not quite so long as the dilated apex and is black in colour; the apex of the petiole and the second segment sparsely punctured, the punctures small and shallow, longer and deeper on the apex of the second segment; the second segment is longer than usual, more than twice longer than broad; the third segment is deeply and largely punctured, the base in the middle smooth; the apex keeled in the middle; the apex all round has a sharply raised border; above there are only three segments distinguishable, below only two.

Note.—It appears to me that Col. Bingham has included in the 'Fauna of British India,' Hymen., *Ampulex cypriata*,

Kohl, in error. He gives the Khasia Hills as the only locality, no mention being made of Java, the only locality given by Kohl for his species. I have not seen the species among the thirteen known to me from Khasia.

Oxybelus ceylonicus, sp. n.

Long. 5 mm.

Hab. Ceylon (*Yerbury*).

Belongs to the section with the scutellar laminae obsolete, previously represented in the Indian fauna by *O. Lewisi*, Cam.

Scape of antennae yellowish beneath; the flagellum more or less brownish and thickly covered with a pale pile. Front and vertex closely punctured; the vertex sparsely, the front thickly covered with silvery pubescence; the front broadly and shallowly excavated in the middle; the hair on the clypeus and face is dense and silvery. Mandibles rufous, black at the base and apex; the base thickly covered with silvery pubescence. Thorax black, shining, thickly covered with silvery pubescence; a broad irregular mark on the pronotum near the tegulae, a smaller, more elongated one nearer the middle, the tubercles, a large oblique mark, rounded at the ends, on the side of the scutellum, the postscutellum, and two narrow lines issuing from them, lemon-yellow. Mesonotum closely and distinctly punctured, more closely at the base than at the apex; the scutellum sparsely punctured; the postscutellum is rounded behind, and has there, on the top, a distinct bordering keel. The top of the median segment is obliquely, the apical slope is more closely, transversely striated; the second row of transverse keels on the top form by longitudinal keels distinct areas; the base is minutely punctured; the apical slope is strongly aciculated; above its centre is a large, smooth, somewhat triangular depression. Propleurae aciculated, the middle and behind with curved striae. Mesopleurae closely rugose, thickly covered with silvery pubescence; the furrow over the sternum is wide. Metapleurae bearing all over curved striae, which are not closely set together. Legs black, the apical half of the four anterior femora beneath, all the tibiae, except behind, and the fore tarsi yellow; the middle and hinder tarsi blackish; the legs are thickly covered with silvery pubescence. Wings clear hyaline, the nervures testaceous. Abdomen shining, covered with silvery pubescence; there is a large yellow mark on the first segment, narrower ones on the second, third, and fourth, and larger yellow marks on the fifth segments almost united in the middle; the pygidium

black, dark testaceous near the apex; it is thickly covered with bright golden pubescence. The base of the petiole is slightly depressed; its sides with some distinct curved striations. The abdominal segments are lined with yellow; the apical one is for the greater part testaceous.

This species is referable to *Oxybelus* rather than to *Crabro*, although it has not got any thoracic laminae, through the submarginal cellule being confluent with the first discoidal, and through the eyes not being strongly divergent towards the vertex. Saussure forms a tribe and Fox a subfamily for *Oxybelus*—the *Oxybelinae*.

III.—*Note on the Weasel, Putorius (Ictis) nivalis, Linn., and some of its Subspecies.* By G. E. H. BARRETT-HAMILTON.

I HAVE recently had under examination the set of skins of the weasel in the British Museum collection, and have been greatly struck by the large amount of local variation shown in the specimens from various parts of Europe, for many of which the Museum is indebted to the liberality of the late Lord Lilford and of Mr. Oldfield Thomas.

The characters which seem most subject to variation are the general size, the length of the tail, the colour of the underside, and the course and arrangement of the line of demarcation between the colours of the two surfaces of the body. In the far north, as is well known, the weasel regularly turns white in winter, and this character is in itself sufficient to warrant the subspecific separation of those individuals whose winter coat is white from those which, as in England, do not undergo such a seasonal change of colour. In temperate regions the reddish-brown colour of the upperside is retained throughout the year, but the animal is characterized, as in Great Britain, by the possession of a pure white belly. In the warmer South, however, we find weasels with the belly more and more washed with yellow, until, in some of the Mediterranean localities, such as Sicily, Malta, and Algeria, the colour reaches buff or orange. The length of the tail seems to bear some relation to the colour of the underside, for whereas specimens from Great Britain, France, Hungary, Germany, Northern Italy, the Caucasus, and Asia Minor (Van and Erzerum) have short tails, those from Sicily, Malta, Sardinia, Algeria, and Cairo are long-tailed, while those from the south of Spain seem to be intermediate in this respect.

The general size of the animal appears also to be larger in the South, especially in those regions where the stoat (*P. ermineus*, Linn.) does not occur or is rare. Thus specimens from Cairo and Malta are the largest, while those from Sicily and Algeria, although larger than those of England, are not quite equal to the former in size. On the other hand, we have examples of a very small subspecies from Asia Minor and the Caucasus. The changes in the line of demarcation are not so clearly connected with the southern range of the animal, since while specimens from Great Britain, North France, North Italy, Haida in Bohemia, Burgheim in Bavaria, Hungary, Malta, Cairo, Tangier, and Sardinia have this line wavy and undulating, those from Seville, Sicily, Algeria, and the Caucasus show an almost straight line like that of the stoat.

The colour of the upperside does not seem to lend itself so readily to variation as do the characters alluded to above, but it is markedly lighter in the eastern subspecies *M. nivalis Stoliczkanus*, Blanford, of Yarkand, and a new subspecies, *M. n. pallidus*, of Turkestan and Afghanistan.

It is of great interest to thus find paralleled in a mammal the well-known increase of richness in the colour of the plumage of so many birds—such as, for instance, *Parus caruleus*, Linn., *Hirundo rustica*, Linn., *Ligurinus chloris* (Linn.), and *Fringilla cælebs*, Linn.—according as they range southwards.

The following forms are recognizable:—

- (I.) *Putorius nivalis typicus*, Linnæus, Syst. Nat. ed. xii. p. 69 (1766).

Type locality. Upsala, Sweden.

Distinguishing characteristic. Winter coat white.

I have no series of northern weasels, but it is almost certain that, in addition to the above, they will be found to present other distinguishing characteristics.

Distribution. Arctic and subarctic regions of Europe.

- (II.) *Putorius nivalis vulgaris*, Erxleben, Syst. Reg. Animal. p. 471 (1777).

*Putorius minutus**, Pomel, 'Cat. méth. et descript. des Vert. Foss. découvertes dans le Bassin Hydrographique supérieur de la Loire, et surtout dans la vallée de son affluent principal, l'Allier,' p. 51 (Paris, 1853).—*Type locality.* Paris.

Type locality. Leipzig.

* Should specimens from Great Britain and Western Europe be distinguishable from those of Central Europe, Pomel's name will be applicable to the former.

Colour (of British specimens). Above reddish brown of variable depth, the darkest specimen being a large male from Elgin, Morayshire, Scotland, dated 29th September, 1894: a very pale male from Froyle, Hants, dated 30th January, 1893, almost approaches *P. nivalis Stoliczkanus* in tint. On the whole I think the most intensely coloured specimens of both sexes are those obtained in September and October.

Beneath. At all ages pure white, which, however, may become dirty when the coat is very old, as is the case with a male from Cambridgeshire, labelled May 24th, and another from Wales, labelled June 15th. The wavy uncertain line of demarcation between the colours of the two surfaces is in its very variability exceedingly characteristic and naturally causes an equal variability in the area of the white colour of the belly. The latter in large specimens (males) usually reaches a breadth of 25 millim. or upwards. In some individuals, however, as in a male from Tring, Herts, it is very much constricted in the region behind the chest and does not exceed a breadth of 11 millim.; in another specimen, a male from Cambridge, there is a complete band of the brown colour extending right across the belly. Posteriorly the brown colour usually, but not always, encroaches on to the belly, preventing the extension of the white as far backwards as the anus. There are frequently isolated patches of brown colour irregularly distributed over the belly, even in the middle line. Some of the variations bear a very close resemblance to those shown by the Irish stoat, *P. ermineus hibernicus*, Thos. & Barr.-Ham.

The fore feet are partially white.

A trace of the assumption of a white winter coat is visible in two specimens from Cromarty, viz. a male killed on the 30th October, 1895, and a female killed on the 21st March, 1896, which, especially the male, show many white hairs on the flanks and a few on the dorsal region, the latter forming an indistinct saddle-like band over the back.

Although in coloration the sexes are identical, males are far larger than females, have the skull proportionately broader, and show a stronger development of the sagittal crest. The following is a summary of the dimensions (in millimetres) of sixteen adult males and eight adult and two immature females, all British, taken from the British Museum and from my own collections, and for which we are indebted to the kindness of Messrs. F. Austen, J. L. Bonhote, Sir W. G. Cumming, W. R. Ogilvie Grant, E. H. Caton Haigh, S. F. Harmer, E. Hartert, W. L. S. Loat, J. C. Mansel-Pleydell, G. St. Quentin, the Hon. W. Rothschild, and A. Wright.

Sixteen males.						
	Head and body.	Tail.	Hind foot (without claws).	Ear.	Length of skull (ba- sion to gnathion).	Breadth of skull at zygoma.
Maximum	235	65	36	16	41	25
Mean	214	60	32	15.5	37	23
Minimum	203	53	29	15	36.5	21.5

Eight females.						
	Head and body.	Tail.	Hind foot (without claws).	Ear.	Length of skull (ba- sion to gnathion).	Breadth of skull at zygoma.
Maximum	195	50	28	13	34	19
Mean	178	44	25	12	33	17
Minimum	160	36	22	11	31	16.5

Two immature females.						
	Head and body.	Tail.	Hind foot (without claws).	Ear.	Length of skull (ba- sion to gnathion).	Breadth of skull at zygoma.
Boxmoor, Herts (<i>A. Piffird</i>), 15th May, 1893	146	37	24	..	..	..
Bletchingley, Surrey (<i>W. R. Ogil- vie Grant</i>), 6th Aug., 1895	150	43	21	13	..	..

The dimensions given would seem to show that the British weasel is a variable species not only in the colour of its underside, but also in its size. The ratio of the length of the tail to that of the head and body is about 1 : 4.

We have also specimens of this subspecies collected by Mr. Oldfield Thomas in the Forest of Guinnes, Pas de Calais, France, from Haida in Bohemia, and from Burgheim in Bavaria, of which the dimensions are :—

	Head and body.	Tail.	Hind foot (without claws).	Ear.	Length of skull (ba- sion to gnathion).	Breadth of skull at zygoma.
No. 94. 6. 6. 10. ♂, Pas-de Calais	212	58	30	..	37	21
No. 94. 6. 6. 11. Same locality, ♂, 27th May, 1894	209	60	31	..	..	..
♂, Haida, Bohemia, 13th Feb., 1896 (not white)	210	52	32	9	..	..
♂, Burgheim, Bavaria, 29th April, 1895 (a small faded skin, not white)	150	40	21	..	about 38	..

Three unsexed skins from Cs. Somoja, in Western Hungary, may possibly be summer examples of *P. nivalis typicus*. The dimensions of tail and hind feet taken from these (dried skins) reach 62 and 25, 55 and 30, and 72 and 30 millim. respectively.

Distribution. Western and Central Europe.

(III.) *Putorius nivalis italicus* *, subsp. n.

Type. No. 95. 11. 11. 1 of British Museum collection, from Grezzana, in the highlands of the Province of Verona, Italy.

Distinguishing characteristics. Size perhaps a little larger than, but line of demarcation and length of tail as in, *P. nivalis vulgaris* of Britain, with the underside slightly washed with buff. The following are the dimensions of three specimens presented to the Museum by Mr. Oldfield Thomas and collected through Conte Ettore Arrigoni degli Oddi by Signor dal Nero Vittorio, of Verona:—

	Head and body.	Tail.	Hind foot (without claws).	Ear.	Length of skull (ba- sion to gnathion).	Breadth of skull at zygoma.
No. 95. 11. 11. 1. ♂, Grezzana, Prov. Verona, Italy, 400 metres, 20th April, 1899. (Type.)	..	..	..	..	40.5	22
No. 95. 11. 11. 2. ♂, Villafranca, Verona, Italy, 10th May, 1899	..	..	..	..	38.5	22
No. 95. 11. 11. 3. ♀, slightly immature, Colaguala, Province of Verona, Italy, 54 metres, 2nd Dec., 1898	190	45	..	10	32	17

The skull of a male from Genoa, presented by the late Lord Lilford, has a length and breadth of 41—24 millim.

Distribution. Italy.

(IV.) *Putorius nivalis ibericus*, subsp. n.

Type. No 95. 3. 3. 10 of British Museum collection, from Seville, Spain.

Distinguishing characteristics. Size and length of tail intermediate; belly usually washed with yellow; line of demarcation decided, as in *P. ermineus*; feet white.

	Head and body.	Tail.	Hind foot (without claws).	Length of skull (ba- sion to gnathion).	Breadth of skull at zygoma.
No. 95. 3. 3. 10. ♀, Seville, Spain, 2nd Oct., 1894 (collector A. Ruiz, for the late Lord Lilford). (Type.)	250	50	..	38	22
No. 95. 9. 4. 12. ♂, ditto, 8th June, 1895	250	65	45	..	..
No. 95. 9. 4. 13. ♀, ditto, 3rd May, 1895	120	40	38	..	..

Distribution. The Iberian Peninsula.

* I cannot find the origin of the reference to a variety "*vulgaris*, var. *meridionalis*, Costa et auct.," thus given by Trouessart in his 'Catalogus Mammalium,' i. p. 276 (1898-99).

(V.) *Putorius nivalis numidicus*, Pucheran, Rev. et Mag. de Zool. p. 393 (1855).

Type. No. C. 250 (in alcohol) of Paris Museum collection (*vide* F. Lataste *).

According to Lataste the type of *P. numidicus* came from Tangier, where it was purchased from the dealer Favié in 1841. If that be so, I possess a topotype of this subspecies, in no. 322 of my collection, which I purchased of Olcese, Favié's successor at Tangier, in 1895. The specimen agrees exactly with Pucheran's description as far as it goes, having "la queue plus longue que la Belette, de France, avec une touffe terminale de couleur noirâtre." In other respects it seems to be very closely related to *P. nivalis boccamela*, having the yellow underside, partially white fore feet, and wavy line of demarcation of that subspecies.

Distribution. Morocco.

(VI.) *Putorius nivalis boccamela*, Bechstein, Säug. Deutsch. p. 819 (1801).

Typical locality. Sardinia.

Distinguishing characteristics. Size larger than and tail longer than in *P. n. italicus* of Italy; line of demarcation wavy. General colour of upperside probably darker. Toes of fore feet white. Skull broad.

	Head and body.	Tail.	Length of Breadth		
			Hind foot (without claws).	skull (ba- sion to gnathion).	of skull at zygoma.
♂ (in spirit), Sardinia. (Topotype.)					
<i>Fide</i> O. Thomas	200	79	36.6	..	..
♀ (ditto)	145	51	26	..	..
♂, Sardinia, Feb. 1898 (<i>E. N. Buxton</i>).					
(A very dark specimen.) .....	..	73 †	..	39	..
♂, ditto (<i>ex coll. Linnaea</i>) .....	..	80 †	..	40	25

This weasel was, as has been pointed out by Lataste ‡, described by Cetti in 1774 §; but as he did not apply a Latin name to it, the name *boccamela* must stand to the credit of the next author who used it, who would appear to have been Bechstein.

Distribution. Sardinia.

(VII.) *Putorius nivalis siculus*, subsp. n.

Type. No. 95. 3. 4. 5 of British Museum collection, from Marsala, Sicily.

* Mamm. de Barbarie, p. 121 (1885).

† Dimensions taken from dried skins only.

‡ Mamm. de Barbarie, p. 122 (1885).

§ 'Quadrupedi,' pp. 165-186 (1774).

Distinguishing characteristics. Size larger, tail long (ratio to head and body about 1 : 3); belly washed with yellow or orange of variable intensity; line of demarcation straight, as in *P. ermineus*; all four feet white.

	Head and body.	Tail.	Hind foot (without claws).	Length of skull (ba- sion to gnathion).	Breadth of skull at zygoma.
No. 95. 3. 4. 2. ♂, Palermo, Sicily, 9th Feb., 1895 (<i>J. I. S. Whitaker</i>).	..	..	..	41.5	22
No. 95. 3. 4. 3. ♂, Palermo, Sicily, 26th Feb., 1895 (<i>ditto</i>)	240	80	38	..	..
No. 95. 3. 4. 4. ♂, Balestrate, Sicily, 15th Feb., 1895 (<i>ditto</i>)	230	70	38	..	..
No. 95. 3. 4. 6. ♂, Marsala, Sicily, 18th Feb., 1895 (<i>ditto</i>)	250	90	40	..	..

A single specimen from Algeria (no. 56. 3. 12. 12, from Oran Prov., W. Algeria, ex coll. Parzudaki) agrees with a series of nine, young and old, from Sicily, for which the Museum is indebted to Mr. J. I. S. Whitaker.

Distribution. Sicily and Algiers.

(VIII.) *Putorius nivalis africanus*, Desm. Nouv. Dict. Hist. Nat. xix. p. 376 (1818) (nec Pomel, C. R. Ac. Sc. p. 654, 1856, and Lataste).

Typical locality. "d'Afrique." *

Distinguishing characteristics. Size large; tail long (ratio of length to that of head and body about 1 : 3); belly orange; line of demarcation wavy; feet partially white.

	Head and body.	Tail.	Hind foot (without claws).	Ear.	Length of skull (ba- sion to gnathion).	Breadth of skull at zygoma.
No. 92. 7. 15. 7. ♂, Pyramids of Ghizeh, Egypt (<i>Dr. J. Anderson</i>), 14th March, 1892	280	90	..	..	42	..
No. 92. 7. 15. 8. ♀, Abu Roash, W. of Cairo, Egypt (<i>ditto</i>)	270	70	..	..	43.5	24
Egypt, ♂, in spirit (<i>vide O. Thomas</i>) ..	260	108	47	..	..	..
No. 94. 11. 26. 2. ♂ juv., Malta (<i>C. A.</i> <i>Wright</i>), 16th April; 1894	173	62	34	16	37	23
No. 95. 1. 2. 1. ♀, Malta, 1894 (<i>ditto</i>), (measured in dry skin)	200	85	..	..	..	..
No. 75. 4. 6. 1. ♂, Malta (stuffed) (<i>vide</i> <i>O. Thomas</i>)	300	105	43	..	..	..

It would appear from the smaller specimens that the tail

* The species was described from a specimen at the time in the Paris Museum, but which had formerly been in the Museum at Lisbon.

may be short in the young of this subspecies. This is the largest subspecies of the series, and the great size of the stuffed specimen from Malta makes it impossible to distinguish Maltese from Egyptian specimens, at least with the material at present available. In my identification I am therefore glad to be able to follow Mr. Oldfield Thomas, who in 1895 recorded his belief that the weasels of Egypt and Malta are identical (P. Z. S., Feb. 5, 1895, pp. 128-131).

Distribution. Egypt and Malta.

(IX.) *Putorius nivalis caucasicus*, subsp. n.

Type. No. 94. 9. 2. 3, from the Barey collection (Mons. Hotschal), the Caucasus, at a height of 12,000 feet, 26th June, 1887.

Distinguishing characteristics. Winter coat white; size very small; tail short; belly white; line of demarcation decided; feet white.

I make this subspecies with confidence from four specimens, since the characters which they show are very constant in the various subspecies of weasels, and their combination in this form is unique. The white winter coat is represented by two specimens, nos. 97. 6. 4. 4 & 5, a male and a female, collected at Van, Asia Minor, by Major Williams, R.A., and of which the date and dimensions are:—

	Head and body.	Tail.	Hind foot (without claws).	Ear.	Length of skull (ba- sion to gnathion).	Breadth of skull at zygoma.
♂, 18th Jan., 1897	196	55	27	12	35.5	17
♀, 10th Jan., 1897	173	55	27	13	34	..

There is also one from Erzeroum (no. 84. 6. 3. 5), collected by Messrs. Dickson and Ross in 1840.

Distribution. Caucasus and Asia Minor.

(X.) *Putorius nivalis pallidus*, subsp. n.

Putorius Stoliczkanus, O. Thomas, Ann. & Mag. Nat. Hist. xv. p. 453 (1895).

Type. No. 94. 9. 2. 1 of British Museum collection, from Kokand, Ferghana.

Distinguishing characteristics. Colour of upperside extremely light and faded; size intermediate; tail short; line of demarcation distinct; feet white or nearly so.

The characters given above readily distinguish this subspecies from *P. nivalis Stoliczkanus*, with which it has been

formerly associated. I know of no other described weasel with which it might be confounded; it is certainly very widely different from *P. alpinus*, Gebler.

The skull of no. 94. 9. 2. 1 is damaged, but measures about 37×20 , showing the specimen to have been about of normal size.

Distribution. I have only two bad and faded skins of this subspecies, one of which (no. 94. 9. 2. 1) is a female (with skull) from Kokand, Ferghana, collected by Th. Bary on 20th March, 1893, and procured in exchange from the Branicki Museum, Warsaw; and the other (no. 79. 11. 21. 293) is an unsexed skin from Afghanistan, from the Indian Museum collection.

(XI.) *Putorius nivalis Stoliczkanus*, Blanford, J. As. Soc. Bengal, xlv. 2, p. 260 (1877).

Mustela vulgaris, ? var., Blanford, Journ. As. Soc. Bengal, xlv. 2, p. 106 (1875).

The typical specimen was brought by Dr. Stoliczka from Yarkand, Eastern Turkestan, where it was purchased.

A single topotype of this subspecies in the collection is no. 75. 3. 30. 8, and was collected by Colonel Biddulph in Yarkand on the 26th May, 1894. It is very faded, but must have been very light in the coloration of the upperside, is of small size, has the tail rather long in proportion to the head and body length, the line of demarcation wavy, and the feet nearly white. The skull has been damaged, but is small, measuring not much more than 36 millim. in total length.

In his original description Blanford states that the colour of the typical specimens was pale sandy brown above, with a small white spot close to the anterior angle of each eye; the tail throughout the same colour as the back; the fore feet white, mixed with pale brown above; the hind feet only whitish at the edges; the soles of all the feet thickly clad, only the toe-pads being naked; the total length 306 millim.*; of which the tail without the end-hairs reached 58 millim.*; the length of the hind foot and tarsus without the claws 30* ; and the weight 5.2 ozs.

[(XII.) ? *Putorius nivalis subpalmatus*, Hemprich and Ehrenberg, Symbol. Phys. dec. ii., at end of article on *Herpestes leucurus* (1833).

I regret that I am unable to throw any light on the identity

* Converted to millim. from the inches as given by Blanford.

of the still lost smaller weasel of Egypt, the status of which has been already discussed by Mr. Oldfield Thomas*. The original description, which is in Latin, is rather peculiar, and interesting enough to merit reproduction here. It runs as follows:—"Quarta *Mustelinorum* forma *Mustelæ vulgari* admodum affinis est. In itinere *Mustelæ subpalmatæ* nomine eam distinximus, digiti enim membrana latius conjuncti erant, statura minor. In domibus ægyptiacis Cahiræ et Alexandria murium vulgaris socius. *Ælurum* (*αἴλουρον*) non hanc, sed *Felam Bubostis* cum *F. maniculata* fuisse serius docebo."]

IV.—On *Squirrels of the Sciurus MacClellandi Group.*

By J. L. BONHOTE.

FROM a close and careful examination of a large series of skins of this species from India and China it seems to me that the following races may be easily distinguished. The most noticeable feature of the group is their variability in a very small area, and it will be seen that there are no less than three forms to be found in the province of Fokien, China, and specimens of all three kinds may be obtained within an easy radius of one place, namely Kuantun. At first I was inclined to regard it as an instance of polymorphism, but a further investigation has satisfied me that such is not the case. In the first place, the differences between the three forms are constant and there is little or no variation among themselves; secondly, one form (*Swinhoei*) is apparently different in habits, being never found amongst the tall conifers, as is the habit of all the other races, but being always found on the ground and among low scrub. With regard to the other two forms, the typical locality of the one is Foochow, on the sea-coast, and of the other Ching Feng Ling, a village about 2000 feet up in the mountains; that they should both be found at Kuantun is not surprising, since Kuantun† is a village halfway up a high mountain, and it may well be that the form which inhabits the valley should be different from that found at a greater altitude. Of the Indian races there is nothing much to be said; those from Tenasserim and the Straits Settlements are, as might be expected, much brighter than those from the north, while specimens from Manipur show a very interesting intermediate stage.

* P. Z. S. 1895, pp. 128-131.

† O. Thomas, Proc. Zool. Soc. 1898, p. 769.

Sciurus MacClellandi typicus, Horsf.

Sciurus MacClellandi, Horsf. P. Z. S. 1839, p. 152; Blyth, J. A. S. B. xvi. p. 875; id. Cat. p. 107; Jerdon, Mamm. p. 173.

Sciurus Pembertoni, Blyth, J. A. S. B. xi. p. 857; id. J. A. S. B. xvi. p. 875.

General colour above yellowish brown. Median dorsal stripe from the nape to the root of the tail black, on each side of which is a lighter stripe hardly distinguishable from the colour of the neck, succeeded by another of a darker shade. The outer dark stripes are bordered by two narrow yellowish ones, which start from the nose and, passing under the eye and ear, continue as far as the root of the tail. Underparts yellowish grey.

Measurements (skin):—

Head and body 131 millim.; tail 90.

Skull: greatest length 35; basal length 26; zygomatic breadth 21; length of nasals 10.

Hab. Nepal, Sikkim, Bootan, and Assam.

Sciurus MacClellandi manipurensis, subsp. n.

Sciurus MacClellandi, Thos. P. Z. S. 1886, p. 61.

This form differs from the foregoing by being much lighter in general coloration. All the stripes are clearer and more distinct, especially the outermost light stripes, which are very pale and well marked. The underparts are also paler. The tail seems to be rather longer.

Dimensions of type (from skin):—

Head and body 120 millim.; tail 100.

Hab. Manipur.

Type B.M. 85. 8. 1. 273. Aimole, Manipur. Presented by Mr. A. O. Hume.

Sciurus MacClellandi maritimus, subsp. n.

This is the form which most nearly approaches the typical *Sc. MacClellandi*, from which it differs in being far greyer and more concolorous. The median dorsal stripe is by no means well marked and very short, *not* being continued to the root of the tail. The two subdorsal stripes are of the same colour as the back, while the outermost light stripes are of a dull white, very narrow and short, not being continued to the root of the tail, and only starting at the shoulder.

Measurement of type (from skin):—

Head and body 140 millim.; tail 95; hind foot 31; ear 12.

Skull: zygomatic breadth 21; length of nasals 10.

Hab. Foochow, province of Fokien, China.

Type B.M. 94. 9. 1. 11. Foochow, April 1893. Collected and presented by Mr. C. B. Rickett.

This is apparently a form inhabiting the coast and low ground. It is found also at Tingchow and Kuatun.

Sciurus MacClellandi monticolus, subsp. n.

Brighter than the preceding subspecies, to which it is most nearly allied, and from which it differs in having the median dorsal stripe more distinct and always continued to the root of the tail. The outermost light stripes are very broad and distinct and continued to the root of the tail.

Measurements of type (from skin):—

Head and body 132 millim.; tail 109; hind foot 31.

Skull: greatest length 37; basal length 29; zygomatic breadth 23; length of nasals 10.5.

Hab. Ching Feng Ling*, 2000 feet.

Type B.M. 97. 3. 2. 6. Ching Feng Ling, Fokien, Dec. 1896. Collected and presented by Mr. C. B. Rickett.

There are also specimens from Kuatun, Fokien, and Chinteh, Anhua.

Sciurus MacClellandi Swinhoei, Milne-Edw.

Sciurus MacClellandi Swinhoei, Milne-Edwards, Rech. des Mamm. p. 308 (1874).

Easily distinguishable by having three black dorsal stripes. The whole animal is much brighter than any of the other Chinese races. The subdorsal stripes are distinctly lighter than the colour of the neck; the outer light stripes are very broad and well marked, with a tendency to join the subocular cheek-stripe over the shoulders.

Hab. Province of Moupin, China.

Specimens in the British Museum are from Ching Feng Ling, Peling, and Kuatun. This form differs also in habits, being found on the ground or in low scrub, whereas the other forms are especially partial to tall trees, rarely descending to the ground.

Sciurus MacClellandi formosanus, subsp. n.

This form, which inhabits the islands of Foochow and Hainan, is simply the insular variety of *Sc. MacClellandi maritimus*. It differs from this form in being darker, the

* Ching Feng Ling is situated 100 miles north-west of Foochow.

general tone being of a dull reddish brown. The stripes are all very short and indistinct, and hardly distinguishable towards the root of the tail. The subocular stripe is very dusky and indistinct. The underparts are of a dark yellowish grey.

Measurements (from skin) :—

Head and body 130 millim. ; tail 90.

Hab. Formosa.

Type B.M. 62. 12. 24. 18. N. Formosa, April 1862. Collected and presented by Mr. Robert Swinhoe.

There are also specimens of this race from Hainan.

Sciurus MacClellandi Barbei, Blyth.

Sciurus Barbei, Blyth, J. A. S. B. xvi. p. 875; Thos. P. Z. S. 1886, p. 71.

Specimens from Tenasserim and Upper Burmah are conspicuously different from all the other forms; they most nearly approach *Sc. MacClellandi manipurensis*, from Manipur, the ground-colour of these two forms being similar and much lighter than in all the other races. *Sc. MacClellandi Barbei* may be, however, at once distinguished by the very broad and conspicuous outer light stripes, which are continuous with the suborbital light stripe, and are clear and distinct to the root of the tail. The three dark stripes on the back are black, broad, and well marked; the subdorsal light stripes are also bright and distinct. The underparts are bright ferruginous.

Hab. Upper Burmah.

In some specimens the yellow of the outer light stripes is replaced by a delicate salmon-pink.

Sciurus MacClellandi leucotis (Temm.).

Tamias leucotis, Temm. Zool. sur la Côte de Guinée, 1853, p. 252.

Closely allied to the preceding form, from which it differs in having all the stripes considerably narrower and with a tendency to disappear before reaching the tail. The hair on the tips of the ears is long and white to its base, whereas in *Sc. MacClellandi Barbei* its basal half is black.

Hab. Malacca Peninsula.

The three specimens which I have referred to this subspecies all came from Perak, and although Temminck's description does not quite agree with the specimens before me, there can be little doubt that it is the squirrel to which he alludes. The most noticeable point about this form is the white ears, agreeing therefore with Temminck's specimens.

All the individuals at hand have most distinctly the three dark bands black, and not only the centre one as stated in the description; but, except for that point, the description agrees fairly well with the specimens.

Sciurus MacClellandi Rodolphi (Milne-Edwards).

Sciurus Rodolphi, M.-Edw. Rev. et Mag. de Zool. 1867, xix. p. 227; id. Rech. Mamm. 1871, p. 162.

This is the last race which we shall have to consider; it is allied to the Tenasserim specimens, but the hairs of all the dark stripes are tipped with brown. The four light stripes are of equal size and intensity, but the subdorsal ones have a slight tinge of pink. The underparts are ferruginous.

Hab. Cochin China.

Key to Species.

One black stripe.

Four light stripes equally bright *S. MacClellandi Rodolphi*.

Two outer light stripes much brighter than subdorsal.

Light stripe continuous with subocular.

General colour suffused with yellowish *S. MacClellandi typicus*.

Lighter, greyer, stripes distinct *S. MacClellandi manipurensis*.

Light stripe not continuous with subocular.

Outer light stripe broad *S. MacClellandi monticolus*.

Outer light stripe narrow and short.

General colour greyish *S. MacClellandi maritimus*.

Darker, general colour reddish brown *S. MacClellandi formosanus*.

Three black stripes.

Light stripes broad; hair of ears black at base.

Light stripe continuous with subocular. *S. MacClellandi Barbei*.

Light stripe not continuous with subocular. *S. MacClellandi Swinhoei*.

Light stripes narrow; hair of ear white at base *S. MacClellandi leucotis*.

V.—*Descriptions of Two new Atherinoid Fishes from Mexico.* By G. A. BOULENGER, F.R.S.

Chirostoma lucius.

Depth of body $4\frac{1}{3}$ to 5 times in total length, length of head * $3\frac{1}{3}$ to $3\frac{1}{2}$. Head large, pike-like, with the lower jaw projecting; teeth small; vomer toothless; snout pointed, $1\frac{1}{2}$

* The projecting lower jaw is not included in the length of the head.

diameter of eye, which is $4\frac{1}{2}$ times in length of head and equals width of interorbital region; maxillary extending to below anterior border of eye or a little beyond; depth of suborbital region barely $\frac{2}{3}$ the diameter of the eye. 21 or 22 gill-rakers on lower part of anterior arch. Dorsals V-VI, I 11-13; longest spines not quite $\frac{1}{2}$ length of head; the distance between the two fins equals the base of the spinous one. Anal I 20-22, originating under posterior extremity of spinous dorsal. Pectoral acutely pointed, about $\frac{2}{3}$ length of head, contained 5 times in total length, extending to above middle of ventral. Ventrals reaching vent. Caudal deeply forked. Caudal peduncle twice as long as deep. Scales with crenate edge, 52 to 60 in a longitudinal series and 20 to 22 in a transverse series. A well-marked silvery lateral stripe.

Total length 200 millim.

Several specimens from Lake Chapala, collected by Dr. A. C. Buller.

This species is very closely related to *C. estor*, Jord., from the same lake, and likewise known under the name of *Pescado blanco*; but it differs from Jordan's and Steindachner's descriptions by the longer pectoral fin, the more numerous anal rays, the narrower suborbital region, and the smaller number of scales along the body.

Chirostoma sphyrcæna.

Depth of body 6 times in total length, length of head $3\frac{1}{4}$. Head large, suggestive of a *Sphyrcæna*, with the lower jaw projecting; teeth in both jaws intermixed with large canines; vomer toothless; snout acutely pointed, $2\frac{1}{3}$ diameter of eye, which is $6\frac{1}{2}$ times in length of head and equals $\frac{3}{4}$ interorbital width; maxillary extending to below anterior border of eye; depth of suborbital region equalling the diameter of the eye. 23 gill-rakers on lower part of anterior arch. Dorsals V, I 11; longest spines not quite $\frac{1}{4}$ length of head; the distance between the two fins equals double the base of the spinous one. Anal I 21, originating a little behind posterior extremity of spinous dorsal. Pectoral acutely pointed, nearly $\frac{2}{3}$ length of head, contained 5 times in total length, extending to above middle of ventral. Ventrals not reaching vent. Caudal deeply forked. Caudal peduncle twice as long as deep. Scales with crenate edge, 65 in a longitudinal series and 20 in a transverse series. A well-marked silvery lateral stripe.

Total length 225 millim.

A single specimen from Lake Chapala, collected by Dr. A. C. Buller.

VI.—Description of a new Lizard of the Genus *Nucras* from Usoga, British East Africa. By OSCAR NEUMANN.

Nucras Boulengeri.

Body elongate; head not depressed, its length (to ear-opening) contained $4\frac{1}{2}$ to 5 times in the length from snout to vent; two postnasals; no granules between the supraoculars and the supraciliaries; interparietal not so long and narrow as in *N. tessellata* and *N. Delalandii*; occipital very small; subocular bordering the lip between the fourth and fifth upper labials; two supratemporals bordering the parietal; tympanum half as large as the ear-opening. Dorsal scales small, pointed behind, larger on the sides of the body; 45 to 53 scales round the body; ventrals in 6 longitudinal and 27 to 30 transverse series. Femoral pores 11 or 12. Foot much shorter than the head. Tail thinner than in *N. tessellata* and *N. Delalandii*, $1\frac{1}{4}$ to $1\frac{1}{3}$ as long as head and body. Colour brown above, with small indistinct blackish spots; bluish white beneath.

This seems to be a much smaller species than the two previously known; its principal distinctive characters reside in the rather large tympanum, the pointed dorsal scales, and the small foot.

Two specimens were collected by me at Lubwas (Usoga) in September 1894.

VII.—On the Genus *Lycodes*. By Prof. F. A. SMITT.

THE genus *Lycodes* has, in recent times, given very much trouble to the ichthyologist; and, in the first place, the usual manner of defining the species by the colouring of the body has failed to give any systematic certainty. Thus, when writing the 'Scandinavian Fishes,' although I had very poor material for comparison, I was struck* by the apparent identity of *Lycodes reticulatus*, in Günther's "Deep-sea Fishes of 'Challenger' Expedition," with *Lycodes frigidus*, Collett, which I knew from one of the author's type specimens, and I expressed my suspicion that the "species" *frigidus* was a mixture of sterile and more or less deformed specimens of two other species. And as it was impossible to find any constant characteristics, either in nature or in the descriptions

* Smitt, Scand. Fish. p. 610.

by the accessible authors, for the greater number of local varieties and forms already described as distinct species, I was unable to recognize more than four true species, viz. *Lycodes reticulatus*, *L. Vahlü*, *L. Sarsii*, and *L. muræna*. Now, in determining the very valuable collections brought home from Greenland this year by the Nathorst expedition, I find these views fully confirmed. *Lycodes perspicillum* (= *L. Rossi*) is the young stage of *L. reticulatus*, *Lycodes gracilis* that same stage of *L. Vahlü*. *Lycodes pallidus* was identified by Lönnberg with *L. frigidus** (= *L. reticulatus*), but by Collett† with *L. gracilis* (= *L. Vahlü*); thus these two authors, by their difference of opinion, strengthen the doubts as to the validity of the distinction based upon the characteristics used by themselves.

As in the near future I shall return to a fuller treatment of the collection of fishes from the last Nathorst expedition, I will here give only a key to distinguish the species, in accordance with the characteristics supplied by my new materials:—

- A. Length of the head more than 29 (30) per cent. of the length of the tail.—Subgenus *Lycodes*.
- a. Length of the head more than 42 per cent. of the length of the tail *Lycodes reticulatus*.
- b. Length of the head less than 40 per cent. of the length of the tail *Lycodes Vahlü*.
- aa. Length of the head more than 22 per cent. of the total length and usually more than 36 per cent. of the length of the tail.—Forma arctica (*Vahlü* typical).
- bb. Length of the head usually less than 22 per cent. of the total length and less than 36 per cent. (most usually less than 33 per cent.) of the length of the tail.—Forma borealis (*gracilis*, auctt.).
- B. Length of the head less than 29 (28) per cent. of the length of the tail.—Subgenus *Lycenchelys*.
- a. Height of the body at the beginning of the anal fin less than 5 per cent. of its total length *Lycodes muræna*.
- b. Height of the body at the beginning of the anal fin more than 5 per cent. of its total length *Lycodes Sarsii*.

* Under this name Lönnberg ("Notes on the Fishes collected during the Swedish Arctic Expedition to Spitzbergen and King Charles Land, 1898," Bih. Sv. Vet.-Akad. Handl. 1899, Bd. 24, Afd. iv. no. 9, p. 24) described a specimen with all the characteristics of *Lycodes reticulatus*.

† "Contribution to the Knowledge of the Genus *Lycodes*, Reinh.—II. *Lycodes gracilis*, M. Sars," Vid. Selsk. Skrifter, Christiania, I. Math.-Naturv. Kl. 1899, no. 6, pp. 5 and 10.

However, I may remark that I have only seen one specimen of each of the last two species, which Professor Collett once kindly lent me. From my own observations I thus cannot extend the knowledge of their relation to each other; but, to judge from the latest observations of Prof. Collett, it seems very probable that here also far too great a weight is given to the colour-differences, while too little heed has been paid to the significance of the evolutionary changes of form; for if we compare the measurements given by Collett* for *Lycodes Sarsii* we shall find:—

	In average for 6 specimens.	In average for 11 specimens.
Total length in millimetres.....	54.7	133.4
Length of head in per cent. of total length	16.6	14.6
Height of body " "	7.5	6.0
Distance of snout from dorsal in per cent. of total length	25.8	22.9
" " anus " "	31.5	28.1
Length of head in per cent. of length of tail	24.4	20.3
Distance of snout from dorsal in per cent. of length of tail	38.2	31.9
Distance of snout from anus in per cent. of length of tail	46.5	39.1
Length of head in per cent. of distance from snout to dorsal †	64.2	63.3

All these changes from fry to mature stage (with the exception of the last one, which, however, is much too small to permit of any trustworthy conclusion) thus point in the direction from the characteristics of *Sarsii* to those of *muræna*, and make it not improbable that, with a fuller knowledge of the latter species, it will be found preferable to regard the two "species" as local or evolutionary forms originating from the same source.

Stockholm,
October, 1899.

* *L. c. i.* (1898), p. 11.

† According to Collett (*l. c.* p. 18) these figures should be 66.7 for *Lycodes muræna* and 55.5 for *L. Sarsii*.

VIII.—On a Second Collection of Butterflies obtained by Mr. Edward M. de Jersey in Nyasaland. By A. G. BUTLER, Ph.D. &c.

THE present collection was sent off from Likoma on May 23rd of the present year, and consists of forty-five species of Butterflies obtained in April and May. The following is a list of the species:—

Nymphalidæ.

1. *Precis simia*, Wallgr.

♂ ♀ ♀, Matope, 13th April.

One normal female and an interesting pair (as large as typical *P. octavia*, but at once distinguishable by the double instead of single black band across the end of the discoidal cell of primaries); the absence of the diffused pink belt on the upper surface and the heavy connected black markings on the basal half of the secondaries below distinguish it at a glance from *P. Trimenii*.

2. *Precis cuama*, Hewits.

♀, Matope, 13th April.

3. *Precis cebrene*, Trimen.

♀ ♀, Likoma, 24th April and May.

4. *Precis clelia*, Cramer.

Likoma and Chisumulu (an island off Likoma), May.

5. *Precis boopis*, Trimen.

♂ ♂, Mpondas, two miles north of Nyasa, 18th April; Likoma, May.

6. *Precis natalica*, Felder.

♂ ♀, between Mandala and Matope, 12th April.

7. *Hamanumida daedalus*, Fabr.

♀ ♀, between Mandala and Matope, 12th April; Likoma, May.

8. *Atella phalantha*, Drury.

♂, Chisumulu, May.

9. *Byblia vulgaris*, Staud.

♂, Matope, 13th April; ♀, Mpondas, 18th April; ♀, Likoma, and ♂♂, Chisumulu, May.

10. *Acræa Buxtoni*, Butl.

♂♂, Kota Kota, 20th April; ♀, Likoma; ♂♂, Chisumulu, May.

11. *Acræa lycia*, Fabr.

♀, Kota Kota, 20th April.

12. *Acræa Doubledayi*, Guérin.

♂, Mpondas, 18th April; ♂♂♀♀, Likoma, May.

13. *Acræa egina*, Cramer.

♂, Chisumulu, May.

I strongly suspect that this is the wet phase and *A. areca* the dry phase of one species.

14. *Acræa acara*, Hewits.

♂♂, Likoma, May:

Lycænidæ.15. *Lachnocnema bibulus*, Fabr.

♂♀, between Mandala and Matope, 12th April; ♂, Mpondas, 18th April, 1899.

16. *Polyommatus bæticus*, Linn.

♂, Kota Kota, 20th April.

17. *Catochrysops asopus*, Hopff.

♂, between Mandala and Matope, 12th April; ♂♀, Likoma, May.

18. *Nacaduba sichela*, Wallgr.

♂, Kota Kota, 20th April.

This species differs from the typical forms of *Nacaduba* in having no tail to the secondaries, a character which is said to be lacking in the African examples of *Talicaða nyseus* (which, according to Staudinger, occurs both in East and West

Africa). Considering the numerous collections which we have received from all parts of East Africa, it seems a little strange that not one example of this species should have been received; it almost makes one inclined to wonder whether the German localities are authentic. If Staudinger's illustration is correct, the species he figures is not only destitute of tails, but differs utterly in the tint of the orange patch on the secondaries; whether African or not, it *must* be a distinct species from the common and well-known Indian type, and I would suggest that it should be called *T. ecaulata*.

19. *Zizera knysna*, Trimen.

♂, Mpondas, 18th April; ♀, Kota Kota, 20th April.

20. *Zizera lucida*, Trimen.

♀, Likoma, ♂ ♀, Chisumulu, May.

21. *Tarucus telicanus*, Lang.

♂, Likoma, May.

22. *Azanus natalensis*, Trimen.

♂, between Mandala and Matope, 12th April.

23. *Plebeius trochilus*, Freyer.

♂, Likoma, May.

According to De Nicéville this is a *Chilades*.

Papilionidæ.

24. *Mylothris agathina*, Cramer.

♀, between Mandala and Matope, 12th April; ♂ ♂, Kota Kota, 20th April.

25. *Terias brigitta*, Cramer.

Var. *zoe*.—♂, Chisumulu, May.

Var. *candace*.—♂ ♂, Kota Kota, 20th April; Likoma, May.

26. *Terias senegalensis*, Boisd.

Typical form.—♀, Kota Kota, 20th April; ♂, Likoma, May.

Var. *bisinuata*.—♂ ♀, Mpondas, 18th April.

27. *Teracolus imperator*, Butler.

Dry form.—♀, Mpondas, 18th April.

The female of this phase is new to the Museum.

28. *Teracolus dissociatus*, Butler.

♂♂, Likoma, May.

We previously only possessed one male of the wet phase of this species.

29. *Teracolus pseudetrida*, Westw.

♂♀, Matope, 13th April; ♀♀, Mpondas, 18th April.

30. *Teracolus xanthus*, Swinh.

♂ (wet phase), Mpondas, 18th April.

31. *Teracolus gavis*, Wallgr.

♀♀ (wet phase), Matope, 13th April; Likoma, May.

32. *Teracolus omphale*, Godart.

♂♂♀♀, Mpondas, 18th April.

33. *Teracolus callidia*, Grose-Smith.

♂♀, Matope, 13th April; ♀, Likoma, 26th April;
♂♂♀♀, Likoma and Chisumulu, May.

Three of the females are of the yellow-tipped type.

34. *Teracolus mutans*, Butler.

♀, Matope, 13th April; ♂, Mpondas, 18th April.

I find that the Nyasa species is undoubtedly distinct from the Natal one, that *T. mutans* is the wet phase, of which *T. rhodesina* is the intermediate, and of which I have recorded the dry phase (as probably intermediate). *T. argillaceus*, the representative of *T. vesta* in South Africa, seems to stand alone in the group as regards the colouring of the under surface in its dry phase. *T. mutans* is, in fact, the East Central representative of the more northerly *T. catachrysops*, from which it differs above in the distinctly broader and larger spots of the discal series on the upper surface of the secondaries and the different character of its intermediate and dry phases on both surfaces.

35. *Catopsilia florella*, Fabr.

♂ ♀ ♀, Kota Kota, 20th April; ♂ ♂, Likoma, May.

All the specimens of this species had evidently been long on the wing and were much worn and shattered.

36. *Belenois severina*, Cramer.

Var. *infida*.— ♀, Matope, 13th April.

37. *Belenois mesentina*, Cramer.

♂ ♂ ♀, Mpondas, 18th April; ♀ ♀, Kota Kota, 20th April; ♂ ♂ ♀ ♀, Likoma and Chisumulu, May.

One pair from Mpondas consisted of mere fragments, but all the others were in tolerably good condition.

38. *Herpænia eriphia*, Godart.

♀ ♀, Likoma, ♂ ♂, Chisumulu, May.

39. *Papilio demodocus*, Esper.

♂ ♂ ♀, Kota Kota, 20th April.

Hesperiidæ.

40. *Tigialdes fesus*, Fabr.

♀, Kota Kota, 20th April.

41. *Pyrgus spio*, Linn.

♂, Likoma, May.

42. *Oxypalpus ruso*, Mab.

♂ ♂, Likoma, May.

43. *Baoris inconspicua*, Bertol.

♂ ♀, Kota Kota, 20th April; ♂ ♂, Chisumulu, May.

44. *Parnara mathias*, Fabr.

♂ ♂, Mpondas, 18th April; Kota Kota, 20th April.

45. *Parnara delecta*, Trimen.

♂, Kota Kota, 20th April.

IX.—*Descriptions of new or doubtful Species of the Genus Ammophila (Kirby) from Algeria.* By F. D. MORICE, F.E.S.

THE notes following should have formed part of an account which Mr. Saunders and myself are now preparing of Hymenoptera taken in Algeria by the Rev. A. E. Eaton in 1893-97 or by me in 1898. They are published now as the larger work cannot be ready for some time, and I have promised Herr Kohl, who is engaged on a monograph of *Ammophila*, to describe as speedily as possible some of my captures in that genus which he considered to be new.

The species to be dealt with comprise three (possibly four) of the group *Psammophila*, one of *Parapsammophila*, and five of *Ammophila* (sensu stricto).

All are from Biskra. Mr. Eaton took several others of this genus, and I a few, elsewhere; but all the latter appear referable to well-known species.

A few preliminary explanations may here be given as briefly as possible:—

(a) In numbering the abdominal segments I have not reckoned the propodeum.

(b) The measurements of petioles &c. have been made according to the methods used by Kohl in his monograph of *Sphæx*, with the help of a camera lucida. By "length of petiole" I mean, as he does, the *apparent* length of that part of the first ventral plate which is completely visible when the object is viewed directly from above, reckoned *from* (i. e. not including) the muscle uniting it with the abdomen to the base of the first dorsal plate.

(c) The term "tarsal pecten" may be here explained. The female anterior metatarsus swells at its apex outwards into a sort of lobe in which are set three spines, one very stout and considerably bent, the others, lying under it, straighter and more slender. Between these three apical spines and the base of the metatarsus runs an even row of (usually) four other spines, which form the "pecten." The metatarsus bears many other more or less spine-like hairs or bristles both externally and internally, but these form no part of the definite series constituting the "pecten," and one soon learns not to confuse them with it.

(d) The following terms may also need some definition, as authors have not always employed them in the same senses. By "pilosity" I mean longish erect hairs, pale or dark, scattered or dense, but never (in clean specimens) matted into a felt-

like mass. By "tomentum," very dense shorter and more decumbent hairs, matted closely together, with a silvery or more rarely a golden glitter, frequently combined with pilosity and lying under it. By "pubescence," a down of still shorter fine and even hairs, never matted, giving a smooth silky or velvety look to the surface which it covers. When the pubescence is quite microscopical and noticeable only by its faint shimmer in certain lights, the surface may be called "pruinose" (frosted). A single row of longish even hairs I call a "fimbria" (fringe).

Group PSAMMOPHILA, Dhb.

1. *Psammophila masinissa*, sp. n.

Nigra, abdomine atrocyaneo, alis violaceis; tegulis mandibulis pedumque armatura (præter unguiculos rufos) nigris, hirsutie nigra. Vertex punctatus, microscopice rugulosus. Pronotum in medio impressum, mesonotum antice sutura mediana longitudinali instructum, ambo punctata et antice saltem subtiliter transversim rugulosa. Scutellum punctatum, elevatum, subtilissime longitudinaliter striolatum, in medio plus minusve depressum. Propodeum concinne undulatim (in medio fere transversim) striatum. Petiolus brevis, apicem versus dilatatus, antennarum articulis 2+3 vel tarsorum posticorum articulo secundo subæqualis, metatarso postico multo brevior.

Long. 16-17 mill.

Biskra (*Eaton*). Three females (29 iii.-3 iv. '97).

Mr. Eaton took also at Biskra (7 ii. '95) what at present I believe to be only an aberrant form of *masinissa* ♀, but with several conspicuous peculiarities. It is very much larger than the type specimens (long. 24 millim.), the thorax more shining and its sculpture more pronounced (*e. g.* the scutellum is clearly and even strongly bituberculate), the blue tint of the abdomen a shade brighter, &c. The neuriation also is curious, the second transverse cubital nervure in both wings being sharply and angularly bent inwards, and the third strongly (but in a curve, not angularly) outwards. This gives a most peculiar appearance to the cubital cells, but one which I suspect to be a result of "neuriation gone wrong" (as so often happens in *Ammophila*) rather than a specific character.

At any rate, I am not prepared to found a separate species on this isolated and probably abnormal specimen.

Possibly it may turn out that *masinissa* = *atro-cyanea*, Eversm., but André describes the (♀) propodeum of that species as *not* striated, which it most evidently is in all the specimens before me.

2. *Psammophila micipsa*, sp. n.

Nigra, abdomine haud cyaneo, alis violaceis: unguiculis rufis, hirsutiae nigra vel fusca. Sculptura praecedenti fere similis, sed punctis minus crassis, propodei striis magis obliquis, petiolo multo longiore, antennarum articulis 2+3+4, vel metatarso postico, subaequali.

Long. 15-17 mill.

Biskra (*Eaton*). Two females (7-24 iii. '97).

In general appearance like the last, but with much longer petiole and perfectly black abdomen.

3. *Psammophila gulussa*, sp. n.

Bicolor, alarum leniter flavescens venis aurantiacis; mandibulis, tegulis, armatura pedum, et abdominis segmentis basalibus 3 vel 4 post petiolum (in ♂ obscure) plus minusve rufescentibus. Pecten tarsalis (♀) pallidus. Mas nigro-hirtus, facie et dorso abdominis antice argenteo-tomentosis; ♀ albo-hirta, facie humeris pleuris coxisque tomento argenteo denso ornatis. Mesonotum dense punctulatum, in ♀ leniter transverse rugulosum. Propodeum oblique subtiliter striatum. Petiolus in utroque sexu metatarso postico vel antennarum articulis 2+3+4+5 distincto longior.

Long. 20-22 mill.

Biskra (*Eaton*). One male (30 iii. '97), one female (31 iii. '97).

The petiole in this species is fully as long as in *tydei*. The male and female were taken in the same spot on two following days, and I feel sure they belong to one another.

Group PARAPSAMMOPHILA, Taschenberg.

4. *Parapsammophila monilicornis*, sp. n.

Nigra, alarum leniter flavescens venis ochraceis, costa subcosta tegulisque in medio brunneis; mandibulis in medio, antennarum, femorum tibiarumque basibus, pedum armatura, abdominisque segmento primo, obscure plus minusve rufescentibus. Caput thoraxque mediocriter pallido-pilosa, facies sub pilis argenteo-pubescentibus. Clypeus ante apicem gibbose prominens, carina mediana longitudinali instructus. Facies quam in *A. armata*, Illiger, angustior, quam in *A. divite*, Brullé, multo latior. Oculi ad clypeum paullulum convergentes. Petiolus metatarso postico subaequalis, reliquum abdomen pro longitudine latum, piriforme. Pronotum collariforme (*i. e.* pæne usque a basi antice perpendiculariter declive). Mesonotum breve, antice fortiter declive. Scutellum et postscutellum alte convexa. Caput et pronotum punctata; meso-

notum oblique, scutellum et postscutellum longitudinaliter, propodeum fere transversim, striato-rugosa. Antennarum articuli 7 apicales infra valde turgido-dilatati, duo ultimi breves, tertius quarto sesqui longior.

Biskra (*Morice*). Six males (v.-vi. '98).

The unusual structure of the antennæ and broad (almost female-like) abdomen make this, at least in the male, a very distinct species. Unfortunately I did not meet with the other sex.

One of my specimens has the antennæ 14-jointed! (see Ent. Month. Mag., Nov. 1899).

Group AMMOPHILA (sensu stricto).

5. *Ammophila pæcilocnemis*, sp. n.

A. Heydeni, Dhb., simillima, sed in utroque sexu tibiis posticis apicem versus fortius incrassatis perque trientem basalem læte rufis, petiolo toto rufo, abdominis segmentis apicalibus conspicue viridi-cyanescentibus, ♂ genitalium stipitum apicibus certe latoribus, ♀ pectine (ut videtur) minus robusto, facile distinguitur.

Biskra (*Eaton*). Seven specimens (♂, 19, 20 iii., 5 iv. '95; 22, 25 iv. '97: ♀, 29 iii., 3 iv., '97).

The coloration of the tibiæ in this species agrees with that in *iberica* as described by André. The latter, however, is treated by von Dalla Torre as a synonym of *Heydeni*, from which *pæcilocnemis* is certainly structurally distinct. Also, according to André, *iberica* has the petiole black, and of the following segments only the fifth above and the sixth entirely are black, whereas in all the specimens before me the petiole is red, and the fourth, fifth, and sixth segments are of a beautiful metallic blue without a vestige of red.

6. *Ammophila rugicollis*, Lep. (= *rubiginosa*, Lep.) ?

A male taken by Mr. Eaton at Biskra (3 v. '97) seems to agree well with Lepelletier's description of *rugicollis*, and a female from the same place (2 v. '93) with that of *rubiginosa*. The two are, I think, certainly the sexes of one species; and M. Robert du Buysson tells me that *rugicollis* and *rubiginosa* are synonyms, though I see that v. Dalla Torre's catalogue keeps them distinct.

I am in some doubt, however, as to the determination of Mr. Eaton's captures, because M. du Buysson has kindly sent me a male from Tamatave of what he considers to be

rugicollis, which is very like the Algerian male in most respects, but, besides differing from it in a much darker coloration and much more flavescens wings, has also the strigosities of the mesonotum distinctly less coarse and closer, and the first dorsal segment of the abdomen only a little longer than the second, while it is quite twice as long in Mr. Eaton's insect. Whether the two are really specifically distinct, I do not venture to say without more material. At present I confine myself to describing Mr. Eaton's specimens.

Caput nonnihil incrassatum, sublæve, sparsim punctulatum. Facies (♀) juxta oculos margine elevato. Thorax valde rugosus vel strigosus (præcipue in ♂), pro- et mesonotum cum mesosterno transversim, scutellum postscutellumque longitudinaliter, propodeum ac pleuræ oblique (fere transversim).

♀. Rufa sunt—caput cum antennarum dimidio basali mandibulisque præter apices nigros: thorax pedesque, nigro parce (hi parcissime) variati; abdominis segmenta duo basalia (superne plus minusve infuscata), etiam tertii basis obscure, omniumque margines apicales. Cetera nigra vel furva, abdominis dorso nonnihil cyanescente.

♂. Pictura minus læta. Caput thoraxque maximam partem nigra; rufescunt tamen—antennarum scapi infra, mandibulæ ut in ♀, pronotum evidenter, obscure quoque latera mesonoti metapleurarumque apices, tegulæ alarum, ac spiracula propodei. Abdomen pedesque fere ut in ♀ sed nigredine magis extensa, tarsis fuscis. Caput thoraxque præcipue in lateribus mediocriter pallido-pilosa. Facies, tempora, humeri, insertiones alarum, metapleurarum apices, coxæque posticæ, plus minusve albo-tomentosa vel saltem pubescentia. Ceterum corpus solita pruina vel pubescentia ornatum (in ♂ ditius). Petiolus metatarso postico multo longior. Clypeus haud emarginatus. Pronotum antice fortiter truncatum. Alæ leniter flavescens fere hyalinæ. Pedum armatura minus robusta, pecten tarsalis ♀ brevior (nisi fallor) quam in *A. Heydeni*.

Long. 23–25 mill.

7. *Ammophila levicollis*, André?

Mr. Eaton has taken one male and one female, and I one male and two females, all at Biskra and all in May, except Mr. Eaton's male (29 iii. '97, "visiting *Antirrhinum ramosissimum*"), which seem to agree pretty closely with André's description except in some very trifling details as to the colour of the abdomen.

I am not quite certain that Mr. Eaton's (March) male, in which the tarsi are nearly all quite red, whereas in all the other specimens they are fuscous, belongs to the same species; but being so early a specimen, it may perhaps be immature. I cannot see that structurally it differs from my own male, though superficially it certainly does so.

The species comes very near *Heydeni*; but, apart from having the posterior femora and tibiæ largely red, the wings are clearer, the strigæ of the mesonotum less strong and tending to become obsolete on the centre of its disk, the labrum—which is usually (perhaps always?) black in *Heydeni*—and fully half the mandibles bright red, the female tarsal pecten pale and thin, and the clypeus not in the least emarginate at the apex centrally. The male genitalia seem to me formed much as in *Heydeni*, certainly not as in *pæcilocnemis* described above. The apex of the abdomen has a decidedly blacker tinge than in the latter species, where it is almost as brightly blue as in *nasuta*.

8. *Ammophila albotomentosa*, sp. n.

Bicolor, capite et thorace nigris, abdomine pedibusque maximam partem pallide rufis. Mandibulæ præter apices nigros, clypei apex, scapus, alarum tegulæ cum venis (basalibus saltem) rufa. Abdomen segmentis duobus basalibus pedumque posteriorum basibus anguste nigro-lineatis, apice in ♂ immaculato, in ♀ superno nigro. Caput (præter areolam nudam extra utrumque ocellum posticum bene definitam) thoraxque totus dense argenteo-tomentosa ita ut vix aut sculptura aut integumentum color appareat. Abdomen cum pedibus plus minusve cano-pruinosis, apice medio-criter pallido-piloso. Tempora albo-fimbriata. Alæ fere hyalinæ. Antennæ tenues. Petiolus segmento dorsali primo circiter quinta parte longior. Clypei apex nonnihil emarginatus.
Long. circ. 20 mill.

The male and female described above have every appearance of belonging to the same species, a very beautiful one, and quite distinct from anything known to me in nature or from descriptions. My specimen was taken at the foot of the "Montagne de sable," Mr. Eaton's "on the sandhill nearest the baths and tramway at Hammam-es-Salahin," *i. e.* practically on the same ground.

The silvery clothing of the body is very thick and conspicuous, much more so than in *Heydeni* &c. It is interrupted in both sexes on the vertex by an exactly similar naked space adjacent on each side to the posterior pair of ocelli, so definite and symmetrical that I think it is probably a constant character. As compared with *Heydeni* the present species seems to be smaller and more slender, with a slightly longer petiole, thinner antennæ, and clearer wings. The prothorax is of the usual shape; otherwise the species somewhat resembles that next following.

Biskia. One male (31 v. '98, *Morice*), one female (26 iv. '97, *Eaton*).

9. *Ammophila producticollis*, sp. n.

Bicolor, capite et thorace nigris; abdomine rufo, basi haud nigro-lineata, segmentis vero 2 vel 3 apicalibus infuscatis. Antennarum articulus 1 (totus) et 2 (partim), mandibulae praeter apices nigros, labrum clypeique margo latus, alarum hyalinarum tegulae cum stigmate et magna parte nervorum pallide aurantiaco-rufa. Pedes rufi, posteriorum basibus superne nonnihil infuscatis. Caput thoraxque densissime splendideque argenteo-pubescencia vel tomentosa; temporum prosterni femorumque anticorum (♀) fimbriae longae et aequabiles.

Pronotum longissimum, evidenter haud latius quam longius.

♂. Pro- et mesonotum antice transversim, scutellum longitudinaliter, propodeum oblique (fere longitudinaliter) strigosum.

Mesonotum antice lineis 3 impressis longis vel suturis divisum.

♀ strigis (quantum video) nullis, sed mesonoto ut in mare lineis impressis diviso atque etiam circa has ita depresso ut pæne trisulcatum vel bicarinatum videatur. Clypeus apice in medio exciso.

Long. 17 mill.

Biskra (*Eaton*). Male, 5 v. '97; female, 16 v. '94.

The two sexes are very similar except in the sculpture of the thorax; this, as stated above, differs widely, and it is not without some hesitation that I put the two together. They were taken, however, in exactly the same locality (near the Fontaine Chaude) and in the same month (May).

The male cannot be *dolichodera*, Kohl, since its pronotum is very strongly strigose; while of *dolichodera* the author expressly says "Kragenwulst ohne Querrunzeln, glatt." Nor can the female be his *longicollis*, which has the same part "wie das Dorsulum mit derben Querriefen besetzt"; while in *producticollis* ♀ both pronotum and dorsulum are apparently quite smooth. It remains as just a possibility that *producticollis* ♂ is the unknown male of *longicollis*, and *producticollis* ♀ the unknown female of *dolichodera*; but on the whole I think this so unlikely that it will be safer to treat the Algerian species as new.

Both this and the last species occur among the glittering sands of the hottest Sahara, and have that peculiar and beautiful silvery clothing which characterizes many of the specially desert insects, and is no doubt "protective."

X.—*Descriptions of new Genera and Species of Coleoptera from South and West Africa, of the Section Serricornia, and of the Families Erotylidæ, Endomychidæ, and Languriidæ.* By H. S. GORHAM, F.Z.S. &c.

THE beetles of which this paper gives an account were principally collected in 1896 by Mr. Guy A. K. Marshall in Natal and near Salisbury, in Mashonaland. One species (*Hedybius amœnus*) had already been described by me in Distant's 'Naturalist in the Transvaal' from that district. The Lycidæ have also been previously described by Mr. Bourgeois. Mr. Marshall sends several very closely allied species; and in general the species of small Coleoptera are very similar from widely separated parts of the African continent, so that I have found it convenient to include in this paper certain species which have been known to me for some time from the western parts, as they really form part of one vast fauna, differing, indeed, in genera from their nearest allies in their respective families, but widely distributed in the African continent, both as regards these genera and even in many instances as to the species.

I have also received from Mr. Marshall a number of Cassidæ and Coccinellidæ from the same countries, which will form the subject of another paper.

Section SERRICORNIA.

Fam. Cleridæ.

Philocalus compressicornis.

Tillus compressicornis, Klug, Abhand. Berl. Akad. 1842, p. 273, t. ii. fig. 3.

Hab. Natal; Mashonaland, Umfuli River, Gadzima (Marshall).

Three specimens. Klug's examples were from Herr Krebs's collecting and probably from Natal, though referred to as "vom Kap." Westwood's *Tillus uniformis* from Gambia may possibly be the male, but it is not (as placed in the Munich Catalogue) a *Macrotelus*, Klug = *Monophylla*, Spin.,—a generic name which only includes the American *M. terminatus*. *Philocali* are very rare in collections; I had not seen this insect before.

Phlaecopus undulatus, sp. n.

Nigro-piceus, robustus, valde pubescens, fortiter punctatus; elytrorum maculis duabus basalibus, una humerali, una lineari scutellari sanguineis; fascia tenui mediana valde dentata, maculaque subapicali suturam haud attingente testaceis.

Long. 14-15 millim.

Mas, antennarum articulo ultimo elongato, falciformi; abdominis segmento quinto emarginato.

Femina, antennarum articulo ultimo dimidio breviori.

Hab. Natal; Mashonaland, Umfuli River, Gadzima (*Marshall*); Zambesi (*coll. Gorham*).

Head clothed with golden-brown pubescence, thickly, coarsely, and rugosely punctured; antennæ of the pitchy-black colour of the whole body, the terminal joint long and falcate, much longer in the male, equalling the preceding eight joints. The thorax is longer than wide, shining, distinctly but sparsely punctate, with a deep but vague central channel; anterior constriction ill-defined. Elytra at the base scarcely wider than the thorax, wider at the apex; the punctuation is cellular and confluent, coarse for half their length, not so coarse and worse defined beyond the fascia; the fascia is rendered irregular by coarse punctuation, it has a double undulation, sometimes it reaches the margin and at others it does not; there are two deep blood-red not conspicuous marks at the base and a yellowish spot at the apex. The scutellum is clothed with golden-yellow pubescence. The femora are coarsely punctured; the tibiæ are also punctured and have carinæ on their sides. The body beneath is shining, sparsely and rather obsoletely punctured; the fifth segment in the male is broadly and angularly emarginate, exposing the membranous base of the sixth, and it has deep strong punctures round the margin, the sixth ventral plate being very smooth and shining.

This insect has been known to me for many years from specimens from Natal. It is apparently allied to *P. flavonotatus*, Bohem., but seems to differ in the colour of the antennæ, which are entirely dark, in the apical spot not being double, by the larger size, &c.

Mr. Marshall has sent three specimens, two being from Gadzima, one of which is a male.

Trichodes tugelanus, sp. n.

Niger, subæruleus, elongatus, subparallelus, pubescens; capite prothoraceque creberrime confluentem punctatis; elytris aurantiacis, fasciis duabus latis apiceque nigris; creberrime rugose

confluentes punctatis, punctis in seriebus vix congestis; antennis brevibus, articulis quatuor basalibus rufis (supra nigro-notatis), clava valida, articulo apicali lato, apice intus acuminato; pedibus nigris, femoribus tibiisque caeruleis, unguibus rufis, simplicibus.

Long. 10–11 millim.

Hab. Natal, Tugela River, Weenen (*Marshall*).

Elongate, parallel; head and thorax dark steel-blue, thickly rugosely punctate, the latter half as long again as wide, the front margin straight, the base rounded; there is no constriction, but the disk is depressed a little behind the front and there is a somewhat carinate bright line down the middle. Elytra scarcely wider than the thorax; they have three orange bands narrowly interrupted at the suture, the first and second united along the margin: the first occupies the base and shoulder, but is rounded off on each side of the scutellum; the second is undulate, concave towards the base; the third orange band is subapical, cut out in front at the suture. The abdomen and body beneath are blue.

The pattern of the elytra of this insect is almost identical with that of the North-American *T. apivorus*. It is really allied to *Clerus lepidus*, Walker, a species described from examples taken by J. K. Lord in "Egypt," and figured by C. Waterhouse in 'Aid to the Identification of Insects,' t. lxxvi., also noticed by him in the index to vol. i. of the same publication, p. 12, and of the variety examples of which, without a central orange band, are in my collection from "Tajura, Straits of Bab-el-Mendeb." Both this insect and *T. tugelanus* are aberrant, if, indeed, they can be referred to *Trichodes*. The cultriform apical joint of the antennæ, though short, almost square, yet acuminate on its inner side, agrees with that genus better than with *Philocalus*. Two *Trichodes* only have yet been recorded from South Africa, viz. *T. aulicus*, Klug, Spin., and *T. Dreyei*, Chev. Rev. et Mag. Zool. 1874, p. 50, unless, as M. Chevrolat seems to think (*cf.* note, p. 16, *l. c.*) *T. aulicus*, Klug, is a different species from *T. aulicus*, Spin. t. xxxi. fig. 4, in which case there are three. These Cape Colony "*Trichodes*" are very scarce; I possess two examples only, which appear to be distinct species, and neither of them agrees with the figure in Spinola, the base of the elytra having only a narrow line of red in one and being wholly dark green in the other, besides other differences. Insects labelled "Cap," *g*, *h*, &c., from old collections, must be received with reserve as to the locality, as any South-African locality was often so designated.

T. zahara, Chev. (*l. c.* pp. 16, 51; Rev. Zool. 1861, p. 152), I have not seen. The Egyptian and North-African species of *Trichodes* are at present ill defined*.

Three examples of *T. tugelanus* were obtained by Mr. Marshall.

DOLICHOPSIS, Gorh.

Dolichopsis, Gorh. Trans. Ent. Soc. 1877, p. 154.

Dolichopsis was proposed by me for two species of very Dasytid appearance, but pertaining to the Necrobiides, from the Cape Colony. Of each species I have since then obtained fresh examples, but without more precise locality.

Dolichopsis auronitens, sp. n.

Subcylindricus, late viridi-auronitens, longius griseo-pubescentis; capite prothoracque subtiliter creberrime punctatis; elytris creberrime et confluentur fortiter punctatis; antennis pedibusque testaceis.

Long. 5-7.5 millim.

Hab. Natal, 6576, 6677, 6718 (*Marshall*).

The larger of three examples before me is rather smaller than the larger examples of *D. haplocnemodes*; the head and thorax are more finely and the elytra more coarsely punctate. It is also more cylindrical. The legs and antennæ are testaceous, the claws and the extreme tip of the latter infusate. The colour varies a little from grass-green with a pale golden reflection to brassy. Being more convex, it is even more like the species of the Melyrid genus *Haplocnemus* than the type. The pile is very long and thick in fresh specimens.

Three examples.

Corynetes analis, Klug.

Corynetes analis, Klug, Mon. Cler., Abhand. Berl. Akad. 1842, p. 348 †.
Corynetes pallicornis, Spin. Mon. ii. p. 95, tab. xliii. fig. 3 [*analis*].

Hab. Natal (*Plant*), Estcourt, Frere (*Marshall*); Caffraria (†*Krebs*).

The identification of this with *Corynetes abdominalis*, Fabr. Syst. Ent. i. p. 286, is an error, that insect being from "India," and also having the whole abdomen pale; and no doubt Fabricius's description refers to some wholly different insect at present unidentified.

The records from Senegal need, I think, confirmation.

* See description of *Philocalus pretiosus*, Gorh. Ann. Mus. Civ. di Genova, xviii. 1883, p. 602 (Abyssinia).

Corynetes concolor, sp. n.

Niger, supra cæruleus; capite prothoraceque crebre distincte punctatis; elytris fortiter punctato-striatis; pubescens; antennis pedibusque nigris; tibiis subcærulescentibus.
Long. 5-7 millim.

Hab. Natal, Estcourt (*Marshall*).

In form and sculpture and as regards size very like *C. analis*, but immediately distinguished from it by the colour of the legs and antennæ.

The punctuation of the head and thorax is less confluent, and hence under a strong glass the surface looks more even. The elytra have the series of punctures somewhat irregular; those near the suture are geminate for half their length from the base, but not distinctly so, and they are similar in *C. analis*. The pubescence is similar to that of *C. analis*.

Four specimens were obtained by "beating" by Mr. Marshall near Estcourt.

Opetiopalpus rubricollis, Klug.

Opetiopalpus rubricollis, Klug, Mon. Cler., Abhand. Berl. Akad. 1837-40, p. 352.

Hab. Natal, 3602-3 (*Marshall*).

Two examples of an *Opetiopalpus* which appears to be the insect indicated by Klug under this name were sent by Mr. Marshall. They are much smaller than the species which I possess as *O. collaris*, being only two millim. in length or a little over. The elytra are blue-black; the legs pale, with darker femora, and the claw-joint dark. They are the smallest examples of an *Opetiopalpus* I have seen.

Fam. Melyridæ.

Charopus cyanopterus, sp. n.

Nigro-subænescens, antennarum basi, femorum apice tibiisque testaceis; elytris cyaneis, crebre leviter punctatis, parum nitidis.
Long. vix 3 millim.

Hab. Natal, Frere (*Marshall*).

Head black, with an æneous reflection, as wide as the thorax, a little shining, smooth; antennæ almost simple, the three basal joints yellow, the basal joint just touched with dark above, the fourth and fifth dark, but pale at their bases and tips. Palpi black. Thorax subquadrate, rounded at the sides and base, scarcely any hind angles; the surface finely

aciculate, with an aeneous tint. Elytra steel-blue, greenish at their bases in one example, very finely coriaceous, and with very short, scarcely visible pubescence. The legs are black; the tips of the femora and the tibiæ are yellow, in one example the hind tibiæ are fuscous. The hind body projects beyond the elytra in both examples.

Two specimens of this insect, which is rather like the European *C. pallipes*, but larger and more brightly coloured, were obtained. Sexual difference not apparent.

DINOMETOPUS, gen. nov.

Corpus oblongum, subparallelum. Elytra abdomen haud tegentia.

Caput (maris?) fronte eroso-excavata; erosionis marginibus elevatioribus, antice laminato-reflexo, lamina sulcata. Antennæ vix serratæ, fere simplices. Palpi maxillares apice subuliformi. Pedes longi; tarsi tibiæ fere longitudine, distincte quinque-articulati, antici (maris?) articulis longis subæqualibus haud multo obliquis.

I propose this name for a singular Melyrid having at first sight very much the appearance and size of *Anthocomus fasciatus*, but of which the head is excavated somewhat in the manner of some *Hedybi*. The genus *Cephaloncus*, Westwood, from the Canary Islands, is another example of this curious structure of heads in this subfamily, but has, according to Westwood, the excavation situate on the *back* of the head and different in form. *Troglops* has the crown of the head hollowed out, but has 4-jointed front tarsi in the male.

Kiesenwetter has described as a *Malachius* a very similarly constructed insect from Japan, *M. foveifrons*, K.; but it is necessary in classifying this subfamily to describe the sexual differences in the tarsi, in the antennæ, and form of the elytra where they exist.

Of the remarkable insect I describe here from Natal there are three specimens only, presumably males (as the heads are usually simple or only impressed in the females of Melyrids); the thorax is produced in a lobe-like form towards the base and is much depressed before the base. The elytra are not much expanded, nor are they convex nor in any way contorted at their apices as in many *Malachii* or *Anthocomi*.

Dinometopus natalensis, sp. n.

Niger, capite flavo, elytrorum margine laterali antice, fascia lata ad suturam interrupta, apiceque tenui flavis; tibiæ apicibus et

tarsis plus minusve flavescens; antennis basi flavis, articulis nigro-maculatis.

Long. 4 millim. ♂.

Mas? capitis occipite profunde excavato-eroso, erosionis margine antico laminato-reflexo, lamina sulcata, intus sub lamina nigro-maculata.

Hab. Natal, Estcourt (*Marshall*).

Head yellow, scarcely wider than the thorax across the eyes; the antennæ are about as long as would reach to the extremity of the elytra, black, but pale at the base, yet only the basal and second joints are clearly so, and they are both spotted with black above; they are scarcely serrate. The thorax is longer than wide, the front angles much depressed, the front margin broadly receiving the base of the head, narrowed towards the base very suddenly; its disk much depressed before the base, the margin only a little reflexed; punctuation not visible. The elytra are somewhat parallel, being very little wider at the apex than the base, finely coriaceous, black, faintly brassy; the lateral margin as far as a very broad fascia, only extending half across the elytra, and the extreme apical margin are yellow. The legs are nearly black, only the tips of the femora and the tarsi are sometimes obscurely yellow. The abdomen shows two or three segments beyond the elytra. The pubescence is very sparse and not easily seen without a strong lens.

Three examples, apparently all males.

Attalus? ornatipennis, sp. n.

Læte flavus, sat latus; capite nigro, fronte anguste flava, lævi; prothorace suborbiculare, glabro, aurantiaco; elytris flavis, basi et annulo postice aperto nigris, breviter pubescentibus, crebre haud profunde punctatis; metasterno nigro.

Long. 3.5 millim. ♂ ♀.

Mas, tarsorum anticorum articulo secundo superne producto, tertium et quartum obtegente.

Hab. Mashonaland, Salisbury (*Marshall*).

Head black, smooth, shining, with the mouth and front bright orange-red. The antennæ are yellow, feebly, scarcely serrate; the thorax is as wide as the head and rather broad, glabrous, and deep orange, almost blood-red, its basal margin broadly reflexed, without any hind angles, slightly impressed near the middle of the base. Elytra a little broader than the thorax and a good deal widened behind, thickly clothed with grey short pubescence; in the male the black ring is open behind like a horse's shoe, distinctly, closely, finely punctured.

The legs and antennæ are deep yellow, and the apex, the suture, and the margins of the elytra have a tendency to this red colour, which is no doubt more conspicuous in the living insect. The tip of the prolonged second tarsal joint in the male is blackish, as in several other species; the claws are curved, with short pads, that give them the effect of being thickened at their bases when closed.

Two males and one female only occurred in December 1894, and a male and a female in January 1895, in sweeping to Mr. Guy Marshall.

Anthocomus apricus, sp. n.

Niger, tenuiter pubescens, antennarum articulis secundo ad quintum, elytrorum lateribus in medio et apice tibiisque flavis; tarsis fuscis, ad basin dilutioribus; antennis serratis.

Long. 4 millim. ♀.

Hab. Natal, Estcourt (*Marshall*).

Head black, shining, the membranous base of the labrum alone yellow, narrower than the thorax; the antennæ are a little longer than the head and thorax, yellow as far as the fifth or sixth joint, but the basal joint marked with black above, the fourth to the tenth joints acutely serrate. The thorax is half as wide again as long, of the usual form, truncate in front, the sides and base rounded, without angles, entirely black and shining. Elytra very closely and very obsoletely punctured, rather shining, clothed with upright black hairs, especially on the apical half, black, with the margin in the middle and the apex broadly orange-yellow, the yellow returning a little up the suture. The body beneath and the femora black; the tibiæ and bases of the tarsi yellow.

The examples, three in number, appear to be all females; at least there is no sexual character in either the antennæ or tarsi. The claws appear to have membranous short pads.

PAGURODACTYLUS, gen. nov.

Corpus subparallelum, pubescens. Antennæ leviter serratæ. Tarsi quinque-articulati, unguiculi anteriores inæquales, anteriore multo longiori.

This new genus of Malachiidæ is sufficiently characterized by the unequal anterior claws, a structure not known in any other genus of the subfamily. The tarsi are rather long, especially the hind pair; the front pair have the joints all oblique and produced at the apex beneath, the third and

fourth joints very short, the two basal joints longer, but short, and the claw-joint longer than the two basal ones taken together; the claws are thin, the anterior one of the front pair (*i. e.* the inner one, as set on a card) twice as long as the other. From the four specimens before me I cannot state if this is a sexual difference, probably it is not. The antennæ are simply formed, with joints two or three times as long as wide (excepting of course the second) and feebly serrate from the second to the tenth. In other respects the insect is allied to *Attalus* and *Anthocomus*.

Pagurodactylus vitticeps, sp. n.

Niger, pube crecta tenuiter vestitus, punctatus; antennarum basi pedibusque pallidis, his femoribus anticis et intermediis externe posticis totis, illis articulo basali nigrescentibus; capitis fronte et occipite interdum conjuncte ferrugineo-maculatis.
Long. $2\frac{1}{2}$ –3 millim.

Hab. Natal, Estcourt (*Marshall*).

The head with the rather prominent eyes is a little wider than the thorax; it is thickly and strongly punctured, with the mouth and front, and a spot on the crown, rusty red; these marks are often joined, forming a vitta. The thorax is small, narrower than the elytra at the base, flattish and impressed near the hind angles; shining, but with erect hairs and thickly punctured, the base and sides margined, but only the former conspicuously so. The elytra deeply subrugosely punctured, with long fine erect hairs, widening a little, but not much, towards their apex. The antennæ are as long as the elytra, their first and second joints touched with black above, the third quite pale, the fourth partly so; the fourth to the tenth joints are gently serrate, becoming gradually longer; the apical joint is a little longer than those preceding it, narrow and acuminate. The palpi are blackish at the tip. The legs are pale, with the exception that the upper edges of the middle and front femora, or sometimes the whole, and the whole of the hind femora and the hind tibiæ are dark, nearly black.

Four examples in which I can detect no sexual difference.

Apalochrus nitens, sp. n.

Læte viridis, elytris vel viridibus vel cæruleis; antennarum basi pedibusque flavis, his tarsis nigris.

Long. 6 millim. ♂ ♀.

Mas, tarsis anticis articulo secundo apice superne elongato; tibiis intermediis incrassatis, intus erosis.

Hab. Mashonaland, Salisbury (*Marshall*).

This species is evidently very much like *A. azureus*, Erichs., but appears to have darker antennæ, and the tarsi are dark, excepting the first joint and the basal part of the second joint of the anterior tarsi in the male. In the female the same joint is wholly dark.

Hedybius amœnus.

Hedybius amœnus, Gorham, in Distant's Naturalist in the Transvaal, p. 197, tab. i. fig. 2, ♀.

Mas, capite antice excavato-eroso, erosione ima et basi nigra; pone oculos elevato, quasi cornuto; antennis longioribus, articulis tertio et quarto compressis, intus modice expansis, subtus nigro-maculatis, superne linea tenuissima aurea, quinto ad apicalem superne nigro-maculatis; prothorace transverso, plaga magna et punctis duobus basalibus nigris.

Hab. Natal, Estcourt (*Marshall*).

The specimens from which this insect was described were two females. I have now the advantage of having several examples of both sexes before me, and I think there are three closely allied species all from Estcourt. The very extraordinary structure of the head is not precisely alike in these, and I associate the male described above with *H. amœnus* from the spotted antennæ, and from the form and amount of the black markings upon the head and the thorax, and from the hind tarsi being blackish in both sexes.

The front of the head is yellow, slightly more prominent in the male than in the female, the excavated erosion is pubescent at the back, and a spur of golden hairs, with a ridge of hairs connecting it with the sides, is to be seen at the bottom; on each side but in front of the eye a few yellow setæ are found; the elevated portion which forms the back of the eye and supports it is yellow and is not separated from the black temples by a deep sulcus as it is in *H. Marshalli*; moreover, the black mark, and indeed the whole disk, is shining and not opaque. These considerations lead me to believe we have here three closely allied but distinct species, and that we cannot assign either of them to *A. erosus*, Erichs., to which, however, they are obviously also allied.

Another male differs somewhat, in the coloration of the antennæ: the third to the sixth joints have each a black line above, the seventh has only an interrupted line, the apical joints being yellow, and the thorax lacks the two basal dots; too much reliance therefore must not be placed on the black markings.

Hedybius anceps, sp. n.

Læte flavus, capitis dimidio basali nigro; prothorace subquadrato vel toto flavo, vel punctis duobus parvis nigris; antennis pedibusque flavis, tarsis posticis infuscatis; elytris viridi-ceruleis, creberrime leviter punctatis.

Long. 6-6.5 millim. ♂ ♀.

Mas, capite antice excavato-eroso, erosione ima tota nigra, supra oculos alte elevato, quasi cornuto; antennis longis, vix serratis.

Femina, antennis multo brevioribus, leviter serratis.

Hab. Natal, Estcourt (*Marshall*).

This insect is so very closely allied to *H. amœnus*, that I think it only necessary to call attention to the observed differences, which are that the thorax is not transverse, in some males there is a slight denticulation in the margin, in others it is quite simple; the antennæ are longer in the male and unspotted, but with the extreme apex black; the elevated ridge borders the whole inner side of the eye, passing into the frontal elevation.

Obs.—It is perhaps not correct to say that the second joint of the front tarsi in the male overlaps the third, but it is certainly distorted and raised above the very short third joint, and is black at its tip.

The *Hedybii* which I have seen from the Cape of Good Hope, which at all resemble the above, have the heads quite differently formed in the males, and have smooth and shining elytra, wrinkled and substriate.

Hedybius Marshalli, sp. n.

Læte flavus, capitis basi, prothoracisque disco opaco maris, nigris, nigredine marginem anticam haud attingente, feminae macula irregulari subdivisa et metasterno nigris; antennis, palpis, pedibusque totis flavis.

Long., ♂ 6.5, ♀ 6 millim.

Mas, capite antice excavato-eroso, erosione ima nigro-notata; pone oculos elevato, quasi cornuto, nigro opaco; antennis longioribus.

Femina, occipite plano, depressiusculo; prothoracis disco nigro maculato.

Hab. Natal, Estcourt (*Marshall*).

Very closely allied to *H. amœnus*, to be distinguished from it by the wholly yellow antennæ and legs, and by the head having less black at its base in either sex, but especially by the elevated canthus of the eye, which rises like a short horn, being separated from the temples by a deep groove, yellow at the bottom; so that the eye and its horn are quite separated

from the black templar portion. The disk of the thorax is smooth but dull, it is yellow, but in the male a large patch, rather narrower in front than at the base, occupies the greater part and covers the base for nearly its whole width. The thorax is a little less wide than the head in the male, and in that sex the edge is notched below the middle. The scutellum is black; the elytra are blue or with a green metallic tint as in *H. amœnus* and very closely and finely punctured.

All these three *Hedybii* were found either on the *Acacia horrida* or by sweeping on grass, and no doubt on flowers and herbage generally.

PHILHEDONUS, gen. nov.

Corpus oblongum, postice modice expansum. Antennæ breves, in utroque sexu leviter serratæ. Tarsi longi, maris 4-articulati. Caput (maris) carinâ transversâ bidentatâ. Prothorax (maris) antice dentato-productus. Reliquæ plerumque ut in *Hedybio*, Erichson.

Philhedonus coronatus, sp. n.

Niger, ore, antennarum basi, thoraceque rufis, hoc punctis duobus interdum confluentibus nigris; elytris cæruleis, creberrime minute punctatis, pube brevi tenuiter erecta vestitis.

Long. 5·5-6 millim.

Mas, capite carina transversa, bidentata, postice instructa; prothoracis margine antico dentato-producto; tarsis 4-articulatis.

Hab. Mashonaland, Salisbury (*Marshall*).

The head is black, the labrum blood-red, and the palpi are blackish. The antennæ are rather shorter than they usually are in female *Hedybii*; their third to the tenth joints are subequal, and not or scarcely longer than wide, there is no apparent difference in those of the male; the first four joints are yellow, but in the male and sometimes in the female the third and fourth are infuscate internally. The head in the male has at its base a ridge which is bituberculate on each side, the outer tubercule being the larger, and both are yellow at their summits; the thorax in this sex has the middle of the front margin acutely produced and turned upwards, with a tuft of black hairs at its tip. The disk of the thorax is very smooth and shining, blood-red, with either two nearly confluent black dots or with a single larger spot nearly reaching the front margin; its front margin in the female is truncate, faintly bisinuate, the sides and base together round and finely margined. The scutellum is transverse, black, and

punctured. The elytra are ample, widened behind, deep blue or bluish green, obsolete sulcate at the base; near the suture closely and finely punctured. The abdomen is black, like the body, but the membranes joining the segments are almost scarlet, so that when distended they appear margined with red. Also the vesicles which these insects can project when alarmed, in common with the *Malachii* and *Hedybi*, are red. The legs are entirely black, the tarsi four-fifths of the length of the tibiae.

Obs.—This very distinct genus is the only one yet described of the larger *Malachiides* with four-jointed tarsi in the male—a character found in the small European *Troglops* and *Colotes*. I have no doubt the anterior production of the thorax in the male is a stridulating apparatus.

One male and three females were obtained by Mr. Marshall.

Fam. Lycidæ.

Lycus Distanti, Bourgeois.

Lycus Distanti, Bourgeois, in Distant's Naturalist in the Transvaal, p. 196, t. i. fig. 3, ♂.

♀. Minus, attamen modice expansus, mari similiter coloratus, sed subtus saturatiori; abdomine, lateribus et segmentis duobus apicalibus exceptis, nigro, margine humerali multo minus elevato-reflexo.

Long. 12 millim.

Hab. Natal, Malvern. ♂ ♀.

This species, described by M. J. Bourgeois, appears to differ from *L. elevatus*, Guérin-Mén., Bohem. Ins. Caffr. i. fasc. 2, p. 428, by lacking the lateral black mark, as well as by the shorter rostrum and some differences in form. The male of our insect has the abdomen wholly yellow. The female was not met with by Mr. Distant, and is now described for the first time. The single male sent by Mr. Marshall has the black apical portion of the elytra less contracted than in the single example taken by Mr. Distant at Pretoria, but which struck me when I saw it as a good deal shrivelled, not altogether in a normal condition. I have not seen *L. elevatus*.

Lycus terminatus, Dalm. (*Acantholycus*, Bourg.)

Hab. Mashonaland, Salisbury. ♂ ♀.

Several examples.

Lycus sinuatus, Dalm. (*Haplolycus*, B.)

Hab. Natal, Tugela River.

Lycus, sp.

Hab. Natal, Karkloof.

Lycus haagi, Bourg. (*Lopholycus*, B.)

Lycus haagi, Bourg. Ann. Soc. Ent. Fr. 1878, p. 166.

Hab. Natal, Tugela River, Weenen (*Marshall*); Transvaal, Barberton.

Fam. Lampyridæ.

Lampyris nigripennis, Bohem.

Hab. Natal, Tugela River.

Lampyris tinctoria, sp. n.

Ochracea, capite, antennis, elytrorum basi, geniculis, tibiis, tarsisque nigro-fumosis.

Long. 14 millim. ♂.

Hab. Mashonaland, Gadzima, Umfuli River (*Marshall*).

Parallel, the thorax as wide as the elytra at the base, as long as or a little longer than wide, delicately carinate, rather strongly so near the base, the disk rather strongly "honey-comb" punctured in front, the sides and basal half obsolete so; scutellum elongate ochraceous; the elytra are opaque, with a smoky patch on their bases, not reaching the outer margin, and shading off indefinitely on the apical side; wings smoky. The body beneath is ochraceous; the femora outwardly and at the knees, the tibiæ and tarsi entirely smoky black.

The antennæ are black, but inclined to be fuscous at their base; the mouth and palpi are ochraceous, fuscous in parts.

Three examples.

Lampyris imbecilla, sp. n.

Pallide fusco-testacea, antennis, pedibus, prothoracisque disco indeterminate subfuscis; elytris nitidis, distincte tricostatis, quam abdomen quadrante brevioribus, debilibus, fuscis.

Long. 13-14 millim. ♂.

Hab. Natal, Estcourt (*Marshall*).

Narrow, obscurely coloured. Thorax as long as wide, the

hind angles right, the whole surface obsolete, but rugosely, punctured, the disk shining, channelled in the middle only, scarcely carinate, but with a smooth line in front, of a dirty bone-yellow, but the basal portion within the rather straight sulci ochraceous, the central channel is wide, but short. The elytra are shorter by a fourth part than the abdomen, they are attenuated and shrivelled (which is probably their normal condition from their being very thin); the body beneath is bone-colour, the margins of each segment are paler.

This insect is about the size of, and somewhat like, the European *L. Lareyniei*. The shortening of the elytra is a character shared with *L. Huddi*, Gorb., but not to the same degree.

Lampyris natalensis.

Lampyris natalensis, Bohem. Ins. Caffr. p. 442.

Hab. Mashonaland, Salisbury (*Marshall*, at light); Lake Nyasa (*coll. Gorham*).

To this I refer three specimens from Salisbury which have the disk of the thorax with a nearly square black spot placed posteriorly, but not touching the base, and the elytra fuscous with the suture and margins pale.

Lampyris troglodytes.

Lampyris troglodytes, Bohem. Ins. Caffr. p. 444.

Hab. Natal, Tugela River (*Marshall*).

Four examples.

Fam. Telephoridae.

Telephorus (Cantharis) circumdata.

Telephorus (Cantharis) circumdata, Bohem. Ins. Caffr. p. 456.

Hab. Natal, Estcourt (*Marshall*).

Ichthyurus, sp.?

Malthinus australis, Péringuey.

Hab. Natal, 4944 (*Marshall*).

A single female labelled with M. Péringuey's name belongs to this genus, but cannot be identified by that sex alone.

PROSTHAPTUS, gen. nov.

Corpus parvum, quasi *Malthodis*. Antennae 11-articulatae, maris tertio incrassato, quam secundus duplo longiore, quarto ad septimum parum elongatis, subaequalibus, octavo quam septimus sesqui longiore, tribus ultimis debilibus, quam praecedentes multo

minoribus. Prothoracis margo lateralis in medio dentato-plicatus
Femora compressa, intermedia et postica curvata. Elytra
abbreviata.

This name is proposed for a singular Telephorid resembling a very small *Malthodes*, but with the antennæ of the male remarkable for the three small apical joints, which spring rather from one side of the oblique termination of the large eighth joint: the three basal joints are somewhat distorted, the third being a little swollen and with a minute linear impression on its inner side. The femora are a little widened and compressed, the intermediate and hinder pairs being bent. The antennæ of the female are quite simple.

Prosthaptus claudus, sp. n.

Parvus; *Malthodis minimi*, L., statura, fuscus; coxis, femorum basi, tibiisque dilutioribus, subtastaceis; antennis (maris) flavis, apice nigris, (feminae) basi tantum testaceis.

Long. 3 millim. ♂ ♀.

Mas, antennis parum distortis, articulo tertio incrassato, extus fusco-tincto, octavo præcedente sesqui longiore, tribus ultimis parvis.

Femina, antennis simplicibus.

Hab. Mashonaland, Salisbury (*Marshall*).

The head is black and shining, with the antennal sockets and the epistome and mouth yellow; the antennæ are about as long as the head, thorax, and elytra taken together, yellow in the male, with only the outside of the third joint, the tip of the eighth, and the three small apical joints blackish, in the female they are fuscous with the base indeterminate yellow. The thorax is small and transverse, as wide as the head, smooth, the lateral margin with a tooth-like projection (somewhat as in *Plectonotum*, a Central and South American genus), and the hind angle rather prominent. The elytra are as in *Malthodes*, about half as long as the body, rather opaque, fuscous; the wings are amply developed, covering the hind-body, and are fuscous. The legs are of normal length; the femora appear to be very much compressed, and the middle and hind pair to be curved and distorted.

Many genera of Telephoridae with the antennæ very singularly distorted or abnormally formed have now been described, but nothing like the present genus is known to me from the African continent. It appears to connect certain forms which I have placed near *Silis* with *Malthodes*; it is a small, obscurely coloured insect, but of interesting structure.

Two males and one female were obtained by sweeping.

Section PSEUDOTETRAMERA.

Fam. Erotylidæ.

Subfam. LANGURIIDES.

PROMECOLANGURIA, Fowler.

Promecolanguria Marshalli, sp. n.

Elongata, parallela, subdepressa, nigra, submitida; capite elytrisq̄ue cyanescens, illo crebre ac distincte punctato, his profunde crebre punctato-striatis; prothorace oblongo, postice vix angustato, latitudine fere duplo longiori, subtilius concinne punctato, medio vage canaliculato rufo, antice indistincte nigro-maculato; antennis articulis sex basalibus pedibusq̄ue ferrugineis, femoribus et genibus plus minusve infuscatis; lineis abdominalibus nullis.

Long. 7 millim.

Hab. Natal, 2008, 3947 (*Marshall*).

Promecolanguria was proposed as a genus by Fowler for *Languria dimidiata* (Guérin, Icon. R. A., Ins. p. 314), and is also given in my table of genera (P. Z. S. 1887, p. 361).

There are no abdominal lines; the eyes are not very coarse, the facets being only just visible, but the depressed form and the oblong and parallel-sided thorax, with finely neatly margined sides, the prosternal process rather long, truncate, and margined with a thickened edge, give these insects a very distinct appearance among the Languriides. I suspect that *Languria lyctoides*, Fowler (Comptes rendus Soc. Ent. Belg.), belongs to the genus.

The species obtained by Mr. Marshall is very like an insect I have received from the Cape Colony, but has the thorax quite differently shaped from the Langurias I have seen from that Colony. The underside is not so coarsely punctured as that of *L. dimidiata*; the abdomen is quite finely punctured. Two specimens.

Promecolanguria trogositoides, sp. n.

Sordide flava, capite prothoraceq̄ue, antennis pedibusq̄ue piccis; illo basi, his basi tarsisque flavis.

Long. vix 6 millim.

Hab. Natal, 3748, 3509 (*Marshall*).

This insect is similar in form to *P. Marshalli*, but is smaller, the thorax is a little more contracted towards the base and shows only a very faint trace of canaliculation towards its base; the puncturing is fine and like that of *P. Marshalli*. The head is either black with a metallic

tinge, or pitchy, finely and thickly punctured; the antennæ with four or five joints at the base pitchy red, gradually passing into the black club, insensibly thickened from the seventh joint, but the club is clearly three-jointed. The thorax is pitchy, becoming yellow in the basal half, with a slight metallic tint. The elytra are punctate-striate (as in *P. Marshalli*); there are eight striæ, apart from the marginal one, which is on the reflexed edge; their apex is simple, the sutural angle is a right angle, and there is no mucro.

Subfam. *DACNIDES*.

AMBLYSCELIS, Gorham.

Amblyscelis nigrinus, sp. n.

Breviter oblongus, subcordatus, nitidus, niger, crebre fortius punctatus; elytris punctato-striatis, interstitiis punctulatis; antennis pedibusque ferrugineis, femoribus piccis.

Long. 4 millim.

Hab. Natal, 7252, 7253, 219, 220 (*Marshall*).

Black, shining; legs and antennæ and palpi yellow, the femora pitchy or nearly black; tibiæ very strongly dilated in their apical half. Head and thorax closely and strongly punctured, the punctures not confluent. Antennæ of the form and length usual in the genus, rather slender, their length about equal to the width of the head, the two basal joints nodiform, the third elongate, the club composed of three strongly transverse joints. The thorax very little narrowed in front, with deflexed front angles, the hind angles almost right angles, the disk convex, the sides very finely margined; the base and apical margin not margined. Elytra narrowed to the apex, presenting almost a uniform outline with the thorax, finely striate, with close but small punctures, the striæ and punctures continued to the apex; the interstices even, with small, rather sparse punctures. Underside thickly, not deeply nor coarsely, punctured; prosternal process very wide at the truncate apex and margined; coxal lines on the ventral basal segment, which appear raised.

This species has quite the appearance of a *Triplax*. As Crotch remarks, the African species which have been referred to that genus are not typical.

Amblyscelis Conradi, sp. n.

A. nigrini statura et summa similitudine, niger, nitidus, crebre fortius punctatus; elytris profundius punctato-striatis, interstitiis

fortius punctulatis; labro, antennis, palpis, pedibusque luteis, illis articulis quinque ultimis nigro-piceis, clava laxo articulata.

Long. 4 millim.

Hab. W. Africa, N. Cameroon, Johann Albrechtshöhe (*L. Conradt*).

Of the same size and extremely like *A. nigrinus*, but rather broader, more like a *Tritoma*, the antennæ are longer, their third joint is almost as long as the two basal ones taken together; the fourth, fifth, and sixth are elongate, the seventh and eighth bead-form; the three apical joints form a lax club, the first two are strongly transverse, the apical one round and yellowish at the tip. The body beneath is pitchy, but nearly black, strongly and deeply punctured. The legs with their coxæ are entirely luteous yellow.

Sent to me by Dr. Kraatz for description.

Amblyscelis brunneus, sp. n.

Oblongus, subparallelus, totus brunneus, parum nitidus; capite prothoraceoque creberrime, distincte haud profunde punctatis; elytris striato-punctatis, subrenulatis, interstitiis haud punctatis, subopacis.

Long. 4.5 millim.

Hab. Natal, Estcourt, Frere (*Marshall*).

This insect is very like the species described by me as *A. pallidus* ('Notes from Leyden Museum,' 1888, p. 146) from the Congo, but on comparing them closely it is rather larger than the single exponent of that species in my possession, and the interstices of the elytra are not finely punctulate as they are in it. It is of a parallel, dull, rusty-brown colour. The antennæ are short, with the club almost capitulate, composed of three strongly transverse joints. The thorax is convex, with its basal margin somewhat deflexed, except in the middle, so that the lobe appears rather elevated in front of the scutellum. The sides are a little more rounded than in *A. pallidus* and the front angles depressed. The elytra have eight finely punctured striæ, the punctures of which are so close that they almost join each other; the striæ coalesce in pairs near the apex. The tibiæ are strongly dilated in the apical half, the dilated part compressed. This insect is like a unicolorous *T. vittipennis* (Görh. P. Z. S. 1889, p. 614), but is smaller, and the dilatation of the tibiæ and the structure of the antennæ, especially that of the club, are quite different. I have taken an African insect for the type of *Amblyscelis*, otherwise I should have regarded this species and *A. nigrinus* as belonging to my genus *Petaloscelis*.

The African Triplacid genera will no doubt require revision when they are better known ; at present the species described as "*Triplax*" are a medley.

Mr. Marshall's examples of *A. brunneus* were taken at light.

Amblyscelis hæmorrhous.

Amblyopus hæmorrhous, Gorham, Ann. Soc. Ent. Belg. vi. 1885, p. 326.

Sanguineo-rufus ; elytris nigo-fuscis, puncto humerali apiceque indeterminate rufis ; crebre punctatus ; elytris punctato-striatis, opacis, interstitiis crebre perminute punctulatis.

Long. 5 millim.

Hab. Natal, Estcourt (*Marshall*).

There is something remarkable in the fact that I have described an insect from India which I cannot separate from this insect, and in writing that description I say : "had this species been an African insect I should have referred it to my genus *Amblyscelis*, for the tibiæ are angularly widened." Mr. Marshall now sends three recent examples, of the origin of which there can be no doubt, and except that they are less shining than my Indian type, I can detect no difference.

PYCNOGEUSTERIA, gen. nov.

Corpus oblongum, nitidum, punctatum, haud pubescens. Oculi concinne leviter reticulati. Antennæ articulo tertio duobus basalibus superante, quarto ad octavum haud transversis, tribus ultimis clavam oblongam formantibus, decimo cum apicali connato. Palpi maxillares articulo apicali triangulari valde dilatato, labiales articulo ultimo oblongo parum dilatato. Pronotum fere ut in *Amblyopo*, tenuissime marginatum, prosterni processu lato æquali opaco, antice haud elevato vel compresso. Metasternum leve. Abdomen æquale, leviter parce punctatum, lineis nullis. Pedes compressi ; femoribus sat latis ; tibiis valde angulariter ad apicem dilatatis.

The type of this new genus is a black insect with the antennæ, trophi, and body beneath, with the exception of the head, prosternum, mesosternum, and mesothoracic epistoma, bright luteous yellow ; the parts are so distinctly separated in colour as to render it an easy object of study ; the mesothorax may be picceous, but the yellow mesothoracic epimera are peculiar. It will be observed that *Pycnogeusteria* approaches both *Amblyopus* and *Amblyscelis* ; from the former the almost entire absence of raised lines on the abdomen (they are distinct in *A. vittatus*, running across the segment) and the

plain prosternum, as well as the much more dilated tibiae, from the latter the quite finely faceted eyes and superior size, amply separate it, not to mention minor differences such as the antennal and palpal structure.

Pycnogeusteria Kraatzi, sp. n.

Oblonga, subparallela, aterrima, nitida, crebre fortiter punctata; elytris seriatim punctatis, striis parum impressis, interstitiis crebre minute punctulatis; labro, antennis (apice fusco), palpis, prothoracis, epimeris, metasterno pedibusque late luteis; corpore subtus leviter crebre punctato.

Long. 9 millim.

Hab. W. Africa, N. Cameroon, Johann Albrechtshöhe (L. Conradt).

Head black, strongly, at the base almost coarsely, punctate; the epistoma very distinctly separated from the labrum, produced and deflexed, the latter bright pale yellow; the mouth and trophi yellow, except the mandibles, which are only pitchy externally. Thorax black at the base, twice as wide as long, narrowed in front, with the front angles a little depressed, finely margined except in the middle of the front and base, thickly punctured, but less so than the head, and not so strongly, there being room for other punctures. The base of the elytra is of the width and forms an even outline with the thorax. The elytra are entirely black, very finely seriate punctate, the small punctures in the series being close but not impressed in striae, the interstices being also thickly minutely punctate; they are continued evenly to the end, but coalesce before reaching the apex. The body beneath is sparsely and finely punctured; the mesosternum is black (or pitchy in less matured specimens); the metasternum with its side pieces, the meso-episterna, and abdomen and legs are all entirely clear luteous yellow.

I have pleasure in dedicating this insect to Dr. Kraatz, the veteran writer on European Coleoptera, who sent it me with other Erotylidæ.

N.B.—This insect very closely resembles a new *Zythonia*, which I propose to describe as *Z. anthracina*, and which appears to inhabit the same district, as well as the Congo, from whence my examples came.

LOPHOCROTAPHUS, gen. nov.

Forma oblonga plerumque *Mycotreti* vel *Amblyopi*, sed caput maris depressum, ad templa ampliatum in carinam elevatum. Oculi per carinam subdivisi, haud magni, tenuiter reticulati. Mentum

triangulare. Antennæ (maris) longi, caput prothoracemquo superantes: articulis longioribus quam lati, tertio elongato, tribus ultimis clavam laxam formantibus; feminae dimidio fere breviores. Palpi maxillares articulo ultimo transverso, valido. Pronotum (praesertim maris) valde transversum, plus quam duplo latum quam longum. Lineæ metasternales et abdominales distinctæ. Tibiæ lineares; tarsi breves. Corpus castaneum, punctatum, haud pubescens. Maris clypei carina altitudine variat.

Hab. West Africa, Gold Coast, Guinea, and Cameroon Mountains.

This extraordinary Erotylid has been long known to me from a male and female I obtained from Mr. G. Waterhouse's collection, where it stood as *Amblyopus testaceus*, Lac., with which, however, it has nothing to do. While the female presents no peculiarities beyond those of some ordinary yellow Triplacid, the male conveys the idea of some Heteromeric genus like *Gnathocerus*. The longer antennæ in this sex and the depressed clypeus, with sinuate sides, and an elevated crest in front of the eyes which invades and almost divides them, are unlike anything I have met with in the Erotylidæ before.

Lophocrotaphus guineensis, sp. n.

Oblongus, testaceus, punctatus; antennis, basi excepta, nigris; elytris obsolete punctato-striatis, interstitiis punctatis.

Long. 4-4.5 millim.

Mas, clypeo depresso, ad latera sinuato, ante oculos elevatiore, in carinam altam oculos incidentem perrecto; antennis longis.

Femina, capite minore, ad antennarum insertionem parum elevato, ad canthum ocularem paululum producto; antennis brevioribus.

Hab. Africa, Guinea.

Var.? Maris clypeo carinâ altiore, cornu muticum nigricans compressum simulante.

Hab. Africa, Cameroon, Johann Albrechtshöhe (*L. Conradt*).

ZYTHONIA.

Zythonia, Westwood, Thesaur. Ent. p. 108 (1874).

Zythonia anthracina, sp. n.

Elongato-ovalis, aterrima, nitida; capite prothoraceque creberrime leviter punctatis; elytris tenuiter punctato-striatis, striis vix impressis; abdomine fulvo; tarsis piccis.

Long. 6.5-9 millim.

Hab. Upper Congo (Clark).

The form is that of *Episcaphula*, elongate-ovate, narrowed in front, and the elytra especially so behind, subcordate, shining black, the surface very even. The antennæ have the third joint elongate, the fourth to the seventh short and nodiform, the eighth is triangular, the last three form a wide club and are transverse, the apical one being compressed; the eyes are finely faceted. The thorax is much narrowed in front, its base is bisinuate, the sides neatly and finely margined; its surface quite smooth, not impressed, and exceedingly finely but thickly punctured. The elytra are of the same width as the thorax at their base, and form with it a nearly continuous outline; they are very finely punctate-striate, the punctures in the series numerous and close; the interstices are even, and under a Coddington lens are very finely punctured, but not so as to prevent the surface being very shining. The under surface is very smooth; short raised metasternal and abdominal lines are present, the latter extend over half the basal segment; the sides of the hind-body are obsoletely punctate, and it is wholly clear fulvous yellow. The legs are black, with pitchy tarsi; the femora are compressed, a little thickened, not punctured; the tibiæ very little widened, the tarsi not long, the claw-joint as long as the basal part.

Many specimens of this interesting species, the second at present known, were collected by Mr. Clark on the Upper Congo. In form, size, and sculpture it is very like its congener, *Z. fulva*, Westw., which is a rare insect of which I have only seen a few examples.

Fam. Endomychidæ.

Ancylopus nigrofuscus, sp. n.

Totus nigro-fuscus vel brunneus; capite prothoraceque crebre ac distincto punctatis, hoc leviter transverso, antice a basi parum angustato, basi marginato, sulcis basalibus distinctis ad medium disci proventis; clytris crebre distincte punctatis, nitidis, subtus eum pedibus unicolore.

Long. 6 millim.

Mas, tibiis anticis, dente parvulo infra medium, intus munitis.

Hab. Natal, 5572, 5573, 5574, 5575; Congo, Boma.

This insect is evidently allied to *A. juscipennis*, Gahan, in Distant's 'Transvaal,' p. 210, t. iv. fig. 10, but is larger, and differs by the thorax not having the sides rounded, as described by him and shown in the figure, but evenly narrowed

from the base to the front angles, which also are more prominent and more acute; the basal sulci are prolonged over half the disk of the thorax, and are linear, deeply impressed at their base, and parallel. The whole insect is nearly unicolorous, but of the four examples before me two are lighter in colour than the others. The antennæ have their third joint rather longer than the fourth and fifth together, the club is three-jointed and is distinct, the eighth joint being in no way wider than those preceding it. If the figure of *A. fuscipennis* is correct, this should not be the case in that species, the antennæ appearing there gradually thickened without a distinct club. Four examples were obtained by Mr. Marshall. I have also received it from the Congo, from Boma (*M. Tschoffen*). The examples from there are black, and are females, with pitchy antennæ, and the joints of the legs and disk of the thorax and other parts more or less pitchy.

XI.—*Descriptions of Three new Forms of Tragelaphus.*

By R. I. POCKOCK.

EARLY in the spring of 1898 my colleague Mr. Oldfield Thomas, who was unhappily compelled by ill health to abandon for the time being all zoological work, kindly asked me to undertake, with Dr. Sclater's acquiescence, his share of the preparation of the systematic and bibliographical section of the part of the 'Book of Antelopes' dealing with the Tragelaphinæ, so that no delay in the completion of the work should be caused by his enforced absence from London. At the suggestion of the joint authors of this work, the three new forms of Bushbuck, which came to light during the investigation of the species of the genus *Tragelaphus*, are described in the following pages prior to their appearance in the forthcoming part of the 'Book of Antelopes,' in order that the responsibility for them should, rightly, rest solely with me.

Tragelaphus scriptus (Pallas).

To the known subspecific forms of this species, namely *T. scriptus typicus*, *decula*, *sylvaticus*, and *Roualeyni*, the following two may be added:—

Subspecies *ornatus*, nov.

Adult male of the same size and much the same general

colouring as the West-African *T. scriptus typicus*, being a dark chestnut-red, passing into black inferiorly and on the legs, and marked with as many as seven or eight transverse white stripes, six spots on the shoulder and many on haunches; a line of white spots passing longitudinally above belly, but never a trace of upper longitudinal white stripe running posteriorly from shoulder.

Young male pale reddish yellow, with spots and stripes much more faintly marked.

Adult female smaller than male, bright chestnut in colour, marked with only three or four faint white stripes, and with fewer spots than in the other sex.

Loc. Linyante on the Chobé River (*F. C. Selous*).

Type: stuffed male in British Museum, no. 81. 4. 20. 4.

Subspecies *fasciatus*, nov.

(= *Tragelaphus decula* of Swayne and Ghika; nec *decula*, Rüppell.)

Somewhat intermediate in character between *T. scriptus typicus* and the East-African Bushbuck which passes as *T. scriptus Roualeyni*.

General colour reddish yellow, brighter on the hind-quarters and distinctly blacker on the dorsal region, where the hair assumes a dusky greyish-brown hue. Body marked with four or five very distinct, mostly broad, white stripes on each side; a row of white spots above the belly and a few on the hind-quarters. No upper white band passing backwards from shoulder. Neck darker than in *T. scriptus typicus* and *scriptus Roualeyni*, the entire neck being covered with a coating of short silky greyish-brown hairs of the same length as those of the head.

Young male redder in colour than adult and equally strongly marked with white.

Loc. Sen Morettu, on the Webbe River, Somaliland (*Capt. Swayne*).

Type: skin of male in British Museum, no. 94. 2. 21. 7.

Tragelaphus Delamerei, sp. n.

About the same size as *T. scriptus*. Head ruddy brown on forehead, with a blackish band extending down muzzle; cheeks fawn, with two small white spots; no white stripe running inwards from the corner of the eye; edge of upper

lip and chin white; white patches at upper and lower ends of throat small, the former only just traceable. General colour of body dark yellowish brown above, paler below, and gradually passing into yellowish fawn upon the shoulder and upon the lower half of the hind-quarters. No traces of white stripes or spots observable either upon the body or upon the hind- or fore-quarters. Fore legs both outside and inside right up to the base yellowish brown, blackish all down the front from above the knees to the fetlocks; fetlocks and pasterns black, except for a pair of white spots on the pasterns in front. Hind legs coloured like fore legs, but paler above the hock and marked with a distinct white patch in front of the hock. Tail white below, dark at the tip. A collar of short hairs round the base of the neck. No long crest of hairs along spine.

Hab. Sayer, in Somaliland.

A single subadult example of this species, remarkable for the absence of white on the inner side of the legs and on the body, was procured by Lord Delamere on his last sporting expedition into Somaliland, and kindly presented by him to the British Museum.

It is a matter for regret that there is some doubt as to the sex of this specimen. In spite of the absence of horns it was declared to be a male by the skinner entrusted with the stripping and preservation of the skin; but it must be held to be in the highest degree improbable that there exists a species of *Tragelaphus* with the male normally hornless. Hence, unless there has been some error either of memory or observation on the part of the skinner, the specimen under discussion is abnormal, and its peculiarities may possibly be attributable to this circumstance. This, however, is not likely to be so, for in a case of this kind the characters liable to be affected by falling under the influence of the cause that has brought about the suppression of the horns would be those which, like the horns themselves, are of a sexual nature; and the coloration of the inner side of the legs does not fall into this category in the antelopes of the genus *Tragelaphus*. Hence, whether the skin in question be that of a normal female or an abnormal male, I venture to think the characters that have led me to regard it as the representative of an undescribed species will be found to hold good when further material has been procured.

XII.—Notes on the Pangoninæ of the Family Tabanidæ in the British Museum Collection. By Miss GERTRUDE RICARDO.

[Plate I.]

THE present paper embodies the results of an attempt to re-arrange the specimens of Pangoninæ in the British Museum collection, dealing only, so far, with *Pangonia*, Latreille, and its allied genera. Little seems to have been added to our knowledge of the Pangoninæ since the publication of 'Dipteren-Fauna Südafrika's' by Loew, nearly forty years ago, in which he gave a valuable summary of the genera of the above, besides the description of species. Rondani, in Archiv. Canestr., three years later, suggested a subdivision of *Pangonia*, Latreille, which has been carried out in this paper. Schiner in 'Reise der Novara' (1866), and other authors of a later date, have established four or more new genera and described new species. The only catalogues of any species of Pangoninæ were those included in Schiner's 'Cat. European Diptera' (1863), Osten Sacken's 'Cat. N. Amer. Diptera' (1878), and Wulp's 'Cat. Diptera S. Asia' (1886). I hope those I have compiled will prove fairly complete, and be of some use in the future study of the family, together with a few notes on the species possessed by the British Museum, including the description of eleven new species. Any fresh specimens of Pangoninæ, to be added to the National collection, would be most acceptable and greatly facilitate further study, especially as regards the Walker types, many of which are in such poor preservation that it is difficult to form any opinion on them; when further modern specimens are available for comparison, more of these types will very probably prove to be synonymous.

The family Tabanidæ is divided into two divisions, viz. :—

Hind tibia with spurs. Ocelli usually present	PANGONINÆ.
Hind tibia without spurs. Ocelli absent	TABANINÆ.

PANGONINÆ.

The following table of genera of the Pangoninæ of the world compiled from different authors I have found useful to work by, carrying it so far as to include *Pangonia*, Latr., and the genera divided off from it; *Silvius* and its allied genera to follow later.

PANGONINÆ.

Hind tibia with spurs. Ocelli usually present.

- | | |
|--|--|
| 1. Third joint of antennæ with eight or at least seven divisions. Proboscis usually prolonged | 3. |
| 2. Third joint of antennæ with five divisions. Proboscis short | 14 (<i>Silvius</i> &c.). |
| 3. Third joint of antennæ with a tooth | <i>Dicrania</i> , Macq. |
| Third joint of antennæ with no tooth | 4. |
| 4. Wings short; body flat, elliptical | <i>Apocampta</i> , Schiner. |
| Wings not short | 5. |
| 5. Third joint of antennæ with each segment branched | <i>Pityocera</i> , Gigl.-Tos. |
| Third joint of antennæ not branched | 6. |
| 6. Upper corner of eyes terminating in an acute angle | <i>Goniops</i> , Aldrich. |
| Upper corner of eyes not terminating in an acute angle | 7. |
| 7. Antennæ deep-seated, inclined downwards. Palpi very large and thick | <i>Cadicera</i> , Macq. |
| Antennæ not deep-seated nor inclined downwards. Palpi not very large and thick | 8. |
| 8. Antennæ subulated; proboscis with terminal lips in form of a hatchet; anal cell open and anal vein curved | <i>Pelecorhynchus</i> , Macq.
= <i>Cænopygga</i> , Thoms. |
| Antennæ not subulated; proboscis simple; anal cell closed, anal vein not curved | 9. |
| 9. Proboscis scarcely extending beyond palpi | <i>Apatolestes</i> , Will. |
| Proboscis extending beyond palpi | 10. |
| 10. Wings with fourth posterior cell closed | <i>Scione</i> , Wlk.
= <i>Diclisa</i> , Schiner. |
| Wings with fourth posterior cell open | 11. |

PANGONIA, Latr.

- | | |
|---|-------------------------------|
| 11. Wings with first posterior cell closed | <i>Pangonia</i> , Rond. |
| 11 a. Eyes naked | } <i>Pangonia</i> , Rond. |
| 11 b. Eyes hairy subgenus | |
| 12. Wings with first posterior cell open | <i>Erephrosis</i> , Rond. |
| 12 a. Eyes hairy | } <i>Diatomineura</i> , Rond. |
| 12 b. Eyes bare subgenus | |
| 13. ? Antennæ long and narrow. Wings with first posterior cell closed | <i>Corizoneura</i> , Rond. |
| | ? <i>Mycteromyia</i> , Phil. |

The three genera *Apocampta*, Schiner, formed for *A. nigra*, *Pityocera*, Gigl.-Tos, formed for *P. festæ*, *Goniops*, Aldrich, formed for *G. hippoboscoides*, containing only the one species each; *Apatolestes*, Williston, formed for *A. comastes*, and *Mycteromyia*, Philippi, formed for *Pangonia conica*, Bigot, and others, are not represented in the Museum Collection, so that I have no knowledge of them; the last genus is probably a doubtful one.

Sackenymia, Bigot (Ann. Soc. Ent. Fr. (5) ix. 1879),

formed for *Pangonia fulvithorax*, Wiedem., and *analis*, Fabr., and others, must be merged again in *Pangonia*, having no distinctive characteristic to justify a new genus.

The following is a list of the described species of the five first-mentioned genera:—

APOCAMPTA, Schiner, Reise der Novara (1866); Verh. zool.-bot. Gesell. Wien, xvii. p. 310 (1867).

A. nigra, Schiner, l. c.—*Hab.* Sydney.

PITYOCERA, Gigl.-Tos, Boll. Mus. Torino, xi. no. 224 (1896), xii. no. 226 (1897).

P. festæ, Gigl.-Tos, l. c.—*Hab.* Darien.

GONIOPS, Aldrich, Psyche, vi. (1892).

G. hippoboscoides, Aldrich, l. c.—*Hab.* Dakota.

APATOLESTES, Williston, Ent. Amer. i. no. 1 (1885).

A. comastes, ♀, Will. l. c.—*Hab.* California.

? *A. Eiseni*, Townsend, P. Calif. Ac. (2) iv. p. 596 (1895).—*Hab.* Lower California.

MYCTEROMYIA, Philippi, Verh. zool.-bot. Gesell. Wien, xv. (1865).

M. conica, Bigot, l. c. [*Pangonia conica*, Bigot, Ann. Soc. Ent. Fr. sér. 3, v. p. 278 (1857).]—*Hab.* Chili.

M. brevisrostris, Philippi, Verh. zool.-bot. Gesell. Wien, xv. p. 713 (1865).—*Hab.* Chili.

M. fusca, Philippi, l. c. p. 712.—*Hab.* Chili.

M. murina, Philippi, l. c. p. 713.—*Hab.* Chili.

M. nigrifacies, Bigot, Mém. Soc. Zool. Fr. v. p. 607 (1892); Wulp, List Dipt. S. Asia (1896).—*Hab.* India.

M. ensata, Bigot, l. c. p. 608.—*Hab.* Cape of Good Hope.

M. elegans, Bigot, l. c. p. 608.—*Hab.* Cape of Good Hope.

M. nitens, Bigot, l. c. p. 609.—*Hab.* Brazil.

M. penicillata, Bigot, l. c. p. 610.—*Hab.* Brazil.

M. cinerascens, Bigot, l. c. p. 610.—*Hab.* Chili.

M. albipectus, Bigot, l. c. p. 611.—*Hab.* Brazil.

M. erythronotata, Bigot, l. c. p. 612.—*Hab.* Brazil.

Those species marked with an asterisk (*) are in the Museum Collection.

DICRANIA, Macq.

Dicrania, Macq. Dipt. Exot. i. p. 110 (1838); Loew, Dipt. Südafrik. p. 15 (1860).

The described species of *Dicrania* are:—

- **Dicrania cervus*, Wiedem., Auss. zweifl. Ins. i. p. 94 (1828); Macq., Dipt. Exot. i. p. 110 (1838); id. Ann. Soc. Ent. Fr. vi. p. 438, pl. xv. (1837); Giglio-Tos, Boll. Mus. Torino, xii. (1897). [*Pangonia cervus*, Wiedem., l. c. *Pangonia comprehensa*, Walker, Dipt. Saund. pt. i. p. 11 (1850). *Pangonia cervus*, var., Walker, List Dipt. pt. v.

Suppl. 1, p. 131 (1854). *Pangonia ramicornis*, Walker.]—*Hab.* Amazons, Brazil.

Dicrania fureata, Wiedem., Auss. zweifl. Ins. i. p. 99 (1828); Walker, List Dipt. pt. v. Suppl. 1, p. 131 (1854); Macq., Ann. Soc. Ent. Fr. p. 438, pl. xv. (1837). [*Pangonia fureata*, Wiedem., l. c.]—*Hab.* Brazil.

Dicrania cervus, Wiedem., Auss. zweifl. Ins. i. p. 94 (1828); Macq., Dipt. Exot. i. p. 110 (1838); id. Ann. Soc. Ent. Fr. pl. xv. p. 438 (1837); Giglio-Tos, Boll. Mus. Torino, xii. (1897).

Pangonia cervus, Wiedem., l. c.

Pangonia cervus, var., Wiedem., Walker, List Dipt. pt. v. Suppl. 1, p. 131 (1854).

Pangonia comprehensa, Walker, Dipt. Saund. pt. i. p. 11 (1850).

One female specimen is labelled in Walker's handwriting *ramicornis*; there is no record of such a species in any of his writings. He describes a *cervus*, var. ♀, in List Dipt. pt. v. Suppl. 1, p. 131, from Santarem, Brazil, Bates coll.: this *ramicornis* is thus labelled and answers to the description of the var., and is probably the fly he described as *cervus*, var.; it is identical with *cervus*, Wiedem., the only difference being in the teeth of the third joint of antennæ, which are not so deep or sharply defined, and there is an appendix on one of the wings not on the other. The *comprehensa*, ♀, Walker, and two other identical male specimens, all from the Amazons, are evidently the same as *cervus*. The male has just been described by Giglio-Tos in the above paper, from one specimen received from Ecuador; the very long proboscis he lays so much stress upon, is (apparently) only present in one of these male specimens.

Hab. Para, Santarem (*Bates*).

CADICERA, Macq., Dipt. Exot. Suppl. 5, p. 23 (1855).

This genus, formed for one species from Oceania, should include *Pangonia melanopyga* and *crassipalpis*, Macq., and *chryso stigma*, Wiedem. It is distinguished by the low insertion of the antennæ, the large, thick, curved, second joint of palpi, and the broad and convex abdomen and short proboscis. Ocelli are present. Wings have the first posterior cell closed and an appendix on branch of third vein.

**Cadicera rubra marginata*, ♀, Macq., Dipt. Exot. Suppl. 5, p. 23 (1855). The type of the genus.

The palpi are very large; ocelli present and distinct, though Macquart says "no distinct ocelli"; his plate of this species

is not exact. The specimen in the Museum came from South Africa, not Oceania, whence Macquart says his type was received.

Hab. South Africa (*Smith*).

**Cadicera melanopyga*, ♂, Wiedem., Auss. zweifl. Ins. i. p. 98 (1828).

Pangonia melanopyga, Wiedem., l. c.; ♀, Macq. Dipt. Exot. i. p. 97 (1838); Loew, Dipt. Südafrik. p. 19 (1860); Walker, List Dipt. pt. i. p. 136 (1848).

Hab. Cape of Good Hope (*Smith, Whitehill*).

**Cadicera crassipalpis*, Macq. Dipt. Exot. i. p. 98 (1838).

Pangonia crassipalpis, Macq., l. c.; Walker, List Dipt. pt. i. p. 138 (1848).

Hab. Cape of Good Hope (*Children*).

**Cadicera chrysostigma*, Wiedem., Auss. zweifl. Ins. i. p. 100 (1828).

Pangonia chrysostigma, Wiedem., l. c.; Walker, List Dipt. pt. v. Suppl. 1, p. 137.

Hab. Cape of Good Hope, Stellenbosch (*Vigors*).

There is an undescribed specimen in the collection unlabelled, which probably belongs to this genus, from the Cape; and another probably new species from Pirie Bush.

PELECORHYNCHUS, Macq.

Pelecorhynchus, Macq., Dipt. Exot. Suppl. 4, p. 28 (1850); Loew, Dipt. Südafrik. (1860).

Cænopygga, Thoms., Eugen. Resa, p. 449 (1868).

This genus was formed by Macquart for *P. maculipennis* from Australia; he distinguished the genus from *Pangonia* by the peculiar shape of the proboscis, which ends in the form of a hatchet: Loew is doubtful as to this being a good characteristic for a genus, though Schiner, in describing *P. ornatus* ('Reise der Novara,' p. 98), mentions this as justifying the genus being established; it seems peculiar to the genus so far as I can judge from the species in the Museum. Thomson formed a new genus, *Cænopygga*, for the same species, distinguishing it from *Pangonia* by its subulated antennæ and the posterior spiracles being ovate not horizontal. Macquart's name has priority, though he gives an insufficient and incorrect description for his genus. Thomson's should be referred to: his statement "wings many-spotted" will only hold good for some species, not for the genus, some having quite clear wings; his distinction as to spiracles I have not been able to

verify. The open anal cell and anal vein curved seems a distinguishing characteristic and should be added to the shape of proboscis and antennae as distinctive for the genus. Three species placed by Walker under *Silvius* belong here, and two new species from S. America, bringing the number of described species of the genus up to six.

**Pelecorhynchus maculipennis*, Macq., Dipt. Exot. Suppl. 4, p. 28 (1850). [*Cænopyga maculipennis*, Thoms. l. c.]

A male and female, both in bad preservation, which were unnamed.

Hab. Sydney, Australia, and Tasmania.

**Pelecorhynchus personatus*, Walker, List Dipt. pt. i. p. 192 (1848).

Silvius personatus, Walker, l. c.

Pelecorhynchus ornatus, Schiner, Reise der Novara, p. 98 (1866); Will. Kans. Univ. Quart. vol. iii. (1895).

This and the two following species were placed by Walker under *Silvius*, with the remark that they would form a genus which approaches *Anthrax*. Schiner redescribed this species, placing it under *Pelecorhynchus*.

Hab. Queensland (*Hunter, Cumming*).

**Pelecorhynchus eristaloides*, ♂, Walker, List Dipt. pt. i. p. 193 (1848).

Silvius eristaloides, Walker, l. c.

Hab. Australia, S.E. Tasmania (*Atkinson*).

**Pelecorhynchus fusconiger*, ♀, Walker, List Dipt. pt. i. p. 192 (1848).

Silvius fusconiger, Walker, l. c.

Hab. New South Wales; Australia (*Hunter*).

**Pelecorhynchus Darwini*, ♀, sp. n. (Pl. I. fig. 1.)

This handsome species was collected by Darwin from Chiloe, S.W. coast of South America. There is only one specimen.

Black. Antennae subulated; palpi short, reddish brown, with black hairs. Face grey, with brown markings in the centre and frontal stripe brown. Ocelli present; beard bright orange-yellow. Thorax with two distinct silky yellow stripes extending to scutellum; dorsum clothed with short black pubescence; sides with orange-yellow hairs, which are also

present at base of wings and on breast. Scutellum with a fringe of short silky yellow hairs. Halteres yellow. Abdomen clothed with black pubescence; a small hoary grey spot on each side of the third segment and a large oblong one on the fourth segment, extending from each side towards the middle; these spots are still more distinct on the underside of abdomen, forming a wave-like band on the fourth segment. Legs black; anterior tibia with greyish pubescence. Wings hyaline, yellow at base and on the fore border; veins yellow. Posterior cells open, also the anal cell; the anal vein is curved. Length 15 millim.

Hab. Chiloe, S. America.

**Pelecorhynchus aurantiacus*, ♀, sp. n. (Pl. I. fig. 2.)

Reddish brown. Antennæ and palpi red; the latter short, clothed with orange-yellow hairs; the beard and hairs on the breast are the same colour; the face and frontal stripe are light ferruginous, clothed with short yellow pubescence. Thorax covered with orange-rufous hairs, very deep in colour on the sides and on the scutellum; there is a large tuft of white hairs below the root of the wings. Abdomen clothed with dense orange-rufous pubescence; the last segment is rather bare, with wrinkled transverse lines. Legs yellow, the posterior tibia red. Wings hyaline, yellow at base and on the fore border; transverse veins slightly clouded. All posterior cells and the anal one open; anal vein curved. Length 15 millim.

Hab. Chili (*Edmonds*).

This may perhaps be the same as *Pangonia vulpes*, Macq., Dipt. Exot. Suppl. 4, p. 23, but he takes no notice of the generic characteristics, though a few pages later he describes *Pelecorhynchus* as a new genus.

SCIONE, Walker.

Scione, Walker, Dipt. Saund. pt. i. p. 11 (1850).

Dictisa, Schiner, Reise der Novara (1866); Verh. zool.-bot. Ges. Wien, xvii. p. 310 (1867).

This genus was formed by Walker for *Pangonia incompleta*, Macq., who based it on the venation of the wings, the fourth posterior cell being closed, besides the first posterior, and the dividing nerve between the second and third posterior cell interrupted. Schiner did not consider he was obliged to make use of the name *Scione*, but established *Dictisa* for the same *P. incompleta* and included two new species, *D. maculipennis* and *distincta*. *Pangonia singularis* and *albifasciata*,

Macq., he considered should be included in it. Giglio-Tos, in Ann. Soc. Ent. Fr. p. 357 (1895), reverts to the name *Scione* established by Walker and accepted by Rondani (Archiv. Canestr. iii. 1863) for *Pangonia incompleta* and *singularis*, Macq.; though he does not consider the closing of the two posterior cells sufficient to distinguish this genus, the species which should belong to it presenting other wide differences, he accepts it for the present, and places a new species, *S. Alluaudi*, here. He thinks *Pangonia biclausula*, Schiner, should be placed in this genus.

Schiner's description of *Diclisia* should be referred to for the genus, which at present would include species widely different in appearance, form of palpi, &c. Two species in the Museum Coll. should be included, viz. *Pangonia brevis*, Loew, and *Pangonia submacula*, Walker, having the fourth posterior cell closed; but they do not agree in other particulars with the description of the genus, and *P. submacula* is so clearly allied to *Pangonia guttata* that it does not seem advisable to remove them from *Pangonia*.

The described species placed in this genus are:—

- **Scione incompleta*, Macq., Dipt. Exot. Suppl. 1, p. 28 (1846); id. *l. c.* Suppl. 4, p. 25 (1850); Walker, Dipt. Saund. pt. i. p. 20 (1850); id. List Dipt. pt. v. Suppl. 1, p. 125 (1854); Gigl.-Tos, Ann. Soc. Ent. Fr. p. 357 (1895). [*Pangonia incompleta*, Macq., *l. c.* *Diclisia incompleta*, Schiner, Reise der Novara, p. 101 (1866).]—*Hab.* South America.
- Scione singularis*, Macq., Dipt. Exot. Suppl. 1, p. 23 (1846). [*Pangonia singularis*, Macq., *l. c.*]—*Hab.* Australia.
- Scione albifasciata*, Macq., Dipt. Exot. Suppl. 1, p. 28 (1846); Walker, List Dipt. pt. v. Suppl. 1, p. 127 (1854). [*Pangonia albifasciata*, Macq., *l. c.*]—*Hab.* New Granada, S. America.
- Scione maculipennis*, Schiner, Reise der Novara, p. 102 (1866); Osten Sacken, Biol. Centr.-Am., Dipt. i. p. 47 (1886). [*Diclisia maculipennis*, Schiner, *l. c.*]—*Hab.* South America.
- Scione distincta*, Schiner, Reise der Novara, p. 102 (1866). [*Diclisia distincta*, Schiner, *l. c.*]—*Hab.* South America.
- Scione misera*, Osten Sacken, Biol. Centr.-Am., Dipt. i. p. 47 (1886). [*Diclisia misera*, Osten Sacken, *l. c.*]—*Hab.* South America.
- Scione Alluaudi*, Giglio-Tos, Ann. Soc. Ent. Fr. (1895).—*Hab.* Seychelles Islands.

- **Scione incompleta*, Macq., Dipt. Exot. Suppl. 1, p. 28 (1846), Suppl. 4, p. 25 (1850); Walker, Dipt. Saund. pt. i. p. 20 (1850); id. List Dipt. pt. v. Suppl. 1, p. 125 (1854); Giglio-Tos, Ann. Soc. Ent. Fr. p. 357 (1895).

Pangonia incompleta, Macq., Dipt. Exot. *l. c.*

Diclisia incompleta, Schiner, Reise der Novara, p. 101 (1866).

Two females, from Colombia.

Four female specimens from British Guiana in a private collection which I examined are allied to *Scione albifasciata* Macq. (*Pangonia albifasciata*, Macq.), but not the same: they probably represent a new species; they have the striped thorax &c. typical of the genus, according to the type, *S. incompleta*.

PANGONIA, Latr.

Pangonia, Latr. Hist. Nat. iii. p. 437 (1802).

Rondani, in Archiv. Canestr. iii. (1863), divides *Pangonia*, Latr., into *Pangonia* and *Diatomiœura*, making the first posterior cell open or shut the distinctive character, and subdivides each again into a subgenus, with the eyes hairy or bare. Loew in his 'Dipt.-Faun. Südafr.' used the divisions of the posterior cells, and Bigot has used Rondani's divisions since for new species (see Mém. Soc. Zool. Fr. v. 1892). I have followed this arrangement as it seems fairly satisfactory, though the closing of the first posterior cell is a variable characteristic in some species I have come across, viz. *adrel*, White, MS., *concolor*, Walker, *depressa*, Macq., noticed by the latter in his description of *depressa*. The prolongations on the fore tarsi of some male species are confined to those from Africa so far as the species in the Museum are concerned—*longirostris*, Hardw., from Asia, being an exception, in the description of this last is the only notice of the peculiarity which I have seen.

The following is a list of the described species of African *Pangonia*, Latr., divided into their subgenera as far as possible; but many of the descriptions are insufficient, where this is the case they are left under *Pangonia*, Latr. Those marked with an asterisk (*) are in the Africa Museum Collection.

PANGONIA, Rond. Archiv. Canestr. iii. (1863).

- **P. rostrata*, ♀, Linn., Mus. Lud. Ulr. p. 421. 1; Wiedem., Auss. zweifl. Ins. i. p. 96 (1828); Walker, List Dipt. pt. v. Suppl. 1, p. 134 (1854); Loew, Dipt. Südafrik. p. 20 (1860).—*Hab.* Cape of Good Hope.
- **P. angulata*, Fabr. Syst. Antl. p. 91. 5 (1805); Wiedem., Auss. zweifl. Ins. i. p. 97 (1828); Loew, Dipt. Südafrik. p. 20 (1860). [*P. obesa*, Walker, List Dipt. pt. v. Suppl. 1, p. 135 (1854); Schiner, Reise der Novara, p. 99 (1866).]—*Hab.* Cape of Good Hope.
- **P. gulosa*, Wiedem., Auss. zweifl. Ins. i. p. 99 (1828).—*Hab.* Cape of Good Hope.
- **P. bifasciata*, Wiedem., l. c. p. 102.—*Hab.* Cape of Good Hope, Burghersdorp.
- P. atricornis*, Wiedem., l. c. p. 103; Walker, List Dipt. pt. v. Suppl. 1, p. 135 (1854); Loew, Dipt. Südafrik. p. 19 (1860). [*P. cingulata*, Wiedem., l. c.]—*Hab.* Cape of Good Hope.
- P. basalis*, Macq., Dipt. Exot. Suppl. 2, p. 10 (1846); Walker, List Dipt. pt. v. Suppl. 1, pp. 130, 323 (1854).—*Hab.* Algeria.

- P. caffra*, Macq., *l. c.* p. 11; Walker, *l. c.* p. 135; Loew, Dipt. Südafrik. p. 20 (1860).—*Hab.* Cape of Good Hope.
- **P. multifascia*, ♀, Walker, *l. c.* pt. i. p. 134 (1848).—*Hab.* Cape of Good Hope.
- **P. adjuncta*, ♀, Walker, *l. c.* p. 135.—*Hab.* Cape of Good Hope.
- **P. conjuncta*, Walker, *l. c.* p. 135.—*Hab.* Cape of Good Hope.
- **P. semifasciata*, ♀, Walker, *l. c.* p. 136.—*Hab.* Cape of Good Hope.
- **P. alboatra*, ♀, Walker, Dipt. Saund. pt. i. p. 13 (1850).—*Hab.* Cape of Good Hope.
- P. biclausia*, Loew, Dipt. Südafrik. p. 19 (1860).—*Hab.* Caffraria (*Wahlberg*).
- **P. brevis*, Loew, Wiener ent. M. vii. p. 9 (1863).—*Hab.* Orange Free State.
- P. Ruppellii*, Jænnicke, Abh. Senck. Gesell. vi. p. 329 (1868).—*Hab.* Simen, Abyssinia.
- P. bullata*, Will., Kans. Univ. Quart. iii. p. 191 (1895).—*Hab.* South Africa.
- P. Brichettii*, Bizzi, Ann. Mus. Genova, xii. (2) p. 181.—*Hab.* Somali-land.

Subgenus EREPHROSIS, Rond. Archiv. Canestr. iii. (1863).

- E. maculipennis*, Macq., Dipt. Exot. Suppl. 4, p. 20 (1850); Schiner, Reise der Novara, p. 98 (1866).—*Hab.* Africa.

DIATOMNEURA, Rond. Archiv. Canestr. iii. (1863).

- **D. barbata*, ♀, Linn., Mus. Lud. Ulr. p. 422. 2; id. Syst. Nat. i. p. 999. 2 (1766); Wiedem., Auss. zweifl. Ins. i. p. 94 (1828); Walker, List Dipt. pt. i. p. 135 (1848), pt. v. Suppl. 1, p. 135 (1854).—*Hab.* Cape of Good Hope.
- **D. fulvifascia*, ♀, Walker, List Dipt. pt. i. p. 137 (1848).—*Hab.* Cape of Good Hope.

Subgenus CORIZONEURA, Rond. Archiv. Canestr. iii. (1863).

- **C. lateralis*, Fabr., Syst. Antl. p. 91. 4 (1805); Wiedem., Auss. zweifl. Ins. i. p. 101 (1828); Walker, List Dipt. pt. i. p. 134 (1848), pt. v. Suppl. 1, p. 135 (1854); Loew, Dipt. Südafrik. p. 17 (1860).—*Hab.* Cape of Good Hope.
- **C. varicolor*, Wiedem., *l. c.* p. 98; Walker, List Dipt. pt. i. p. 134 (1848), pt. v. Suppl. 1, p. 137 (1854); Loew, Dipt. Südafrik. p. 17 (1860).—*Hab.* Cape of Good Hope.
- **C. parva*, ♀, Walker, List Dipt. pt. i. p. 145 (1848).—*Hab.* Cape of Good Hope.
- **C. subfascia*, ♂, Walker, *l. c.* pt. v. Suppl. 1, p. 136 (1854).—*Hab.* Port Natal.
- **C. directa*, ♀, Walker, Dipt. Saund. pt. i. p. 21 (1850).—*Hab.* Cape of Good Hope.
- **C. brunnipennis*, Loew, Dipt. Südafrik. p. 17 (1860).—*Hab.* Port Natal.
- **C. suavis*, Loew, *l. c.* p. 17.—*Hab.* Caffraria (*Wahlberg*).
- C. zig-zag*, Macq., Dipt. Exot. Suppl. 5, p. 20 (1850); Karsch, Berlin. ent. Zeit. xxviii. p. 171 (1884).—*Hab.* Central Madagascar.
- C. albifrons*, Bigot, Mém. Soc. Zool. Fr. v. p. 612 (1892).—*Hab.* Cape of Good Hope.
- C. brachyrhyncha*, Bigot, *l. c.* p. 614.—*Hab.* Cape of Good Hope.
- **C. pallidipennis*, ♀, sp. n.—*Hab.* Delagoa Bay.
- **C. umbratipennis*, sp. n.—*Hab.* Annshaw (*Barrett*).

PANGONIA, Latr. Hist. Nat. iii. p. 437 (1802).

- P. leucomelas*, Wiedem., Auss. zweifl. Ins. i. p. 90 (1828); Walker, List Dipt. pt. i. p. 136 (1848).—*Hab.* Cape of Good Hope.
P. thoracica, Wiedem., l. c. p. 89; Walker, l. c. pt. v. Suppl. 1, p. 139 (1854) (name twice chosen).—*Hab.* Cape of Good Hope.
P. nobilis, Wiedem., l. c. ii. p. 622; Walker, l. c.—*Hab.* Cape of Good Hope.
P. spiloptera, Wiedem., l. c. p. 102; Walker, l. c. pt. i. p. 136 (1848).—*Hab.* Cape of Good Hope.
P. senegalensis, Macq., Hist. Nat. Dipt. i. p. 193 (1834); Walker, l. c. pt. v. Suppl. 1, p. 137 (1854).—*Hab.* Senegal.
P. chrysopila, Macq., l. c. p. 194; Walker, l. c.—*Hab.* Africa.
P. flavipes, Macq., Dipt. Exot. i. p. 98 (1838).—*Hab.* Cape of Good Hope.
P. appendiculata, Macq., l. c. p. 97; Walker, l. c.—*Hab.* Cape of Good Hope.
P. funebris, Macq., l. c. Suppl. 1, p. 23 (1846).—*Hab.* Algeria.
P. ramulifera, ♀, Loew, Wiener ent. M. vii. p. 9 (1863).—*Hab.* Orange State.
P. semilivida, Bigot, Ann. Soc. Ent. Fr. lx. p. 366 (1891). [*Sackenymia semilivida*, Bigot, l. c.]—*Hab.* West Africa.

PANGONIA, Latr.

PANGONIA, Rond.

Wings with first posterior cell closed. Eyes naked or subnaked.

Pangonia conjuncta, ♂ ♀, Walker, List Dipt. pt. i. p. 135 (1848)

Palpi with first joint stout; second joint long and slender, pointed. Wings with an appendix on fork of the third vein, and also one on the apex of the first posterior cell.

Hab. Cape of Good Hope.

Pangonia alboatra, ♀, Walker, Dipt. Saund. pt. i. p. 13 (1850).

Palpi with second joint club-shaped at base, ending in a point. Wings with appendix on fork of third vein.

Hab. Cape of Good Hope.

Pangonia angulata, Fabr., Syst. Antl. p. 91. 5 (1805); Wiedem., Auss. zweifl. Ins. i. p. 97 (1828); Loew, Dipt. Südafrik. p. 20 (1860).

P. obesa, Walker, List Dipt. pt. v. Suppl. 1, p. 135 (1854); Schiner, Reise der Novara, p. 99 (1866).

Walker's type *obesa*, ♀, from Saunders Coll., seems identical with *angulata*, Fabr., agreeing with the amended description of *angulata* by Loew, who notes a female var., placed by

Wiedemann under *angulata*, and having the extra appendix on the first posterior cell; *obesa* must therefore sink.

There is a male specimen here, evidently this species, though it has no appendix on the first posterior cell, which apparently varies in the same species, as in *sexfasciata*, Walker. The palpi are similar to those of *alboatra*.

Hab. Cape of Good Hope.

Pangonia sexfasciata, ♀, Walker, Cat. Dipt. pt. i. p. 136 (1848).

Palpi as in *alboatra*. Wings have an appendix on the apex of first posterior cell on one wing only.

Hab. Cape of Good Hope.

Pangonia gulosa, Wiedem., Auss. zweifl. Ins. i. p. 99 (1828).

Palpi with second joint shorter than the first.

Hab. Cape of Good Hope.

Pangonia rostrata, ♀, Linn., Mus. Lud. Ulr. p. 421. 1; Wiedem., Auss. zweifl. Ins. i. p. 96 (1828); Walker, Cat. Dipt. pt. v. Suppl. 1, p. 134 (1854); Loew, Dipt. Südafrik. p. 20 (1860).

Hab. Cape of Good Hope.

Pangonia multijascia, ♀, Walker, Cat. Dipt. pt. i. p. 134 (1848).

Palpi slender; second joint not quite so long as the first. Wings with appendix on fork of third vein.

Hab. Cape of Good Hope.

Pangonia adjuncta, ♀, Walker, Cat. Dipt. pt. i. p. 135 (1848).

Palpi rather stout; joints almost equal in length; the second joint club-shaped at base, ending in a point. Wings with an appendix on fork of third vein.

Hab. Cape of Good Hope.

Pangonia bifasciata, Wiedem., Auss. zweifl. Ins. i. p. 102 (1828).

The white band on second segment of abdomen, mentioned by Wiedemann, resolves itself, in one male specimen and two female specimens in the collection, into two lateral and one

dorsal white spot. Wiedemann only described the female. The male in the Museum has a prolongation on the second joint of the fore tarsi, reaching to the end of the third joint, with long hairs on its apex. One of the females was wrongly labelled as *flavipes*, Macq.

Hab. Cape of Good Hope, Burghersdorp.

Pangonia brevis, Loew, Wiener ent. M. Bd. vii. p. 9 (1863).

One male.

This species has the fourth posterior cell closed, and should therefore be placed in the genus *Sciouc*, Walker (*Dielsia*, Schiner); but as it differs in the form of the palpi and other particulars from the description of that genus, it does not seem advisable to remove it from *Pangonia* for the present.

Hab. Transvaal (*Young*).

DIATOMINEURA, Rond.

Wings with first posterior cell open. *Eyes* hairy.

Diatomineura fulvifascia, ♀, Walker, List Dipt. pt. i. p. 137 (1848).

Palpi with second joint rather long, club-shaped at base, ending in a point. The tawny hind borders of segments of abdomen have golden pubescence. Wings have no appendix.

Hab. Cape of Good Hope.

Diatomineura barbata, ♀, Linn., Mus. Lud. Ulr. p. 422. 2; Syst. Nat. i. p. 999. 2; Wiedem., Auss. zweifl. Ins. i. p. 94 (1828); Walker, List Dipt. pt. i. p. 135 (1848), pt. v. Suppl. 1, p. 135 (1854).

Hab. Cape of Good Hope.

Subgenus CORIZONEURA, Rond.

Wings with first posterior cell open. *Eyes* naked or subnaked.

Corizoneura lateralis, ♂ ♀, Fabr., Syst. Antl. p. 91. 4 (1805); Wiedem., Auss. zweifl. Ins. i. p. 101 (1828); Loew, Dipt. Südafrik. p. 17 (1860); Walker, List Dipt. pt. i. p. 134, pt. v. Suppl. 1, p. 135 (1854).

Hab. South Africa.

Corizoneura subfascia, ♂, Walker, List Dipt. pt. v. Suppl. 1, p. 136 (1854).

Wings have an appendix on fork of third vein.

Hab. Port Natal, Durban (*Distant*).

Corizoneura brunnipennis, Loew, Dipt. Südafrik. i. p. 17 (1860).

Two females which were unnamed; the veins and fore borders of wings are yellow, not dull grey smoky-brown as Loew says.

Hab. Port Natal.

Corizoneura suavis, Loew, Dipt. Südafrik. i. p. 17 (1860).

Two females.

Hab. Potchefstroom, Transvaal.

Corizoneura varicolor, ♂ ♀, Wiedem., Auss. zweifl. Ins. i. p. 98 (1828); Walker, List Dipt. pt. i. p. 134 (1848), pt. v. Suppl. 1, p. 137 (1854); Loew, Dipt. Südafrik. i. p. 17 (1860).

The male has not been described. There is one male in the Museum from the Transvaal which answers to Wiedemann's description in every particular, but has the prolongations on the fore tarsi, viz. from the extremity of the first joint of tarsus there is the first prolongation, overlapping a second one, which starts from the base of the extremely short second joint and continues beyond the third; both are yellow in colour as the legs. There is another male rather larger, which was wrongly labelled *P. appendiculata*, Macq., from South Africa, and five females so labelled; the hairs on the second and fourth segments of abdomen are hardly apparent in some of the specimens, which are old and rubbed.

Hab. South Africa, Natal, Transvaal

Corizoneura pallidipennis, ♀, sp. n. (Pl. I. fig. 3.)

Light fulvous. The upper part of the face is covered with greyish tomentum; longitudinal furrows on the vertex. Antennæ red, the first two joints are greyish. Beard white. Palpi red; a short furrow on the upper end of the last joint, which is only half as long as the first and is club-shaped. Proboscis a little longer than body. Thorax brown, covered with short yellow pubescence, fringed at sides with yellow hairs, with tufts of white hairs above wings reaching to

scutellum. Abdomen fulvous, with interrupted black dorsal stripe; on middle of posterior margin of second segment a tuft of white hairs; remaining segments brownish, with a few black spots and markings; at sides of second, fourth, sixth, and seventh segments are white hairs, on the others black hairs; underside of abdomen covered with whitish pubescence. Wings hyaline, with appendix on fork of third vein; the veins are light yellow. Legs yellow, coxæ black. Length 13-14 millim.

Hab. Delagoa Bay.

Corizoneura umbratipennis, ♂ ♀, sp. n. (Pl. I. fig. 9.)

Fulvous. Face reddish with grey tomentum; in female three deep longitudinal furrows in centre of forehead and transverse wrinkles below, a faint longitudinal stripe extending from these to below the antennæ. Beard white. Antennæ and palpi red, the latter with a short deep furrow on face of the third joint, which is club-shaped and shorter than the first joint. Ocelli absent. Proboscis nearly twice as long as the body. Thorax thickly clothed with dark hairs, sides with white, extending to the base of the scutellum. Abdomen fulvous, with black dorsal stripe on the first segment and base of the second, the third has black markings; the posterior borders of segments two and three are lighter in colour, the remaining segments dark; a tuft of white hairs on lateral margins of segments two, four, six, seven, the others with black hairs. Underside of abdomen light fulvous with whitish tomentum. Legs red, posterior ones dark brown; on the fore tarsi of the male there is a slender prolongation, starting from the base of the second and extending nearly to the end of the third joint; there are two long bristles on the end of the first joint. Wings grey; veins brown, the transverse ones shadowed. Length 15-16 millim.

This species somewhat resembles *varicolor*, Wiedem., but the longer proboscis and absence of hairs on the second and fourth segments distinguish it.

Hab. Annshaw, South Africa (*Barrett*).

Corizoneura directa, ♀, Walker, Dipt. Saund. pt. i. p. 21 (1850).

In very poor preservation.

Hab. Cape of Good Hope.

Corizoneura parva, ♀, Walker, List Dipt. pt. i. p. 145 (1848).

In very poor preservation.

Hab. Cape of Good Hope.

Australia

(including Oceania, New Guinea, and New Zealand).

PANGONIA, Latr.

PANGONIA, Rond.

- P. fulviventris*, Macq., Dipt. Exot. i. p. 109 (1838); Walker, List Dipt. pt. v. Suppl. 1, p. 144 (1854).—*Hab.* Australia.
P. fuscicapennis, Macq., l. c. Suppl. 5, p. 18 (1855).—*Hab.* Cape of Needles, Oceania.

Subgenus EREPHROSIS, Rond.

- **E. guttata*, Donovan. [*Tabanus guttatus*, Donovan, Illust. Ent. i. Hym. et Dipt. (1806); Guérin, Voyage de la Coquille, ii. pt. 2, p. 289 (1830); l. c. Atlas Ins. pl. 20; Wiedem., Auss. zweifl. Ins. i. p. 194 (1830); Walker, List Dipt. pt. i. p. 141 (1848). *Pangonia margaritifera*, Wiedem., l. c. p. 88; Macq., Dipt. Exot. Suppl. 3, p. 8 (1847); Williston, Kans. Univ. Quart. iii. (1895).]—*Hab.* Sydney.
 **E. macroporum*, Macq., Dipt. Exot. i. p. 101 (1838); Walker, List Dipt. pt. v. Suppl. 1, p. 143 (1854).—*Hab.* Kangaroo Island.
 **E. Jacksonii*, Macq., Dipt. Exot. i. p. 102 (1838).—*Hab.* Port Jackson.
E. bicolor, Macq., l. c. Suppl. 1, p. 24 (1846); Walker, l. c. p. 142 (1854).—*Hab.* Australia.
E. limbinevis, Macq., l. c. Suppl. 5, p. 21 (1855).—*Hab.* Sydney.
E. albonotata, Macq., l. c.—*Hab.* Sydney.
 **E. media*, ♀, Walker, l. c. pt. i. p. 142 (1848).—*Hab.* Australia.
 **E. submacula*, ♀, Walker, l. c.; id. Dipt. Saund. pt. i. p. 13 (1850).—*Hab.* Swan River.
 **E. quadrimacula*, ♀, Walker, List Dipt. pt. i. p. 138 (1848).—*Hab.* Australia.
 **E. contigua*, Walker, l. c.—*Hab.* Australia.
 **E. gemina*, ♀, Walker, l. c.—*Hab.* Australia.
 **E. gibbula*, Walker, l. c. p. 140.—*Hab.* West Australia.
 **E. tricolor*, ♀, Walker, l. c. p. 139.—*Hab.* West Australia.
 **E. divisa*, ♀, Walker, Dipt. Saund. pt. i. p. 17 (1850).—*Hab.* West Australia.
 **E. adrel*, White, MS., Walker, l. c. p. 16; Walker, List Dipt. pt. i. p. 141. [*Tabanus adrel*, White, MS., Butler, Cist. Ent. i. p. 355 (1876).]—*Hab.* New Zealand.
E. dilatata, Jænnicke, Abh. Senck. Gesell. vi. p. 328 (1868).—*Hab.* Australia.
E. vertebrata, Bigot, Mém. Soc. Zool. Fr. v. p. 618 (1892).—*Hab.* Australia.
 **E. aureohirta*, ♀, sp. n.—*Hab.* Mackay, Queensland.

DIATOMINEURA, Rond.

- D. aurijlva*, ♀, Donovan, Gen. Illust. Ent. pt. i. (1805). [*Tabanus aurijlva*, Donovan, l. c. *Pangonia solida*, ♀, Walker, List Dipt. pt. i. p. 141 (1848).]—*Hab.* New South Wales (*Don.*), Port Stephen (*Walker*).

- **D. jacksoniensis*, ♀, Guérin, Voyage de la Coquille, ii. pt. 2, p. 289 (1830); *l. c.* Atlas, Ins. pl. 20. 3.—*Hab.* Port Jackson, New-South Wales.
- D. testacea*, Macq., Dipt. Exot. i. p. 99 (1838); Walker, List Dipt. pt. v. Suppl. 1, p. 145 (1854).—*Hab.* Australia.
- D. aurata*, Macq., *l. c.* p. 100; *id.* Ann. Soc. Ent. Fr. vi. p. 429, pl. 15 (1837); Walker, *l. c.* pt. i. p. 141 (1848).—*Hab.* Tasmania and Australia.
- D. clavata*, Macq., *l. c.* p. 101.—*Hab.* Australia.
- D. ruficornis*, Macq., *l. c.* Suppl. 1, p. 26 (1846); Walker, *l. c.* pt. v. Suppl. 1, p. 142 (1854).—*Hab.* Tasmania.
- D. albicostata*, Macq., *l. c.* p. 24; Walker, *l. c.* p. 144 (1854).—*Hab.* Australia.
- D. subappendiculata*, Macq., *l. c.* Suppl. 4, p. 20 (1850).—*Hab.* Tasmania.
- D. testaceo-maculata*, Macq., *l. c.* p. 21.—*Hab.* Australia.
- D. brevirostris*, Macq., *l. c.* p. 23.—*Hab.* Australia.
- D. dorsomaculata*, Macq., *l. c.* p. 22.—*Hab.* Tasmania.
- D. violacea*, Macq., *l. c.*—*Hab.* Tasmania.
- **D. patula*, ♂, Walker, List Dipt. pt. i. p. 141 (1848).—*Hab.* ? Australia.
- **D. crassa*, ♀, Walker, *l. c.*—*Hab.* Australia.
- **D. plana*, ♀, Walker, *l. c.*—*Hab.* Australia.
- **D. gemella*, ♀, Walker, *l. c.* p. 139.—*Hab.* Australia.
- **D. constans*, ♀, Walker, Dipt. Saund. pt. i. p. 15 (1850).—*Hab.* Tasmania.
- **D. concolor*, Walker, *l. c.* p. 14.—*Hab.* Australia.
- **D. lerda*, White, MS., Walker, *l. c.* p. 16; Walker, List Dipt. pt. i. p. 141 (1848). [*Tabanus lerda*, White, MS., Butler, Cist. Ent. i. p. 355 (1876).]—*Hab.* New Zealand.
- **D. caliginosa*, ♀, Walker, Proc. Linn. Soc. viii. p. 108 (1865).—*Hab.* New Guinea.
- ? *D. carnea*, Bigot, Mém. Soc. Zool. Fr. v. p. 618 (1892).—*Hab.* Australia.
- ? *D. gagantina*, Bigot, *l. c.* p. 620.—*Hab.* Australia.
- **D. minima*, ♂ ♀, sp. n.—*Hab.* Queensland.

Subgenus CORIZONEURA, Rond.

- C. dives*, Macq., Dipt. Exot. Suppl. 1, p. 25 (1846); Walker, List Dipt. pt. v. Suppl. 1, p. 142 (1854).—*Hab.* Tasmania.
- C. angusta*, Macq., *l. c.* Suppl. 2, p. 11; Walker, *l. c.* p. 144.—*Hab.* Australia.
- C. brevipalpis*, Macq., *l. c.* Suppl. 3, p. 8; Walker, *l. c.*—*Hab.* Australia.
- C. rufovittata*, Macq., *l. c.* Suppl. 4, p. 19.—*Hab.* Tasmania.
- **C. fulva*, Macq., *l. c.*—*Hab.* Australia.
- C. anthracina*, Macq., *l. c.* p. 22.—*Hab.* Tasmania.
- C. alternans*, Macq., *l. c.* Suppl. 5, p. 19 (1855).—*Hab.* Cape of Needles, Oceania.
- C. sulcifrons*, Macq., *l. c.* p. 20.—*Hab.* Cape of Needles, Oceania.
- **C. erratica*, ♂, Walker, List Dipt. pt. i. p. 189 (1848). [*Tabanus erraticus*, Walker, *l. c.*]—*Hab.* Australia.
- **C. chrysofila*, ♀, Walker, *l. c.* p. 155. [*Tabanus chrysophilus*, Walker, *l. c.* *Pangonia aurofasciata*, Jænnicke, Abh. Senck. Gesell. vi. p. 327 (1868).]—*Hab.* Australia.
- C. nigrosignata*, Thomson, Eugen. Resa, p. 451 (1868).—*Hab.* Sydney.
- C. neocaledonica*, Mégnin, Bull. Soc. Ent. Fr. (5) viii. p. 145 (1878); *l. c.* ix. p. 61 (1879); *l. c.* (6) iii. p. 139 (1883).—*Hab.* New Caledonia.

- C. nigricornis*, Bigot, Mém. Soc. Zool. Fr. v. p. 614 (1892).—*Hab.* Australia.
 ? *C. rubiginosa*, Bigot, l. c. p. 615.—*Hab.* Australia.
C. leucopicta, Bigot, l. c.—*Hab.* New Caledonia.
C. trichocera, Bigot, l. c. p. 616.—*Hab.* Australia.
C. angusta, Bigot, l. c. p. 617.—*Hab.* Australia.

PANGONIA, Latr.

- P. Roei*, King, Narr. Surv. Coasts Austral. ii. p. 467 (1827); Wiedem., Auss. zweifl. Ins. ii. p. 647 (1830); Walker, List Dipt. pt. i. p. 145 (1848); id. l. c. pt. v. Suppl. 1, p. 145 (1854).—*Hab.* Australia.
P. lasiophthalma, Bois., Voy. Astrolabe, Zool. ii. p. 666 (1832); Macq., Hist. Nat. Dipt. i. p. 193 (1834); Walker, List Dipt. pt. v. Suppl. 1, p. 139 (1854); Wulp, Cat. Dipt. S. Asia (1893). [*P. fuliginous*, Bois., Voy. Astrolabe, Zool. ii. p. 663 (1832).]—*Hab.* New Guinea.
P. maculiventris, Westwood, London & Edinburgh Phil. Mag. (3) vi. p. 449 (1835).—*Hab.* Australia.
P. dorsalis, Macq., Dipt. Exot. i. p. 100 (1838).—*Hab.* Australia.
P. conjungens, ♀, Walker, l. c. pt. i. p. 140 (1848). This type is not to be identified in the Museum Coll.—*Hab.* Australia.

PANGONIA, Latr.

PANGONIA, Rond.

Subgenus EREPHROSIS, Rond.

Wings with first posterior cell closed. *Eyes* hairy.

Erephosis guttata, Donovan, Illust. Ent. i. Hym. et Dipt. (1806).

Tabanus guttatus, Donovan, Guérin, Voyage de la Coquille, vol. ii. pt. 2, p. 289 (1830); Atlas Ins. pl. 20; Wiedem., Auss. zweifl. Ins. i. p. 194 (1830); Walker, List Dipt. pt. i. p. 141 (1848).

Pangonia margaritifera, Wiedem., l. c. p. 88 (1830); Macq., Dipt. Exot. Suppl. 3, p. 8 (1847); Williston, Kans. Univ. Quart. iii. (1895).

The name *guttata* has priority and was kept by Walker in his Catalogue, though Macquart and Williston retained Wiedemann's name *margaritifera*. The *Tabanus guttatus* figured by Donovan is evidently the same as *P. margaritifera*, though the spurs on hind legs are not shown in the plate, and the antennæ are figured with a tooth, but in general form and markings it agrees with *margaritifera*; it is again figured by Guérin in 'Voyage de la Coquille,' Atlas, and mentioned in vol. ii. as a variety with no tooth to the antennæ and no white spots on middle of abdomen.

Hab. Australia, Sydney.

Erephrosis media, ♀, Walk. List Dipt. pt. i. p. 142 (1848).

The palpi have the second joint long, club-shaped at base,

tapering to a long point. Wings with a short appendix on fork of third vein.

Hab. Australia.

Erephrosis submacula, ♀, Walker, List Dipt. pt. i. p. 142 (1818); id. Dipt. Saund. pt. i. p. 13 (1850).

Walker has described two species under this name, but the one described in Dipt. Saund. is not to be identified. The type is old and denuded of hairs. Walker's description may be amended thus, from modern specimens:—

Antennæ bright red, the first and second joints ferruginous, with black hairs. Face has a black square mark above the palpi; these latter are long and slender. Proboscis is short. Thorax with tawny hairs on sides, extending also to the scutellum. There are tufts of white hairs on the middle of the posterior borders of the first four segments of abdomen, thickest on the third and fourth; the hind segments incline to a reddish colour. Wings with first and fourth posterior cells closed; a rudimentary appendix is present on the fork of the third longitudinal vein in only one out of the four female specimens in the Museum.

This species should belong to *Scione*, Walker (*Diclisa*, Schiner), having the fourth posterior cell closed, but the head, face, and proboscis do not agree with the description of the genus (*Diclisa*, Schiner) in 'Reise der Novara,' and it is too nearly allied to the two preceding species to make it advisable to remove it from *Erephrosis* at present.

Hab. Swan River, King George Sound, N. & W. Australia.

Erephrosis adrel, ♂ ♀, White, MS., Walker, Dipt. Saund. pt. i. p. 16 (1850); Walker, List Dipt. pt. i. p. 141 (1848).

Tabanus adrel, White, MS., Butler, Cist. Ent. i. p. 355 (1876).

This was one of the species collected in voyage of 'Erebus' and 'Terror' and described by White in MS. only. Walker described it in Dipt. Saund. as *Pangonia adrel*, White. Butler published White's original description of it, believing it had not been published before. White placed it under *Tabanus*. Two out of the six male specimens in the Museum have the first posterior cell of wings closed, in all the others it is open; in the female specimens it also varies. In the original description there is no mention of the wing-cells; Walker says the first posterior cell is closed. In the male the sides of the first two segments of the abdomen are fulvous; the tufts of white or yellow hair on middle of abdominal segments are not

so conspicuous in the female and sometimes resolve themselves into faint bands of white or yellow hairs.

Hab. New Zealand.

Erephrosis quadrimacula, ♀, Walker, List Dipt. pt. i. p. 138 (1848).

The palpi have the second joint more than double as long as the first, large and wide, tapering to a point. Wings have no appendix.

Hab. Australia.

Erephrosis contigua, ♀, Walker, List Dipt. pt. i. p. 138 (1848).

The palpi have the second joint large and wide, concave, tapering to a point. The first and second segments of abdomen ferruginous, the transverse spots on them more black than grey. In the male the spot on first segment is not so conspicuous as in female, and that on the third segment is broken up into two round black spots: the sides of segments are fringed with hairs—on first and second yellow and black mixed, on third and fourth wholly black, on fifth and sixth yellow, the third segment almost wholly ferruginous; there are traces of white hairs on the middle of the posterior borders of segments.

Hab. Australia.

? *contigua*, var., Walker.—There are two males almost similar to above, but the yellow hairs on sides of abdomen are here white and conspicuous only on the last segment, the dorsal stripe on the first two segments is distinct. The legs are much darker, all the femora black, and the hind legs entirely black.

Hab. Queensland.

Erephrosis aureohirta, ♀, sp. n. (Pl. I. fig. 10.)

Black. Face brown with greyish pubescence, black stripe on forehead. Beard yellow. Antennæ ferruginous; first and second joints grey, the latter with some black hairs. Palpi ferruginous, with the second joint large and broad, concave, ending in a point, with some black hairs on margins and tip. Proboscis as long as head and thorax together. Thorax with golden pubescence on the sides. Abdomen with the first three segments reddish brown, clothed with thin golden pubescence, thicker on the posterior margins; the remaining

segments dark with black pubescence, their posterior margins lighter; sixth and seventh with tufts of white hairs at the sides. Legs black; anterior tibiæ and tarsi brown. Wings with fore border brown, and two cross-bands, the lower one darkest, extending from the border to the basal half of the discoidal cell, the upper one from the border to the apex of the discoidal cell. No appendix. Length 14 millim.

Hab. Mackay, Queensland (*Turner*).

Erephrosis gemina, ♀, Walker, List Dipt. pt. i. p. 138 (1848).

The palpi have the second joint short and broad, concave, as long as the first joint. Wings have no appendix.

Two females were wrongly labelled "*conjungens*, Walker."

Hab. West Australia; Perth, South Australia.

Erephrosis macroporum, Macq., Dipt. Exot. i. p. 101 (1838);
Walker, List Dipt. pt. v. Suppl. 1, p. 143 (1854).

One female.

Hab. Kangaroo Island.

Erephrosis divisa, ♀, Walker, Dipt. Saund. pt. i. p. 17
(1850).

The palpi have the second joint large and broad, concave, the same length as the first joint. Wings with no appendix.

Hab. West Australia.

Erephrosis Jacksonii, Macq., Dipt. Exot. i. p. 102 (1838).

The wings were not described by Macquart, as they were mutilated in his type.

Wings with cross-veins shadowed; in one female the first posterior cell is open on one wing, but closed as a rule.

The *Jacksonii* var. mentioned by Walker in Dipt. Saund. pt. i. p. 15 and List Dipt. pt. i. p. 140 is not to be identified.

Hab. Swan River, Australia.

Erephrosis gibbula, ♂, Walker, List Dipt. pt. i. p. 140 (1848).

The palpi have the two joints equal in length, the second one being broad and somewhat concave. Wings have an appendix on fork of third longitudinal vein.

Hab. West Australia.

Erephrosis tricolor, ♀, Walker, List Dipt. pt. i. p. 139 (1848).

The palpi have the second joint slender, curved, and

tapering to a point. Walker omits to mention that the fourth segment of abdomen is fringed with white hairs on its posterior border, and the sides of segments five and six have tufts of white hair.

Hab. West Australia.

DIATOMINEURA, Rond.

Wings with first posterior cell open. *Eyes* hairy.

Diatomineura concolor, ♀, Walker, Dipt. Saund. pt. i. p. 14 (1850).

The palpi have the second joint large and broad, tapering to a point. The male is similar to the female (the type). One of the female specimens has the first posterior cell closed at the margin on one of the wings.

Hab. Australia: Moreton Bay, Toowomba.

Diatomineura caliginosa, ♀, Walker, Proc. Linn. Soc. viii. p. 108 (1865).

Walker says "palpi piceous." They are only so at the tip and edges, otherwise the same colour as the antennæ; the second joint is large and broad, tapering to a point, curved on the upperside.

Hab. New Guinea.

Diatomineura constans, ♀, Walker, Dipt. Saund. pt. i. p. 15 (1850).

The palpi have the second joint broad and concave at the base, tapering to a point.

Hab. Tasmania.

Diatomineura jacksoniensis, ♀, Guér. Voyage de la 'Coquille,' vol. ii. pt. 2, p. 289 (1830); Atlas Ins. pl. 20. 3.

Hab. Melbourne.

Diatomineura plana, ♀, Walker, List Dipt. pt. i. p. 144 (1848).

The palpi have the second joint broad at the base, tapering to a point.

Hab. Australia.

Diatomineura gemella, ♀, Walker, List Dipt. pt. i. p. 139 (1848).

The palpi have the second joint stout at base, tapering to a

point. The legs are black, the tibia ferruginous. Wings with an appendix on fork of third longitudinal vein.

Hab. Australia.

Diatomineura lerda, White, MS., Walker, Dipt. Saund. pt. i. p. 16 (1850); Walk. List Dipt. pt. i. p. 141 (1848).

Tabanus lerda, White, MS., Butler, Cist. Ent. i. p. 355 (1876).

See remarks on *Erephrosis adrel*, White, which apply to this species also.

Hab. New Zealand.

Diatomineura minima, sp. n. (Pl. I. figs. 4 ♂, 5 ♀.)

One male and two females.

This may possibly be the same as *D. gargantina*, Bigot (Mém. Soc. Zool. Fr. v. p. 620, 1892), but the description is so incomplete that it is impossible to determine any fly from it (Bigot himself doubts whether his species belongs to *Diatomineura*). For the present, therefore, I prefer to regard the British Museum specimens as belonging to a distinct species.

Black (male and female). Face and forehead grey; frontal stripe on upper half of forehead black in female; black hairs on the face.

Antennæ with the first two joints grey; the third is reddish at the base, black at the tip; the palpi are reddish; in the female with black hairs, curved, broad at base, tapering to a point. Beard scanty and whitish. Thorax with black hairs at sides, and grey hairs on breast. Abdomen with fine white hairs on lateral margins of segments, in the female greyish; underside of abdomen with grey tomentum. Legs brown, whitish tomentum on the posterior femora of female. Wings dark brown, paler on the posterior borders.

Length 8 millim.

Hab. Sydney or Moreton Bay, Queensland.

Diatomineura auriflua, ♀, Donovan, Gen. Illust. Ent. pt. i. (1805).

Tabanus aurifluus, Don. l. c.

Pangonia solida, ♀, Walker, List Dipt. pt. i. p. 141 (1848).

Walker's type seems the same as *auriflua*, of which Donovan gives a plate. Walker's description should be referred to for the species, and may be amended thus as regards the abdomen. Palpi broad at base, ending in a point. Abdomen with golden or white tufts of hair on the middle of

the posterior borders of the segments, also white tufts on the lateral margins of segments 1-4, most marked on the second, becoming an oblong spot or even reaching as a narrow fringe to the tuft in centre, on 3 and 4 often very insignificant.

Two specimens, labelled "*aurata*, Macq.," and four of *solida*, Walker, belong here.

Hab. Sydney or Moreton Bay, Mackay, Queensland, Port Stephen, Tasmania.

Diatomineura crassa, ♀, Walker, List Dipt. pt. i. p. 144 (1848)

The palpi have the second joint large and broad, tapering to a point. In both sexes the posterior parts of the thorax and the scutellum are adorned with a fringe of yellowish hairs. In the male the abdomen is more fulvous in colour; in the female the yellow hairs are chiefly on the middle of the posterior borders of the segments as triangular spots, and on the lateral posterior margin of second segment there is a well-marked tuft of white hairs, overlooked by Walker.

Hab. Australia, Sydney or Moreton Bay.

? *Diatomineura patula*, ♂, Walker, List Dipt. pt. i. p. 144 (1848).

One male specimen in very bad condition, locality not known. It has a general resemblance to the last two species; I therefore place it under Australia for the present.

Hab. ? Australia.

Subgenus CORIZONEURA.

Wings with first posterior cell open. *Eyes* bare.

Corizoneura fulva, Macq., Dipt. Exot. Suppl. 4, p. 19 (1850).

Two male specimens, which were wrongly labelled "*Roei*, King."

Hab. Australia (*Lord Derby coll.* and *Lambert*).

Corizoneura chrysophila, ♀, Walker, List Dipt. pt. i. p. 155 (1848).

Tabanus chrysophilus, Walk. *l. c.*

Pangonia aurofasciata, Jænnicke, Abh. Senck. Gesellsch. vi. p. 327 (1868).

This fine species was placed by Walker among the *Tabani*. Jænnicke redescribed it fully and should be consulted: the

third joint of antennæ was gone in his type; in these three female specimens it is the same colour as the preceding ones, long and slender, its first annulation wide, the others tapering off to a point. Walker's type cannot be identified from amongst the three females.

N.B.—The name *chrysophilus* was used by Macquart (Hist. Nat. Dipt. i. p. 194) for an African species; since, however, *chrysophilus*, Walker, is differently derived, both designations may be retained.

Hab. Australia.

? *Corizoneura erratica*, ♂, Walker, List Dipt. pt. i. p. 189 (1848).

Tabanus erraticus, Walker, l. c.

This was placed by Walker among the *Tabani*, but it is distinctly a *Pangonia*, Latr.; the eyes apparently bare; it is in very bad condition, the antennæ broken off, one lying on the face.

Hab. North or north-west coast of Australia.

The *Pangonia conjungens*, ♀, Walker (List Dipt. pt. i. p. 140), from Australia, type, is missing.

The *Pangonia lurida*, ♀, Walker, is not a *Pangonia* at all; it belongs to the *Tabaninae*.

[To be continued.]

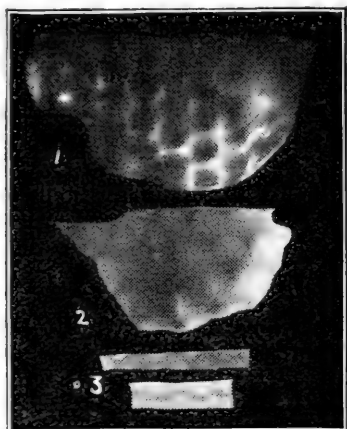
XIII.—*The Hexagonal Structure naturally formed in Cooling Beeswax, and its Influence on the Formation of the Cells of Bees.* By CHARLES DAWSON, F.G.S. &c., and S. A. WOODHEAD, B.Sc., F.C.S., &c., County Analyst, East Sussex*.

THE hexagonal arrangement of the cells of bees has been generally ascribed to a structural instinct. The object of this paper is now to show that the form of the bee-cell is chiefly influenced by a crystalline or pseudo-crystalline hexagonal formation due to the cooling of the wax.

While experimenting with waxes and resins, one of us (Mr. Dawson) noticed that on cooling the mixture had a tendency to arrange itself in hexagonal forms, from which

* Communicated by the Authors, having been read at the Dover Meeting of the British Association, 1899.

he surmised that the outline of bee-cells might be primarily due to the natural structure produced in cooling wax* (fig. 1).



At the instance of Mr. Woodhead, who also recognized the analytical importance of such a discovery, we agreed to work out the details together in Mr. Woodhead's laboratory at the Agricultural College, Uckfield.

It was first of all determined that, although the addition to beeswax of resinous substances gave a more pronounced and bolder outline to the hexagons, no such addition was necessary to beeswax for their production.

If a thin slab of beeswax be melted in a shallow tray (measuring, say, 10 by 8 inches), which is evenly heated throughout and is then placed to cool gradually in a warm atmosphere without draught, hexagonal forms of the ordinary size of a worker-cell of the hive-bee will be seen gradually forming at the bottom of the dish; and a similar line of hexagons will be seen to form on the surface of the wax round the sides of the dish where the wax first cools. The sides of the hexagon are to be seen forming and branching out in advance of the cooling wax, and when a portion of the wax in the centre of the dish alone remains melted the remaining crystals form very rapidly and almost appear to flash out upon the surface.

The tray should be exactly level and the wax about

* The specimens in illustration of this paper may be seen at the Laboratory at the Agricultural College, Uckfield, Sussex.

1.5 millim. thick and of uniform depth, and the atmosphere of even temperature, otherwise the hexagons will be irregular in size and shape.

It is immaterial how thin the plate of wax is, as the hexagons are formed in any case; but their size is undoubtedly regulated by the thickness of the plate of wax, the rule being the thinner the plate the more minute the individual hexagon. The same result may be obtained on a much smaller scale, so as to produce only one or two hexagonal forms; but the operator will then find that the difficulty lies in the rapid cooling at the sides of so small a mass of wax.

The explanation of the formation of these crystalline bodies is as follows:—

On cooling, the wax at first forms into nuclei of nearly equal size. On the shrinking of the wax by further cooling, these nuclei or spheroids are pressed together, forming planes at their points of contact (see longitudinal section, fig. 2). Should the wax be rapidly chilled before these spheroidal bodies are fully formed, they are then prevented from coming into contact one with another by the intervening nebulous masses of “uncentralized” particles of wax*. In this state the nuclei appear when cold as solid circular bodies.

The crystals appear very distinctly above and below the surface while the wax is cooling. When it is actually solid their forms are often very indistinctly seen or may be altogether invisible, but they are none the less present.

The bases of these hexagons, which lie midway between those visible at the top and those at the bottom, are pointed and are arranged so that the point of the base of the upper hexagon coincides with the points of contact of the lower hexagons, as in the honeycomb (see perpendicular sections, figs. 3).

These bases can be observed by making a very thin microscopic section; but several hundred sections had to be examined before they were made out with certainty.

When a small amount of resin and turpentine is added to beeswax and melted, and the mixture is allowed to cool, the outlines of the planes of contact on the hexagons are more distinct and are to be seen raised upon the surface. Under these circumstances they may be easily rubbed with black-lead, which still further increases their visibility.

Our chief experiment was next to put our theory to a practical test, and observe in what manner the bees would

* It would appear from microscopic examination that these particles are also smaller nuclei which become absorbed in the larger. They also, like the larger, assume hexagonal form.

deal with a cast sheet of pure beeswax, which, when viewed by a side light, distinctly showed traces of these hexagons over its surface.

Before introducing it to the bees we had traced upon it with vermilion a group of the hexagons which appeared near the centre of the plate*. This was then photographed, after which the wax plate was placed in an observatory-hive on a bar-frame. The bees soon started upon it, proceeding to excavate round hollows in the centres of the hexagons near the edges of the plate, pushing out on all sides the wax débris around the edge of each excavation. When they reached the planes of contact of the hexagons, either on feeling the minutely raised edges on the surface, or more probably on feeling the increased density of the wax †, the bees determined the limits of their excavation; and it was then discovered by us that the bases of these hexagons were three-sided in the usual form of a bee-cell. Meanwhile a similar process was going on in the cells which lay as nearly as possible in the same irregular wavy line; but the work on one side of the sheet was sometimes considerably more advanced than on the other, the excavation being brought three or four more rows of cells nearer the centre on one side than on the other.

Portions of the débris taken from the centre of the crystal were now kneaded up by the bees into a kind of froth and placed above the lines of pressure or margins of the hexagons, the residue of the débris being put aside for future use.

The portions placed on the margin of the hexagon speedily adhered and solidified; another layer was then added by the bees, and this process was repeated, thus forming a series of strata (which may be noticed under a magnifying-glass on the sides of the complete cells), the bees planing and polishing the inner surfaces of the cell upwards from the base, taking as guides the planes and angles of the hexagons ‡.

In the places where we had traced the outlines of the hexagons in vermilion the bases of the cells were to be distinctly seen formed upon the vermilion outlines. Similar experiments have been repeatedly tried, with the same results.

* We black-leaded another group, with similar results.

† There are two reasons for the density of the wax, namely, the outer edges of the nebule are composed of smaller particles, and are therefore more compact, also the pressure brought to bear on the planes of contact renders the sides of the bodies still more compact.

‡ A plate of wax produced by compression and in which no crystals had formed was inserted in the hive; this the bees gnawed to pieces and (?) utilized elsewhere.

In places where the wax plate had been of uneven depth or had cooled too rapidly, the comb presented an irregular appearance, following in form the irregular hexagonal bases beneath, the result being very distinctive and striking to the practised eye of an apiarist.

When in a natural state the newly secreted wax is formed into a small pendent plate, it is probable that the bees crowding around produce the required amount of heat to soften or to keep soft the newly deposited wax, and allow it to cool very gradually when a few hexagonal bodies form within the plate, and these must be soon afterwards hollowed out and built upon. The same process takes place repeatedly against the sides of newly formed hexagons, until the comb is large enough to suit the requirements of the bee, the sizes of the cells being partly influenced and regulated, as above stated, by the rapidity or otherwise of the process of cooling of the wax, and so indirectly, as previously mentioned, by the thickness of the cooling mass*. The size of the crystals may be varied experimentally from those of nearly an inch across to others of microscopic dimensions.

At the time of writing this paper we have not yet succeeded in casting a large sheet of wax containing groups or rows of hexagons so perfectly regular as those which are to be seen in a natural comb or in a comb built upon the ordinary manufactured comb-foundation. We do not pretend, even after many experiments, to be able to cast a foundation of hexagons with the same comparative exactitude as those made by a bee. Although we have little doubt that we may soon be able to do so, we cannot expect in a few limited experiments to compete with the bee, whose seeming aptitude is probably the outcome of ages of natural selection and adaptation. Yet the bees still prefer to adopt our less regular groups or rows of crystals as bases to work upon rather than pull our wax-plate to pieces so as to recast the wax with greater regularity.

A further outcome of our discoveries is that paraffin wax and adulterated beeswax do not assume the same hexagonal form as pure beeswax. We are not aware that other "animal fats" on cooling assume so regular an hexagonal form.

We have succeeded in producing a variety of characteristic forms of these pseudo-crystalline bodies by the treatment of certain waxes with other fats, oils, or waxes. The analytical

* The temperature within a hive, as repeatedly measured by two self-recording thermometers in June 1899 at Uckfield, reached 105° Fahr. without contact with the bodies of the bees.

value of these experiments we hope will prove to be very great both directly and indirectly, and open up an immense field of crystallography in its relation to oils, fats, and waxes.

It has also naturally occurred to us that the formation of certain intricate structures by other insects may be also more or less directly due to crystalline or pseudo-crystalline formation*.

XIV.—*British Amphipoda of the Tribe Hyperiidea and the Families Orchestiidae and some Lysianassidae.* By Canon NORMAN, M.A., D.C.L., LL.D., F.R.S., &c.

I PURPOSE in these notes to revise the species of British Amphipoda, and at the same time give an account of the Amphipoda procured during the North Atlantic Expeditions of the 'Porcupine,' 'Valorous,' 'Knight Errant,' and 'Triton.' The records of the larger number of the captures of these expeditions will fall under the British species, but in those instances where the species are not members of our fauna, that which relates to them will be enclosed in brackets.

The study of this group of Crustacea has been beset with difficulty, and in consequence of inadequate descriptions and illustrations old records of species must, in some instances, be received with caution. The publication of the splendid work of Professor G. O. Sars has supplied the student with most perfect descriptions and illustrations of the Amphipoda of Norway, which include by far the greater part of those known in our own fauna. If the critic is sometimes inclined to think that occasionally there are to be found in that work divergences described as specific which he would rather regard as varietal, after all it is a mere matter of opinion, and the author has at any rate directed our attention to modifications of character which are worthy of study. In Sars's work we recognize a standard authority, and the arrangement there set forth will here be followed.

I have only given references to such authors and papers as especially throw light upon the species and their more important synonymy. By way of shortening the references to the most frequently quoted authors, the following numbers will be employed. In those cases where the work was included in the list of works and papers on Isopoda lately given by me in the 'Annals' in my paper on "British Isopoda Chelifera"

* The cells of wasps, though hexagonal, have not the prismatic base of the bee-cell. Analysis shows that they contain typical wax crystals.

(Ann. & Mag. Nat. Hist. ser. 7, vol. iii. 1899, p. 317) I have here repeated the same prefix number as was there used:—

- (1) BATE and WESTWOOD.—‘History of British Sessile-eyed Crustacea.’ 1861–9.
- (137) BOECK (A.).—“Crustacea Amphipoda borealia et arctica,” Vid.-Selsk Forhand. 1870.
- (138) BOECK (A.).—‘De Skandinaviske og Arktiske Amphipoder.’ 1872–6.
- (139) DELLA VALLE (A.).—‘Fauna und Flora des Golfes von Neapel.’ 20. Monographie: Gammarini. 1893.
- (140) HANSEN (H. J.).—“Oversigt over de paa ‘Dijmphna’-Togtet indsamlede Krebsdyr,” ‘Dijmphna’-Togtets zoologiske-botaniske Udbytte. 1886.
- (141) HANSEN (H. J.).—“Oversigt over det vestlige Grönlands Fauna af Malakostrake Havskrebsdyr,” Vidensk. fra den Naturf. Foren. i Kjöbenhavn. 1887.
- (71) MEINERT (FR.).—Crustacea Malacostraca in Petersen’s “Det Videnskabelige Udbytte kanonbaden ‘Hauchs’ Togter ia de Danske Have indenfor Skagen 1883–86.” 1888–9.
- (102) SARS (G. O.).—“Oversigt af Norges Crustaccer med foreløbege Bemærkninger over de nye eller mindre bekjendte Arter. I,” Vid.-Selsk. Forhand. 1882.
- (104) SARS (G. O.).—‘Norwegian North Atlantic Expedition, 1876–78,’ Crustacea, i. 1885, ii. 1886.
- (142) SARS (G. O.).—‘An Account of the Crustacea of Norway,’ vol. i. Amphipoda, 1890–95.

With respect to localities given, specimens are in my own collection from all habitats by whomsoever collected which precede the indication *Mus. Nor.* As at my death my collections will be deposited in the Brit. Mus. it will be known where types and specimens thus indicated can be examined in case of doubt attaching to species. As regards all other habitats given, the authority for them is that of the carcinologists whose name is added.

In the case of those whose names will thus most frequently occur, I shall employ, for brevity’s sake, their initials as follows:—

A. M. N.—A. M. NORMAN.

D. R.—DAVID ROBERTSON. The localities are taken from his two papers on the Amphipoda and Isopoda of the Firth of Clyde. (Trans. Nat. Hist. Soc. Glasgow, vol. ii. 1888 and vol. iii. 1892.)

T. S.—THOMAS SCOTT. Localities taken from his numerous papers on the Crustacea of Scotland, for the most part published in the Reports of the Fishery Board of Scotland.

A. O. W.—ALFRED O. WALKER. With respect to the Crustacea of the district of Liverpool and the Isle of Man, I have depended on his 'Revision of the Amphipoda of the L.M.B.C. District,' as being the corrected list. Most of Mr. Walker's papers are published in the Trans. Liverpool Biol. Assoc.; others will be referred to; but one should be here mentioned as it does not embrace any descriptions of species, but contains a good list of Channel Island Amphipods: "Report on the Schizopoda, Cumacea, Isopoda, and Amphipoda of the Channel Islands," by A. O. Walker and J. Hornell (Journal of Marine Zoology and Microscopy, vol. ii. 1896.)

AMPHIPODA.

Tribe I. HYPERIDEA.

Fam. I. Hyperiidæ.

Genus 1. HYPERIA, Latreille.

(Syn. *Lestrigonus*, M.-Edw., ♂.)

1. *Hyperia galba*, Montagu.

1863. *Hyperia galba*, B. & W. (1) vol. ii. p. 12, ♀.

1863. *Lestrigonus exulans* (Krøyer), B. & W. (1) vol. ii. p. 5, ♂.

1863. *Lestrigonus Kinahani* (Bate), B. & W. (1) vol. ii. p. 8, ♂.

1869. *Hyperia galba*, Norman, "Last Report Dredging Shetland Isles," Brit. Assoc. Rep. for 1868, p. 286, ♂ ♀.

1872. *Hyperia medusarum*, Boeck (*nec* Müller), p. 79, pl. ii. fig. 1.

1887. *Hyperia Latreillei* (M.-Edw.), Bovallius, Contrib. Mon. Amphip. Hyperiidea, pt. 1 (Kong. Sv. Vet.-Akad. Hand. vol. xxi. no. 5), p. 164, pl. ix. figs. 31-43, pl. x. figs. 1-17.

1887. *Hyperia galba*, id. *ibid.* p. 180, pl. x. figs. 25-32.

1887. *Hyperia spinigera*, id. *ibid.* p. 191, pl. x. figs. 33-39.

1890. *Hyperia galba*, Sars, (142) p. 7, pl. ii. & pl. iii. fig. 1.

Hab. Shetland; East of Scotland; Plymouth; Birturbay Bay (*A. M. N.*); 55 miles off Valentia, Ireland, 'Porcupine,' 1869; Banff (*T. Edward*): *Mus. Nor.* Firth of Clyde (*A. M. N.*); Anglesea (*A. O. W.*); Mull (*G. Brook*); Firth of Forth (*Cunningham*); St. Andrews (*McIntosh*); Loch Fyne and Moray Firth (*T. S.*).

Distrib. Arctic regions from Greenland to Murman coast, Norway, the Baltic, west coast of France.

As I pointed out in my Shetland Report of 1863, *Lestrigonus exulans* and *Lestrigonus Kinahani* of Bate and West-

wood are different stages of development of the male of this species. Bovallius regards *Hyperia Latreillei*, M.-Edw., as a distinct species; but I agree with Sars in considering that the differences indicated are insufficient for specific distinction, and are in a great measure dependent on the ages of the individuals examined. Yet, further, I am unable to hold the *Hyperia spinigera*, Bovallius, as entitled to specific rank. The chief characters assigned are the spination of the two pairs of gnathopods and the form of the uropods. With respect to the gnathopods, I find that in young specimens of *H. galba* the spines are sparingly developed, in middle-sized individuals they become more numerous; in large examples I find them, as in *H. spinigera* (Bovallius, *l.c.* pl. x. figs. 34-36), encircling the extremities of the carpus of the gnathopods and well developed at the dorsal corners. The other points Bovallius especially emphasizes are the short branches of the last uropods. Now in the male sex the branches of the last uropods are always shorter than are those of the female (compare Sars, pl. ii. fig. *us* and pl. ii. fig. *1 us*); and it is a male which is the subject of Bovallius's figures. Should other authors disagree with my views in this matter, the female specimens of *H. galba* taken by me at Birturbuy Bay and the one taken off Valentia by the 'Porcupine' are, from the character of their gnathopods, to be referred to *H. spinigera*.

The *Cancer medusarum* of Müller's 'Prodrömus' was applied by O. Fabricius, in his 'Fauna Gröenlandica,' under the name *Oniscus medusarum*, to *H. galba*, and he has been followed by many authors. The *Metoecus medusarum* (Fabr.), Kröyer and other authors, is *Hyperoche tauriformis* (Bate & Westwood*). Lastly, Bovallius, Hansen, and Sars now consider the specific name *medusarum* (*Cancer medusarum*, Müller) to belong to *Hyperia spinipes* of Boeck. Müller applied the specific name to the animal described by Ström, and they doubtless think that weight must be attached to Ström's description of the first two pairs of legs as "hirsute and fluffy, truncated at the apex." *Hyperia medusarum* (Müller) thus considered, of which the *H. spinipes*, Boeck, becomes a synonym, has not yet been found in our seas. *Talitrus cyaneæ*, Sabine, is indeed regarded as a synonym of *H. medusarum* (= *spinipes*), but what the *Hyperia cyaneæ* of Bate and Westwood (vol. ii. p. 521) may be it seems

* I first found this species in Shetland, and soon afterwards T. Edward procured it at Banff, and sent a specimen to me and another to Bate. I recorded the specimens I had seen in my Shetland report as *Metoecus medusarum*, Kröyer; Bate and Westwood did not recognize Edward's specimen as a known form, and described it as *Hyperia tauriformis*, a name which now stands.

impossible to say. They compare it to *Hyperia galba*; but the following sentence in the description of this small form, "rather more than three-twentieths of an inch long," found by Edward at Banff, is very puzzling:—"Dactyli of three posterior pairs of pereopoda long, sharp, and furnished with a bunch of cilia in the middle."

Genus 2. HYPEROCHE, Bovallius.

[Syn. = *Metoecus*, Kröyer (in use) = *Tauria*, Boeck (not Dana).]

2. *Hyperoche tauriformis* (Bate & Westwood).

1838. *Metoecus medusarum*, Kröyer, Grönlands Amphipoder, p. 288, pl. iii. fig. 15.

1869. *Metoecus medusarum*, Norman, "Last Report Dredging Shetland Isles," Brit. Assoc. Rep. for 1868, p. 287.

1869. *Hyperia tauriformis*, Bate & Westwood, (1) vol. ii. p. 519.

1872. *Tauria medusarum* and *Tauria abyssorum* †, Boeck, (138) pp. 82 & 83, pl. i. fig. 2.

1889. *Hyperoche Kröyeri*, Bovallius, l. c. p. 87; *Hyperoche abyssorum*, p. 94; *Hyperoche Lütkeni*, p. 97, pl. vii. figs. 1-26; and *Hyperoche tauriformis*, p. 115.

1890. *Hyperoche Kröyeri*, G. O. Sars, (142) p. 9, pl. iv.

Hab. Banff (*T. Edward*); Shetland (*A. M. N.*): *Mus. Nor.* Firth of Forth; Firth of Clyde; Loch Fyne (*T. Scott*); near Puffin Island, N. Wales (*A. O. W.*).

Distrib. Faroe Channel, 'Triton' Exped. (*Sir J. Murray*); Greenland, and lat. 52° 53' N., long. 23° 44' W., surface, in great abundance, 'Valorous' 1870: *Mus. Nor.* The species has an arctic range from Siberia to Greenland.

2*. *Hyperoche prehensilis* (Bate & Westwood).

1869. *Hyperia prehensilis*, Bate & Westwood, (1) vol. ii. p. 540.

1885. *Hyperoche prehensilis*, Bovallius, System. List of Amphip.

Hyperiid. (K. Svenska Vet.-Akad. Handl. vol. ii.), p. 19 (sep. copy).

1889. *Hyperoche prehensilis*, Bovallius, Contrib. &c. p. 93.

The only known example "was taken at Banff by Mr. T. Edward." The characteristic feature is the subchelate character of the posterior pairs of pereopods; but this character Bovallius thinks may be a feature depending only on the young stage of the animal. Indeed Fr. Müller has described just such a difference in the posterior pereopods in his *Hyperoche Martinezi*, in which species these legs are prehensile in the young (as in *H. prehensilis*) and simple in the adult (as in *H. tauriformis*). It would appear therefore that the former will probably be proved to be the young stage

† First described by Boeck in 1870.

* I repeat the previous number here with an asterisk, because I regard *H. prehensilis* as not a satisfactorily established British species; and similarly repeated numbers must be interpreted in the same way throughout these papers.

of the latter species. (Vide *H. Martinezii*, Bovallius, 1889, p. 107.)

Genus 3. PARATHEMISTO, Boeck.

3. *Parathemisto oblivia* (Kröyer).

1838. *Hyperia oblivia*, Kröyer, Grönlands Amphip. p. 70, pl. iv. fig. 19.
 1869. *Hyperia oblivia*, Norman, "Last Report Dredging Shetland Isles,"
 Brit. Assoc. Rep. for 1868, p. 287.
 1890. *Parathemisto oblivia*, Sars, (142) p. 10, pl. v. fig. 1.

It is also *Parathemisto abyssorum* of Boeck and *Parathemisto oblivia* of Bovallius.

Hab. Shetland (*A. M. N.*); Banff (*T. Edward*); St. Andrews (*McIntosh*); 25 miles off May Island, Firth of Forth (*Sir J. Murray*); *Mus. Nor.* Off the mouth of the Tees (*G. S. Brady*); Moray Firth, Firth of Forth, and 70-80 miles off mouth of the Humber (*T. S.*); surface-net at Sanda Pay, near Mull of Cantyre (*D. R.*); off Gally Head, Co. Cork (*A. O. W.*); Valentia and Dingle Bay (*Rev. W. S. Green*).

Distrib. Faroe Channel, 'Triton' (*Sir J. Murray*); Knævanger Fiord, Finmark (*J. S. Schneider*); *Mus. Nor.* Norway and off Jan Mayen (*G. O. Sars*); Kara Sea (*Hansen*); Greenland (*Kröyer*); Bay of Biscay, 950 metres, 'Caudan' (*J. Bonnier*).

3*. *Parathemisto gracilipes* (Norman).

1863. *Hyperia oblivia*, Bate & Westwood, (1) vol. ii. p. 16.
 1869. *Hyperia gracilipes*, Norman, "Last Report Dredging Shetland Isles," Brit. Assoc. Rep. for 1868, p. 287.
 1887. *Parathemisto longipes*, Bovallius, "Syst. List of Amphip. Hyperideae," Bih. t. K. Sv. Vet.-Akad. Hand. vol. xi. no. 16, p. 21.
 1889. *Parathemisto gracilipes*, Bovallius, "Contrib. to Monog. Amphip. Hyperideae," K. Sv. Vet.-Akad. Hand. vol. xxii. no. 7, p. 268.

In 1868 I pointed out that Bate and Westwood's *H. oblivia* was not that of Kröyer; and as no other specimen has since been found, I cannot help suspecting that Bate has described and figured the second limb of the first gnathopods as the second gnathopod: if so *P. gracilipes* may hereafter become a synonym of Kröyer's species.

Hab. Banff (*T. Edward*)*.

* In confirmation that Bate and Westwood's figure is incorrect, it may be noticed that the figure is taken from a specimen sent to the authors by the late Thomas Edward of Banff. Now I have specimens of the true *P. oblivia* received from him, and in T. Edward's "Stray Notes on some of the smaller Crustaceans," Journ. Proc. Linn. Soc. vol. ix. 1867, pts. 143 and 166, we are told that "*H. oblivia*" occurs in enormous shoals at times in the Moray Firth, filling the rock-pools "with literally one living mass" and cast up on the shore as "a ridge or wall extending more than one hundred feet in length, and varying from one to two inches in height and breadth."

Genus 4. EUTHEMISTO, Bovallius.

4. *Ethemisto compressa* (Goës).

1865. *Themisto compressa*, Goës, "Crust. Amphip. Maris Spetsbergiam alluentis, etc.," Öfvers. K. Vet.-Akad. Förh. p. 533, pl. xli. fig. 34.
 1878. *Lestrigonus spinidorsalis*, Spence Bate, "Two new Crustacea from the Coast of Aberdeen," Ann. & Mag. Nat. Hist. ser. 5, vol. i. p. 411, fig. 2, and as *Hyperia spinidorsalis*, id. ibid. vol. ii. p. 489.
 1892. *Ethemisto compressa*, Norman, "Rare Crustacea on the Yorkshire Coast," 'The Naturalist,' p. 175.
 1895. *Ethemisto compressa*, Sars, (142) p. 12, pl. v. fig. 2.

Bovallius has joined *Ethemisto bispinosa*, Boeck, with this species; but the remarkable spination of the propodos of the third peræopods (see Sars, pl. vi. fig. 2, p. 5), which is the chief distinguishing character of that species, as indicated by Sars, and as I find in Greenland specimens of *E. bispinosa*, seems to distinguish them.

Hab. Redcar, Yorkshire, in extraordinary profusion, thrown up upon the beach, April 4, 1892 (*T. H. Nelson*): *Mus. Nor.* Aberdeen (*Spence Bate*); 70-80 miles E. by N. of mouth of the Humber (*T. S.*).

Distrib. Davis Strait and Greenland, 'Valorous,' 1875; lat. 52° 33' N., long. 26° 44' W., and lat. 59° 16' N., long. 37° 16' W., 'Valorous,' 1875; Faroe Channel 'Triton,' 1882 (*Sir J. Murray*): *Mus. Nor.* Norway and Jan Mayen (*G. O. Sars*).

5. *Ethemisto libellula* (Mandt).

1822. *Gammarus libellula*, Mandt, Observationes in Historiam Naturalem et Anatomiam Comparatam in itinere Groelandiæ factæ, p. 32.
 1838. *Themisto crassicornis*, Krøyer, Grönlands Amphipoder, p. 295, pl. iv. fig. 17.
 1838. *Themisto arctica*, id. ibid. p. 291, pl. iv. fig. 16.
 1869. *Themisto crassicornis*, Bate & Westwood, (1) vol. ii. p. 522.
 1887. *Ethemisto Nordenskiöldi*, Bovallius, "Arctic and Antarctic Hyperids," 'Vega' Exped. Vetensk. Iakttagelser, vol. iv. p. 570, pl. xlvii. figs. 104-110.
 1895. *Ethemisto libellula*, Sars, (142) p. 13, pl. vi. fig. 1.

It is the *Themisto libellula* of Goës and the *Ethemisto libellula* of Bovallius.

Hab. Banff (*T. Edward*, fide *Bate*).

Distrib. Davis Strait and Greenland, 'Valorous,' 1875; Jan Mayen, Austro-Hungarian Exped.: *Mus. Nor.* In shoals on north and east coasts of Finmark (*G. O. Sars*); and Arctic region generally from Siberia to Greenland.

A good specific character by which the species may be at once recognized is that the nail of the third and longest peræopods bears a comb-like set of long spines.

[*Ethemisto bispinosa*, Boeck.

1870. *Themisto bispinosa*, A. Boeck, (137) p. 8.
 1872. *Themisto bispinosa*, Boeck, (138) p. 87, pl. i. fig. 4.
 1887. *Ethemisto bispinosa*, Bovallius, "Arctic and Antarctic Hyperids,"
 'Vega' Exped. Vetenskap. Iakttag. vol. iv. p. 569, pl. xlvi. figs. 97
 103.
 1890. *Ethemisto bispinosa*, G. O. Sars, (142) p. 14, pl. vi. fig. 2.

Taken by the 'Valorous,' 1875, in Davis Strait and in the two following places in the North Atlantic: lat. 42° 8' N., long. 63° 39' W., and lat. 60° 24' N., long. 49° 57' W. Also taken in the Faroe Channel by the 'Triton,' 1882.

Distrib. Off Martha's Vineyard, N.E. America (*U.S. Nat. Mus.*); Gulf of Maine and 87 miles S. of Block Island, N.E. America (*Prof. S. I. Smith*): *Mus. Nor.* Sars has taken it on the coast of W. Finmark.

I entirely agree with Sars in regarding this as quite distinct from *Ethemisto compressa*; the length and very peculiar spinal armature of the third peræopoda are evident in young as well as old specimens.]

Fam. II. **Phronimidæ.**

Genus PHRONIMA, Latreille.

6. *Phronima sedentaria* (Forskål).

1863. *Phronima sedentaria*, Bate & Westwood, (1) vol. ii. p. 23.
 1872. *Phronima sedentaria*, Claus, "Naturgeschichte der *Phronima sedentaria*," Zeits. f. wiss. Zool. vol. xxii. p. 331, pls. xxvi., xxvii.
 1879. *Phronima sedentaria*, Claus, "Der Organismus der Phronimiden," Zool. Institut. zu Wien, vol. ii. pl. ii. figs. 11-14, pls. iii.-viii.
 1880. *Phronima sedentaria*, Bovallius, "Contrib. Mon. Amphip. Hyperiidæ," Kong. Sv. Vet.-Akad. Handl. vol. xxii. p. 354, pl. xvi. figs. 1-3.

Phronima custos, Risso, *P. borneensis*, Bate, and *P. novæ-zealandiæ* are regarded by Bovallius as synonyms of this species.

Hab. Taken off the S.W. of Ireland, August 1890, by the Rev. W. S. Green (*A. O. W.*).

Distrib. Naples (Zool. Stat.): *Mus. Nor.* Atlantic and Mediterranean, and it would seem also the Pacific.

Fam. III. **Tryphænidæ.**

Genus I. TRYPHÆNA, A. Boeck.

7. *Tryphæna Malmii*, Boeck.

1870. *Tryphæna Malmii*, Boeck, (137) p. 9.
 1872. *Tryphæna Malmii*, Boeck, (138) p. 91, pl. i. fig. 3.
 1887. *Tryphæna Nordenskiöldi*, Bovallius, "System. List Amphip.

Hyperiid,," Bihang till K. Sv. Vet.-Ak. Handl. vol. xi. p. 30; and "Arctic and Antarctic Hyperids," 'Vega' Exped. Vetensk. Jakttag. vol. iv. p. 573 (the male).

1888. *Tryphana Boeckii*, Stebbing, Report 'Challenger' Amphipoda, p. 1539, pl. exciv. (the male).

1890. *Tryphæna Malmi*, Sars, (142) p. 17, pl. vii.

Hab. Banff (*T. Edward*): *Mus. Nor.*

Distrib. It is known from Norway, the Faroe Isles, and North Atlantic, lat. 18° 8' N., long. 30° 5' W. (*Stebbing*).

[Genus 2. BRACHYSCELUS, Spence Bate, 1861.

= *Thamyris*, Spence Bate, 1862.

= *Schnehagenia*, Claus, 1871.

[*Brachyscelus crustulum*, Spence Bate.

1861. *Brachyscelus crustulum*, Spence Bate, Ann. & Mag. Nat. Hist. ser. 3, vol. viii. p. 7, pl. ii. figs. 1, 2.

1862. *Brachyscelus crustulum*, Spence Bate, Cat. Amphip. Brit. Mus. p. 333, pl. liii. figs. 2, 3.

1887. *Thamyris crustulum*, Bovallius, "Syst. List Amphip. Hyperiid,," Bihang till K. Svensk. Vet.-Akad. Hand. vol. xi. p. 31.

1887. *Thamyris mediterranea*, Claus, Die Platysceliden, p. 60, pl. xvi. figs. 11-18, ♂ jun.

1888. *Brachyscelus crustulum*, Stebbing, Report 'Challenger' Amphip. p. 1544, pls. excv., excvi., ♂.

1893. *Brachyscelus crustulum*, Chevreux, Bull. Soc. Zool. de France, vol. xviii. p. 70, & woodcuts.

A young male specimen taken by the 'Triton' in the Faroe Channel in 1882, the exact locality not preserved.

Distrib. Naples (Zool. Stat.): *Mus. Nor.* In stomachs of the Tunny between the coasts of France and the Azores (*Chevreux*); North Pacific, 'Challenger' (*Stebbing*).

The Faroe Channel specimen is a very young male. Full-grown females from Naples, whence Claus procured the small male which he called *Thamyris mediterranea*, agree with Stebbing's description and figures and those of Chevreux of *B. crustulum*. It also seems questionable whether *T. globiceps*, Claus, is a valid species. The occurrence of this genus so far north as the Faroe Channel is very interesting. It was taken in the towing-net at a depth of several hundred fathoms.]

[Genus 3. LYCÆA, Dana.

[*Lycæa robusta*, Claus.

1887. *Lycæa robusta*, Claus, Die Platysceliden, p. 63, pl. xix. figs. 2-10.

A single specimen, 'Porcupine,' 1870, Mediterranean. Claus's specimens were from Messina and Naples.]

[Fam. IV. *Scinidæ*.

[Genus *SCINA*, Prestandrea.

[*Scina borealis*, G. O. Sars.

1886. *Clydonia borealis*, G. O. Sars, (102) i. p. 75, pl. iii. fig. 1.
 1887. *Tyro borealis*, Bovallius, "Arctic and Antarctic Hyperids,"
 'Vega' Exped. Vetensk. Iakttag. vol. iv. p. 551.
 1887. *Tyro borealis*, Bovallius, "Contrib. Monog. Amphip. Hyperideæ,
 pt. 1," Kong. Sv. Vet.-Akad. Hand. vol. xxi. p. 16.
 1890. *Scina borealis*, G. O. Sars, (142) p. 20, pl. viii.

Hab. 'Triton,' 1882, Faroe Channel, tow-net down to 300 fathoms (*Sir J. Murray*).

Distrib. Lofoten Islands, 300 fathoms; Bejan at outer part of Trondhjem Fiord, and at Hanko, Christiania Fiord, 100-150 fathoms (*G. O. Sars*); Bay of Biscay, 960 metres, 'Caudan' (*J. Bonnier*).]

Fam. V. *Lanceolidæ*.

Genus *LANCEOLA*, T. Say.

S. Lanceola Sayana, Bovallius.

1885. *Lanceola Sayana*, Bovallius, "Some forgotten Genera among the Amphipodous Crustacea," Bil. t. K. Sv. Vet.-Akad. Hand. vol. x. no. 14, p. 7, figs. 1, 1 a, 1 b.
 1887. *Lanceola Sayana*, Bovallius, "Contrib. to Monog. of Amphip. Hyperideæ," K. Sv. Vet.-Akad. Hand. vol. xxi. no. 5, p. 30, pl. iv. figs. 1-10, pl. v. fig. 1.

Hab. 'Porcupine,' 1869, Stat. 22, lat. 56° 8' N., long. 13° 34' W.; south of Rockall, a single specimen: *Mus. Nor.*

Distrib. North and South Atlantic (*Bovallius*).

This species is stated by Bovallius to be "one of the largest of all the Amphipoda, measuring 30-42 millim." The 'Porcupine' specimen is only 5 millim. long. Nevertheless, in most essential points, such as general character, the gnathopods, the structure and proportional lengths of the pereopods, &c., it agrees with *L. Sayana*. The lower antennæ have the penultimate joint shorter in proportion to the last, and the telson is not quite so long as the basal joint of the last uropods. Bovallius lays stress upon this last character as specific throughout the genus; but age may easily make a difference in it. In form the telson corresponds to that of *L. Sayana*.

[*Lanceola Murrayi*, n. sp.

First gnathopods with a group of about six slender spines on the posterior lobes of the meral joint; carpus, as usual, somewhat cup-shaped, distal breadth only slightly exceeding greatest length, the extremity set round with slender spines;

propodos as long as carpus and narrower at the base than the extremity of carpus, one and half times as long as greatest breadth, widest near the base, thence with slightly convex margins evenly tapering to the extremity; anterior margin bearing about four slender spines; posterior margin serrated throughout, and bearing five or six long slender spines; nail equalling rather more than one-third the length of the hand, slightly serrated quite at the base.

Second gnathopods with carpus and manus subequal in length, the length of neither exceeding two and a half times the breadth, each widest at their junction with the other, the former widening slightly distally to receive the latter; carpus with two or three small setæ on anterior border and two distal setæ; hand tapering from the base to the extremity, where it is just wide enough to receive the nail; anterior margin with three spines and two distal ones; posterior margin minutely serrated throughout, with three slender spines about the middle and two distal spines; nail nearly straight, one-third as long as the hand, with finely serrated edge.

First peræopods with the hand longer than the wrist, inner margin of each with five or six small spines at about equal distance from each other; outer margin naked; nail long and slender, about one-fourth the length of the hand.

Inner peræopods with the hand somewhat longer than the wrist; the curved dactylus and its sheath as usual in the genus.

Telson equals two-thirds the length of the basal joint of the last uropods; these latter with the branches narrowly lanceolate, the branches of the second pair still narrower.

This appears to differ from all described species. The first gnathopods in their less expanded wrist and proportionately longer hand differ from most species, but approach Bovallius's figure of *L. felina* (if the hand were a little longer in that species); the second gnathopods are most like those of *L. Sayana*. Bovallius does not mention or figure in any species the serration of the margin of hand and finger in this gnathopod, and *Lanceola Loveni* is the only species in which serration of margin of first gnathopods is recorded. The telson and uropods are nearly as in *L. serrata*. *L. pacifica*, Stebbing ('Challenger'), comes nearest to *L. Murrayi* as regards the gnathopods, but the telson and uropods are quite different.

A single specimen taken by tow-net sunk to 640 fathoms in the Faroe Channel: 'Triton,' 1882, Stat. 8 (*Murrayi*).

Fam. VI. **Vibiliidæ.**

Genus **VIBILIA**, H. Milne-Edwards.

9. *Vibilia borealis*, Bate & Westwood.

- 1869. *Vibilia borealis*, Bate & Westwood, (1) vol. ii. p. 524.
- 1887. *Vibilia Krøyeri*, Bovallius, "System. List of Amphipoda Hyperidiæ," Bih. t. K. Sv. Vet.-Akad. Hand. vol. xi. no. 16, p. 8.
- 1887. *Vibilia Krøyeri*, Bovallius, "Arctic and Antarctic Hyperids," 'Vega' Exped. Vetensk. Inakttag. vol. iv. p. 555.
- 1887. *Vibilia borealis*, Bovallius, "Contrib. Monog. Amphip. Hyperidiæ," K. Sv. Vet.-Akad. Hand. vol. xxi. no. 5, p. 57.
- 1887. *Vibilia Krøyeri*, id. *ibid.* p. 53, pl. viii. figs. 18-25.

Hab. Two specimens from Thomas Edward, taken at Banff, Scotland: *Mus. Nor.*

Distrib. West Coast of Greenland (*Bovallius*).

On referring to Edwards's own notes it is clear that Bate and Westwood have erroneously applied the profusion which Edwards saw in *Parathemisto oblivia* to *Vibilia*.

In drawing up the specific characters of *V. borealis* to distinguish it from other species, Bovallius writes:—"As the specific character given by Bate and Westwood is applicable to several of the known *Vibiliæ*, the diagnosis here is taken from the generic characters of the authors compared with the drawing." The brief diagnosis of the two species is as follows:—

The head is not rostrate.

a. The pereional segments are dorsally smooth.

aa. The fifth and sixth pairs of pereipoda are scarcely longer than the third and fourth pairs.

aaa. The femora of the first and second pairs of pereipoda (*i. e.* the gnathopods) are narrow.

1. The peduncles of the uropoda are shorter than the rami. *V. borealis*, B. & W.

2. The peduncles of the uropoda are longer than the rami *V. Krøyeri*, Bov.

Respecting the uropoda, Bovallius has taken the character of *V. borealis* from B. & W.'s woodcut, and while he has adopted the *generic* characters, in certain respects he has taken no notice of the statement "*Three posterior pairs of pleopoda with the peduncle long and the rami short and compressed.*" This description of the uropods agrees with my specimens received from Edward, and thus does away with the assumed difference of *V. Krøyeri* and *V. borealis*.

Tribe II. **GAMMARIDEA.**

Fam. I. **Orchestiidæ.**

Genus I. **TALITRUS**, Latreille.

10. *Talitrus locusta* (Pallas).

- 1861. *Talitrus locusta*, Bate & Westwood, (1) vol. i. p. 16.
- 1899. *Talitrus locusta*, G. O. Sars, (142) p. 23, pl. ix.

Hab. All round our coasts in suitable places, among decaying weeds at high-water mark on sandy shores.

Distrib. The whole coasts of Europe from Norway southwards, extending to the Black Sea; Azores (*Barrois*); Madeira (*Morelet*).

Genus 2. HYALE, Rathke.

(= *Allorchestes*, Dana, ♂, = *Nicca*, Nicolet, ♀.)

11. *Hyale Nilssoni* (Rathke).

1861. *Allorchestes Nilssonii*, Bate & Westwood, (1) vol. i. p. 40.

1890. *Hyale Nilssoni*, Sars, (142) p. 26, pl. xi. fig. 1.

It is *Orchestia nidrosiensis* of Kröyer.

Hab. Torquay (*Stebbing*); St. Andrews (*McIntosh*); Firth of Clyde (*D. R.*); Berhaven, Ireland (*Prof. Haddon*): *Mus. Nor.* Jersey (*Kæhler*); Firth of Forth and Loch Fyne (*T. S.*); Liverpool district and Valentia, Ireland (*A. O. W.*).

Distrib. Valencia, Spain (*P. Antiga*); Trondhjem Fiord, Norway (*A. M. N.*): *Mus. Nor.* South and West Norway (*G. O. Sars*); Sweden, Denmark, West France (*Chevreaux*); Azores (*Barrois*).

12. *Hyale Lubbockiana* (Bate).

1861. *Allorchestes imbricatus*, Bate & Westwood, (1) vol. i. p. 43, ♂.

1861. *Nicca Lubbockiana*, Bate & Westwood, (1) vol. i. p. 47, ♀.

1876. *Hyale Lubbockiana*, Stebbing, Ann. & Mag. Nat. Hist. ser. 4, vol. xvii. p. 337, pl. xviii. fig. 2 a-d.

1879. *Hyale Lubbockiana*, id. ibid. ser. 5, vol. iv. p. 396.

1890. *Hyale Lubbockiana*, Sars, (142) p. 27, pl. xi. fig. 2.

There has been great confusion between the species of this genus. Boeck confused the two British species of *Hyale*, and his figures of the entire animal of his *Hyale Nilssoni*, and of the second gnathopod of the male, "undoubtedly," as Sars says, represent *H. Lubbockiana*.

Della Valle, with Stebbing's and Sars's clear definitions of the two species before him, actually makes the *H. Lubbockiana* of Sars a synonym of his *H. pontica*, Rathke, which he makes = *H. Nilssoni*, Rathke, and keeps *H. Lubbockiana* of Bate and Stebbing as a species distinct from that of Sars! A glance with even a hand-lens at the propodos of the peræopods of the true *H. Lubbockiana* is sufficient at once to recognize the species on account of the two remarkable large serrated spines with which it is armed. These spines are shown in Bate and Westwood's figure *k*, in Stebbing's fig. 2 c, in Sars's fig. 2, p. 7, and are even sufficiently indicated in Boeck's small figure of the entire animal of his "*H. Prevostii*," to show that the figure really represents *H. Lubbockiana*. On the other hand, it is clear that the species described by Della Valle as *H. Lubbockiana* cannot

be that species, inasmuch as these peculiar spines are not to be seen on the large figures he gives of the pereopods.

Hab. Bantry, Ireland (*A. M. N.*); Torbay and Banff (*Stebbing*); *Mus. Nor.* Jersey and Sark (*Sinclair and Hornell*); Isle of Cumbrae (*D. R.*).

Distrib. South and West Norway (*Sars*); Western France and Algiers (*Chevreaux*).

Genus 3. ORCHESTIA, Leach.

13. *Orchestia littorea* (Montagu).

1861. *Orchestia littorea*, Bate & Westwood, (1) vol. i. p. 27.

1869. *Orchestia brevidigitata*, Bate & Westwood, (1) vol. ii. p. 497 (see Barrois, 'Note sur quelques points de la Morphologie des Orchesties,' Lille, 1887, p. 13).

1890. *Orchestia littorea*, Sars, (142) p. 24, pl. x.

It is also *Talitrus tripudians* of Kröyer and *Orchestia euchore* of F. Müller. B. & W. refer it to *Cancer gamarellus* of Herbst, but that author's figure certainly does not agree, and is in fact more like *O. mediterranea*. The description of *Oniscus gammarellus* in Pallas's 'Spicilegia,' moreover, cannot, I think, be reconciled with this species.

Hab. Diffused in suitable localities round our coasts. Like *Talitrus* it is found beneath decaying seaweed, but in this case only when the seaweed is lying on pebbles, or pebbles and sand, and it is not found in pure sand, which is the habitat of *Talitrus*.

Distrib. On the West Norwegian coast as far north as the Trondhjem Fiord (*Sars*), thence southward throughout the Atlantic coasts of Europe to the Mediterranean and Black Sea (*Czerniavsky*); Madeira (*Morelet*); Azores (*Barrois*).

14. *Orchestia mediterranea*, A. Costa.

1861. *Orchestia mediterranea*, Bate & Westwood, (1) vol. i. p. 31.

1893. *Orchestia chilensis*, Dalla Valle, (139) p. 498, pl. ii. fig. 8 and pl. xv. figs. 31-38.

1899. *Orchestia mediterranea*, T. Scott, Rep. Fishery Board of Scotland, p. 264, pl. xiii. figs. 9-11.

Hab. As yet there is no record of this species occurring on the eastern shores of our islands, nor further north than the Firth of Clyde on the west. Weymouth and Inverary (*A. M. N.*): *Mus. Nor.* Topsham and Exmouth Warren (*Parfitt*); between Fairlie and Hunterston, Firth of Clyde (*T. Scott*).

Distrib. Adriatic (*Prof. Heller*); Naples (*Della Valle*): *Mus. Nor.* West France (*Chevreaux*).

Genus 4. ORCHESTOIDEA, Nicolet.

15. *Orchestoidea Deshayesii* (Audouin).

1861. *Orchestia Deshayesii*, Bate & Westwood, (1) vol. i. p. 36.

1887. *Orchestia Deshayesii*, Th. Barrois, Note sur quelques points de la Morphologie des Orchesties, Lille, p. 6, figs. 1-13.

1893. *Orchestia Deshayesii*, Della Valle, (139) p. 507, pl. ii. fig. 5, pl. xv. figs. 15-30, pl. lvii. figs. 70-73.
 1893. *Talorchestia Deshayesii*, Chevreux, Bull. de la Soc. Zool. de France, vol. xviii. p. 127, fig. in text.
 1899. *Talorchestia Deshayesii*, Stebbing, "Amphip. from Copenhagen Mus. and other sources, Pt. 2," Trans. Linn. Soc., 2nd ser. Zool. vol. vii. p. 400, pl. xxx. A.

Barrois, in his paper referred to, gives very useful illustrations of the change of form in the second gnathopods of the male during successive stages of growth; and Stebbing, also in the last-quoted memoir, figures the gnathopod of a young male.

Hab. Ryhope, Co. Durham (*A. M. N.*): *Mus. Nor.* Mount Batten, Devon (*Parfitt*), sandy shores of North Devon (*Stebbing*).

Distrib. Adriatic (*Prof. Heller*); Naples (*Della Valle*): *Mus. Nor.* Denmark (*Meinert*); Holland (*Hoek*); Western France (*various authors*); Mediterranean (*various authors*), Black Sea (*Czerniarsky*). East coast of Africa (*Hilgendorf*).

16. *Orchestoidea brito* (Stebbing).

1891. *Talorchestia brito*, T. R. R. "Stebbing, Sessile-eyed Crustacea," Ann. & Mag. Nat. Hist. ser. 6, vol. viii. p. 327, pl. xv.

Hab. Woolacombe Sands, near Ilfracombe, North Devon (*Stebbing*): *Mus. Nor.* Saunter Sands, North Devon (*Stebbing*).

Distrib. Mouth of the Gironde, France (*Chevreux*).

Undoubtedly the two preceding species belong to the same genus. That described by Stebbing was placed by him in the genus *Talorchestia*. Chevreux finding the gnathopods of *Orchestia Deshayesii* in their general character corresponded with those of *O. brito*, removed the former species to *Talorchestia*, and in this he has been confirmed by Stebbing. This allocation of the forms I cannot but regard as mistaken. To take Stebbing's characters of two closely-allied genera:—

Talorchestia. First gnathopods subchelate in the male, simple in the female; second gnathopods strongly subchelate in the male.

Orchestoidea. First gnathopods simple in the male and female; second gnathopods strongly subchelate in male.

I am at a loss to understand how the first gnathopod male of *Talorchestia brito* and *Orchestia Deshayesii* can be called subchelate. This expression implies a palm against which the finger can close. Where is such a palm in these gnathopods? There is a tubercle near the extremity of the hand, but if the gnathopod possesses any grasping power I take it that it would be by the approximation of this tubercle with another which is situated on the wrist; but if this is so it would make the limb not subchelate but complexly subchelate. Exa-

mining my North Atlantic allied forms I find *Talorchestia longicornis* (Say) and *Talorchestia megalophthalmus* (Bate) from N.E. America (received under these names from S. I. Smith) to be true *Talorchestia*, in which the males have the first gnathopods subchelate and similar in structure to those of *Orchestia*, and thus quite different from the two species we are now considering. From Cadiz I have examples of *Orchestoidea Fischerii* (M.-Edwards) given me by Signor Bolivar under that name. In this species, as in those which I here call *Orchestoidea Deshayesii* and *Orchestoidea brito*, there is a close correspondence in the character of the first gnathopod male, which is not subchelate, for the end of the hand is not expanded to receive the impact of the finger, but both the hand and the wrist bear a tubercle on the margin. These tubercles may prove general throughout the genus; but whether they exist in the type *Orchestoidea tuberculata*, Nicolet, I have no means of ascertaining. It is a question whether the two genera ought to be maintained. It is not necessary to go beyond Stebbing's species in the paper referred to, where in *Talorchestia novæ-hollandiæ*, Stebbing, we have a characteristic species of *Talorchestia*, in *T. Deshayesii* what I take to be an *Orchestoidea*, and in *T. tridentata*, Stebbing, an intermediate form, but one which, if the genera are to be kept distinct, must be retained in *Talorchestia*.

Fam. II. **Lysianassidæ.**

Genus 1. **NORMANION, J. Bonnier.**

= *Normania*, Boeck (*nec* Bowerbank).

17. *Normanion quadrimanus* (Bate & Westwood).

1868. *Opis quadrimana*, Bate & Westwood, (1) vol. ii. p. 503.

1876. *Normania quadrimana*, Boeck, (138) p. 188, pl. vi. fig. 3.

1890. *Normania quadrimana*, Sars, (142) p. 32, pl. xiii. fig. 1.

1893. *Normanion quadrimanus*, J. Bonnier, "Les Amphipodes du Boulonnais, III.," Bull. Sci. France et Belgique, vol. xxiv. p. 167.

Hab. Isle of Cumbrae, 20-25 fath. (*A. M. N.*): *Mus. Nor.*
Near Devaar Island, Firth of Clyde (*T. S.*).

Distrib. South and West Norway (*G. O. Sars*).

Genus 2. **ACIDOSTOMA, Lilljeborg.**

18. *Acidostoma obesum* (Bate).

1861. *Anonyx obesum*, Bate & Westwood, (1) vol. i. p. 98.

1865. *Acidostoma obesum*, Lilljeborg, "On *Lysianassa magellanica* and *Amphipoda lysianassina*," Nov. Act. Soc. Sci. Upsal. ser. 3, p. 34, pl. v.

1890. *Acidostoma obesum*, Sars, (142) p. 38, pl. xiv. fig. 2.

Hab. Shetland (*A. M. N.*); Banff (*T. Edward*): *Mus. Nor.*
Isle of Cumbrae (*D. R.*); St. Andrews (*McIntosh*); between

Fidra and Bass Rock, Firth of Forth (*T. S.*); Salcombe (*Stebbing*).

Distrib. Trondhjem Fiord, 20–40 fath. (*A. M. N.*): *Mus. Nor.* South and West Norway (*G. O. Sars*); Bohuslän, Sweden (*Lindström*); West France (*Chevreux*).

Genus 3. ICHNOPUS, Costa.

19. *Ichnopus spinicornis*, Boeck.

1860. *Ichnopus spinicornis*, A. Boeck, Forh. ved de Skand. Naturf. Sde Møde i Kjøbenhavn, p. 645.

1867. *Ichnopus calceolatus*, Heller, Beit. z. Kennt. der Amphip. des Adriat. Meeres, p. 20, pl. ii. figs. 26–28, ♂.

1872. *Ichnopus spinicornis*, Boeck, (138) p. 124, pl. ii. fig. 3, and *I. minutus*, p. 126, pl. iii. fig. 7.

1890. *Ichnopus spinicornis*, Sars, (142) p. 40, pl. xv.

Hab. A single specimen taken off Valentia, Ireland, by the 'Porcupine,' 1869 (*Mus. Nor.*).

Distrib. Haakelsund in Kors Fiord and Trondhjem Fiord, Norway (*A. M. N.*); West Norway (*G. O. Sars*): *Mus. Nor.* This Trondhjem Fiord locality is the most northern range as yet known to Sars. South-east of Belle-Ile, 130–160 metr. (*Chevreux*); Gulf of Marseilles (*Marion*); Adriatic (*Heller*).

Genus 4. LYSIANAX, Stebbing, 1888 (Rep. Chall. Amphip.). = *Lysianassa*, M.-Edwards (preoccupied).

20. *Lysianax septentrionalis*, Della Valle.

1861. *Lysianassa Costæ*, Bate & Westwood, (1) vol. i. p. 74, ♀.

1861. *Lysianassa longicornis*, Bate & Westwood (nec Lucas), (1) vol. i. p. 85, ♂ (partim)*.

1872. *Lysianassa Costæ*, Boeck, (138) p. 118, pl. iv. fig. 1, ♀.

1872. *Lysianassa plumosa*, id. ibid. p. 116, pl. iii. fig. 5, ♂.

1890. *Lysianassa Costæ*, G. O. Sars, (142) p. 42, pl. xvi. fig. 1.

1893. *Lysianax septentrionalis*, Della Valle, (139) p. 778.

Della Valle makes it clear, in my opinion, that the above species cannot be the *Lysianassa Costæ*, H. Milne-Edwards. That species is too imperfectly described and figured to be recognizable; but it can scarcely be our northern species, as here understood—*first*, because the third segment of the metasome is not produced in hook-like form; *secondly*, because it was found among seaweeds at Naples; and Della Valle has not met with anything like our northern *Lysianassa* at Naples. He thinks it possible that M.-Edwards's species may be the same as that which he has himself described under the name *Lysianassa bispinosa*.

* Judging by the telson, the figures of the entire animal and of the urosome cannot have been taken from this species. *Vide* Walker, Ann. & Mag. Nat. Hist., Feb. 1892, p. 136.

Hab. Isle of Skye; Moray Firth; Isle of Cumbrae; off Berwick; Guernsey; 'Porcupine,' 1869, St. 3, west of Bantry, Ireland, 722 fath.: *Mus. Nor.* Valentia, Ireland (*A. O. W.*); Isle of Müll (*G. Brook*); Loch Fyne (*Sir J. Murray*).

Distrib. West coast of Norway, in 50-100 fathoms (*Sars*); Atlantic coast of France (*Bonnier and Chevreux*).

21. *Lysianax ceratinus*, Walker.

Lysianax ceratinus, A. O. Walker, "Third Report on Higher Crustacea," Fauna of Liverpool Bay, vol. iii. p. 200, pl. x. figs. 1-8.

Since the date of this publication the species has been frequently named in Mr. Walker's papers as *Lysianax longicornis* (Lucas), which, however, was an erroneous assignment of the form, as he has subsequently stated. I have considerable doubts as to the specific distinction of this form from *L. septentrionalis*, since specimens occur apparently intermediate with only a small spine point on the hinder margin of the third segment of the metasome, instead of the large upturned process of typical *L. septentrionalis*.

Hab. This seems to be a much more abundant form on our coasts than *L. septentrionalis*. Isle of Skye; Firth of Clyde; Berwick-on-Tweed; Plymouth; Guernsey; Strangford Lough, Ireland; Clew Bay, Co. Mayo (*A. M. N.*); Valentia, Ireland (*A. O. W.*); Salcombe, Devon (*Stebbing*); *Mus. Nor.* Liverpool district and Jersey (*A. O. W.*)*.

Distrib. Several localities, west coast of France (*Chevreux*).

Genus 5. *SOCARNES*, Boeck, 1870.

22. *Socarnes Vahlü* (Kröyer).

1838. *Lysianassa Vahlü*, Kröyer, Grönlands Amphipoder, p. 5.

1844. *Anonyx Vahlü*, Kröyer, Naturhist. Tidssk., 2 Række, vol. i. p. 599; Voyage en Skand. &c. pl. xiv. fig. 1.

1872. *Socarnes Vahlü*, Boeck, (138) p. 129, pl. vi. fig. 8.

1890. *Socarnes Vahlü*, G. O. Sars, (142) p. 44, pl. xvi. fig. 2.

Hab. Off Clack Rock, Isle of Cumbrae (*D. R.*); Firth of Forth, very rare (*T. S.*).

Distrib. Greenland; 'Valorous,' 1875; Tromsö (*Schneider*): *Mus. Nor.* Spitsbergen; Novaia Zemlia; Kara Sea; Iceland; Finmark; northern coasts of Norway.

23. *Socarnes erythrophthalmus*, Robertson.

1892. *Socarnes erythrophthalmus*, D. Robertson, Second Contribution towards Cat. of Amphip. and Isop. of Firth of Clyde and West Scotland, p. 6.

1893. *Socarnes erythrophthalmus*, J. Bonnier, "Les Amphipodes du Boulonnais," Bull. Sci. de France et Belgique, vol. xxiv. p. 183, pl. vi. figs. 1-10.

* Where in recent years *Lysianassa longicornis* has been given as a British species there should be read instead *L. ceratinus*.

Hab. Oban; Falmouth, in great abundance on dead fish in a crab-pot (*A. M. N.*); Banff (*T. Edward*); Clyde (*D. R.*); Menai Strait (*A. O. IV.*); Ardbear Bay Ireland (*G. S. Brady*); *Mus. Nor.* Isle of Man and Valentia Harbour, Ireland (*A. O. IV.*).

Distrib. West coast of France (*Chevreaux and Bonnier*).

Genus 6. AMBASIA, Boeck.

24. *Ambasia Danielsseni*, Boeck.

‡ 1861. *Lysianassa atlantica*, Bate & Westwood, (1) vol. i. p. 82.

1870. *Ambasia Danielsseni*, A. Boeck, (137) p. 17.

1872. *Ambasia Danielsseni*, A. Boeck, (138) p. 121, pl. iii. fig. 6.

1890. *Ambasia Danielsseni*, G. O. Sars, (142) p. 46, pl. xvii. fig. 1.

1898. *Ambasia Danielsseni*, Walker, "Malacostraca from the West of Ireland," Trans. Liverpool Biol. Soc. vol. xii. p. 166.

Hab. Mr. Walker, in the last-mentioned paper, records *Ambasia* as taken off the south-west of Ireland in 750 fathoms. The specimen is preserved in the Dublin Museum of the Royal Irish Academy.

Distrib. Trondhjem Fiord, Norway, in 100–300 fathoms (*A. M. N.*); West Norway (*G. O. Sars*): *Mus. Nor.* Though rare, found by Sars in several places on the south and west coasts of Norway and as far north as Hammerfest in Finmark.

It is not improbable that the *Lysianassa atlantica*, Bate and Westwood, may be the male of *Ambasia Danielsseni*, the greater length of the filaments of the antennæ being a character distinctive of the male sex. The remarkable character of the first joint of the antennules, the form of the head, the structure of the gnathopods, all closely agree with *Ambasia*. It is true that the telson is described as "squamous and simple;" but Mr. Walker*, who has carefully examined the type in the British Museum, says that it is not so, but "cleft to the base, without lateral spines, but with a terminal spine in a deep notch in each division." If we read "deeply cleft" instead of "cleft to the base" we have in Mr. Walker's words an accurate description of the telson of *Ambasia*; and to complete the identity we learn further from Mr. Walker that "the third pleon-segment has the hinder angle acute and shortly recurved, but without a sinus."

* Mr. Walker has done excellent service in the examination of Spence Bate's specimens. His two papers on the subject are:—

1. "The Lysianassides of the 'British Sessile-eyed Crustacea,' Bate and Westwood," Ann. & Mag. Nat. Hist. ser. 6, vol. ix. p. 134.

2. "The Amphipoda of Bate and Westwood's 'British Sessile-eyed Crustacea,'" Ann. & Mag. Nat. Hist. ser. 6, vol. xv. p. 464.

XV.—*A new Bat from the Key Islands.*

By OLDFIELD THOMAS.

Rhinolophus achilles, sp. n.

Allied to *Rh. mitratus* and *Rh. philippinensis*, but the aural and nasal membranes even more developed, the ears suggesting those of a *Nycteris*, and the nose-leaf that of a *Megaderma*. Nose-leaf in essential structure as in *philippinensis*, but much larger; expansion of horizontal base of sella very wide, its greatest breadth equalling or exceeding the height of the vertical part of the sella, and double the corresponding breadth in *philippinensis*; it is broader posteriorly, tapering evenly forward, while in the allied species the anterior and posterior breadths are more nearly equal. Horseshoe membrane much broader than the muzzle; terminal nose-leaf large, not acutely pointed. Ears enormous, reaching when laid forward nearly half an inch beyond the long muzzle, their shape about as in *philippinensis*, the notch behind the antitragus much deeper than in *mitratus*. Lower lip with three grooves. Fur dark brown above, rather greyer below. Wings to the end of the tibiæ. Extreme tip of tail projecting.

Dimensions of the type (an adult male, in spirit):—

Forearm 55·5 millim.

Head and body 55; tail 31; hind foot, including claws, 11; head 25; ear from inner base 30; nose-leaf 21 × 12; sella, height 8·5, breadth of basal expansion 8·5. Lower leg 24.

Hob. Key Islands.

Type. B.M. no. 99. 12. 4. 5.

This species may be readily distinguished from any known *Rhinolophus* by the unusual development of its ears and nasal membranes.

XVI.—*The Geographical Races of the Tayra (Galictis barbara), with Notes on Abnormally Coloured Individuals.*

By OLDFIELD THOMAS.

ON laying out the British Museum series of the Tayra it is seen at once that it falls readily, apart from the colour abnormalities to be mentioned further on, into three geographical colour races—Mexican, Central American, and South American; and in trying to put the proper subspecific names on each of them I find that the whole of the many technical names that occur in the synonymy of the Tayra have been applied to examples from Guiana, Brazil, Paraguay, or Peru, none of them therefore being available for the two northern

subspecies. The latter will therefore both need new names, as will also the small race from the Island of Trinidad.

The three chief subspecies, passing from north to south, may be briefly recognized as follows:—

1. *Galictis barbara senex*, subsp. n.

Head and neck white or greyish white, conspicuously different in colour to the rest of the animal, and rather sharply separated from the black of the shoulders. As in the South-American form, the face is darker than the crown and neck, and the latter is more or less suffused with yellow. Size rather greater than in the next subspecies. Skull of male 109 millim. in basal length by 76 in greatest breadth.

Hab. Hacienda Tortugas, Jalapa, Vera Cruz. Alt. 190 metres.

Type (male) B.M. no. 89. 12. 7. 4. Collected in November 1888, and received from the Mexican Museum. (Specimen *a* of P. Z. S. 1890, p. 72.)

Native name "Cabeza de Viejo," which has suggested the technical name now given.

2. *Galictis barbara biologica*, subsp. n.

Head and neck brown, scarcely lighter than the back, decidedly darker than in *typica*, and far darker than in *senex*, the darkest-headed form therefore occurring between the two lightest-headed subspecies. Unlike either of the other two forms, the neck is even darker than the head, its colour passing quite gradually into that of the back.

Skull of female 98 millim. by 63.

Hab. of type: Calovevora, Veragua, Panama. Another specimen from Costa Rica.

Type B.M. no. 69. 7. 19. 1. Received from Mr. O. Salvin; collected by E. Arcé.

The name now given both commemorates the magnificent work published by Messrs. Salvin and Godman, and also exactly applies to the animal, as it is the *Galictis barbara* of the 'Biologia,' though the white-headed Mexican form is also referred to in that work.

While considering for the present both these new forms of the *Tayra* merely as subspecies, as they are certainly the local representatives of the typical *G. barbara*, I think it probable that at least the northern white-headed *senex* will prove to be so sharply separated from *biologica* as to need specific rank. The latter, on the other hand, will more probably be found to grade into the South-American race as further material becomes available.

So far as can be made out by the descriptions given by different writers on the Tayras, it would appear that *senex* (no doubt the Tepeytzeutli of Hernandez) is found over a large part of Southern Mexico, while *biologicæ* ranges over the other provinces of Central America.

3. *Galictis barbara typica*, Linn.

(Synonyms: *Gulo canescens*, Ill.; *Viverra poliocephala*, Traill; *Mustela gulina*, Wied; *Gulo laira*, F. Cuv.; *Eira itya*, H.-Sm.; *Galictis b. peruana*, Tschudi.)

Head greyish brown, paler than in *biologicæ*, darker than in *senex*, neck more suffused with yellowish; line of demarcation on shoulders fairly evident, though not so sharp as in *senex*. Breast-spot normally present.

Tayras of this type are represented in the Museum collection by examples from many parts of South America, and all seem very similar in colour, when normal specimens only are examined. But two forms of abnormal coloration also occur side by side with the normal ones, and might, in the absence of sufficient material, have been taken for separable species or subspecies.

One of these is a pale form, apparently a semi-albinism, which occurs somewhat frequently and has been referred to by Burmeister* and other authors.

In two examples of this variety in the Museum the whole body is dull whitish, but the muzzle, some hairs at the bases of the toes, an indistinct line down the back, and the tips of the tail-hairs are blackish.

Another spasmodic variation is most striking, and, so far as I am aware, quite unique. Three examples of it are in the Museum, differing considerably among themselves, but agreeing in the essential fact that the brightly contrasted triangular breast-spot is reproduced again on the back in the region of the withers. In the best marked example, from Bogota (Child collection) the spot is similar in size, shape, and colour to the breast-spot, but the apex of the triangle points towards the tail. In another example from unknown locality it is connected across the shoulders with the breast-spot, so that a light ring passes right round the animal. In a third specimen, from the Valley of the Cauca, the dorsal spot is only about half its size in the other two.

That this most striking variation is not a mark of specific or subspecific distinction is shown by the fact that the Museum possesses normal examples of *G. b. typica* both from Bogota and the Cauca Valley, these specimens agreeing absolutely in every other respect with the abnormal ones.

* Thiere Brasiliens, p. 108 (1854).

The occurrence of such a variation as this gives much food for thought, especially to those who are interested in the question as to whether species are ever developed by spasmodic or discontinuous variation. It is evident that under conditions of light or colour-surroundings favourable to an animal like the normal Tayra, black with a yellow breast-spot, the same patch on the upper surface might also prove effective, and that individuals possessing it might gradually crowd out the normal coloured examples. In this way, however spasmodically produced in the first place, the abnormal colouring might become the mark of a peculiar race or species. That this has not as yet taken place, however, is shown by the normal examples taken with the others already referred to.

It would also have to be remembered that the Tayra, like so many similarly coloured animals, is arboreal in its habits, and that if it often crawls along, back downwards, underneath boughs, a similar reason for breaking up the mass of the body-colour might obtain as with the breast-spot in the normal position. The curious yellow spot in the middle of the back in male specimens of *Bradypus* offers a suggestive parallel to the coloration of these abnormal Tayras.

In addition the Tayra of the Island of Trinidad has become so very much smaller than that of the mainland that it also seems to deserve a peculiar subspecific name, and may be called

4. *Galiotis barbara trinitatis*, subsp. n.

Size much smaller than in *G. b. typica*; skull of male 101 millim. in basal length by 67 in greatest breadth, of female 92 by 60. Colours as in the typical form.

Hab. Trinidad. Type from the Caroni district.

Type (female) B.M. no. 99. 2. 2. 1. Presented by Henry Caracciolo, Esq.

XVII.—*New South-American Mammals.*

By OLDFIELD THOMAS.

Canis sechuræ, sp. n.

Allied in essential characters of skull and dentition to *C. griseus*, Gray, and *C. gracilis*, Burm., but very different externally.

Fur short, coarse and harsh, quite unlike the soft fur of the allied species, the hairs of the back barely 30 millim. in length. General colour of upper surface coarsely grizzled iron-grey, with a slight fulvous tinge; each of the longer hairs of the back is light-coloured for its proximal third, black for the middle third, the terminal third being white or

fulvous white proximally and black terminally; the basal part of the hair being hidden in the underfur, the visible portion of the hairs may be said to be black with a whitish subterminal ring. Underfur scanty, dull greyish proximally, dull fulvous terminally. Face clearer grey, very different to the rufous face of the allied species; muzzle blackish; narrow ring round eyes rufous brown; whole of outer surface of ears and a triangular patch behind their posterior bases bright rufous. Upper lip white, clouded with brown opposite the roots of the whiskers; a narrow line of rufous edging its junction with the grey of the face. Tip of chin white; interramia more or less darkened, but not, as in the allied species, broadly black to the level of the angles of the mouth. Centre line of throat dull white, terminated by a grizzled grey band across the chest. Belly fulvous white; the hairs pale fulvous to their bases, gradually becoming white mesially and in the inguinal region. Fore limbs grizzled grey proximally in front, fulvous terminally and on their inner surfaces. Hind limbs nearly all fulvous, darker behind and on the soles, lighter above and in front; no blackish marking above the heels. Tail slender, coarse-haired, coloured like the back, but more heavily blackened; gland-patch and terminal tuft fairly well marked, but not so conspicuous as in *griseus* and *gracilis*.

Skull practically identical with that of the Chilla, but perhaps slightly smaller on the average, and with rather lower bullæ. In the dentition the carnassial, both above and below, is slightly smaller and the grinding-teeth larger than in the allied forms.

Dimensions of the type (a male, measured in the flesh by collector):—

Head and body 580 millim.; tail 300; hind foot (s. u.) 120; ear 60.

Skulls.

	No. 464.	455.	456.	448.	460.	500.
	♂, aged.	♂, adult.	♂, adult.	♂ (type), yg. adult.	♀.	♀.
Extreme length	123	120	118	114	113	107
Basal length	114	111	109	..	..	99
Greatest breadth	68	61.5	61	59	57	57
Length of nasals	38	38	38	36	35	34
Interorbital breadth	24	21.5	20	20.5	20	22
Intertemporal breadth	24	22	21	24.5	23	25
Breadth of brain-case	44	41.5	41.5	41	39	41
Palate length from hensenion..	60	58	57	57	55	53
Teeth:—						
Upper carnassial, outer length.	10.6	10.1	9.8	10.4	10	10
Combined length of m_1 and m_2	13.4	13	13	13.3	13.1	12.5
Greatest diameter of m_1....	..	..	10.6	11	10.5	10.8
Lower carnassial, length....	11.6	12	11.7	12.5	11.7	11.5
M_1 and m_2 combined.....	..	10.8	9.4	10	10.1	10.5

Hab. Desert of Sechura, N.W. Peru. Type from Sullana; other examples from Amotape and Catacaos.

Type (male). Original number 448. Collected 12th July, 1899, by Mr. Perry O. Simons. Five skins and six skulls examined.

This fox is clearly a northern representative of *C. griseus* and *gracilis* (which are doubtfully different from each other), but is interestingly modified for a desert life. In this modification it has taken on a considerable resemblance to the Old-World jackals, just as the desert-mouse described below resembles the desert-gerbilles of Africa and Asia. As a species it may be readily distinguished from its allies by its short coarse fur, scanty underfur, grey instead of rufous head, bright rufous ears, less blackened chin, more fulvous belly, and other details.

As usual in describing specimens relating to Chilean animals, I have been much indebted to the excellent material contributed to the British Museum by Mr. J. A. Wolffsohn, of Valparaiso, and it is by the help of his specimens of the "Chilla" that I have been able to make out the relationship of this interesting Peruvian fox.

Sciurus stramineus guayanus, subsp. n.

Mr. Simons has sent from Sapotillo and other places to the north of the Sechura Desert a series of a squirrel answering precisely to the description of *S. Nebouxii**, Is. Geoff., and showing that instead of being an individual variation of *S. stramineus*, as had been supposed by Alston, that form, which is characterized by a prominent white nuchal patch, is at least locally constant. The type specimen was obtained at Paita, perhaps sent down from the interior.

On the other hand, the typical specimens of *Macroxus Fraseri*, Gray, from "Ecuador," agree fairly well with the original figure of *S. stramineus*, Eyd. & Scul., and may be considered to represent the typical form of that species.

Compared with these two subspecies, the squirrel found west of Guayaquil seems to form a third definable race, for which I would suggest the above name, and would describe as follows:—

No white nuchal patch.

General colour of back grey, the hairs tipped with white as in *Nebouxii*, quite unlike the dark colour of *typicus*; rump and base of tail orange-rufous; nose white; face brown, finely sprinkled with yellowish; ears grizzled brown and

* References to all the names here quoted are given by Alston, P. Z. S. 1878, p. 664.

white. Arms and legs like back; wrists and ankles rufous; hands and feet blackish. Under surface dark brown, the chest and middle line of belly prominently grizzled with whitish. Tail, as usual, broadly washed with white.

Dimensions of the type (measured in skin):—

Head and body 270 millim.; tail 310; hind foot (wet) 57; ear (wet) 26.

Hab. of type, Balzar Mountains, on the Upper Palenque River, W. Ecuador. Another specimen from Chongon (*Simons*).

Type (male). B.M. no. 80. 5. 6. 81. Collected by Mr. Illingworth.

The three races now recognized may be briefly distinguished as follows:—

S. stramineus typicus.—General colour dark; no nuchal patch. Under surface dark brown.

S. s. Nbouxii.—General colour light; a nuchal patch. Under surface pale grey.

S. s. guayanus.—General colour pale; no nuchal patch. Under surface brown, grey mesially.

Phyllotis gerbillus, sp. n.

A small species, not unlike a *Peromyscus* in general proportions, with typical desert-coloration, such as is found in many Gerbilles; quite unlike any Neotropical species hitherto described.

Size rather larger than in *Mus musculus*. Fur soft, sleek and shiny, the hairs about 5–6 millim. long on the back. General colour of head and back clear sandy fawn, rather variable in tone, but on the whole very similar to that of the Egyptian *Gerbillus gerbillus*. Individually the hairs are slaty at their bases, then whitish, with their visible ends fawn, finely tipped with blackish. Ears proportionally large, pale grey. Under surface wholly pure white, the line of demarcation fairly well marked, and so high that the white includes the whole of the limbs, fore and hind, from the shoulders and hips downwards, the fawn not extending on to the limbs at all. Tail fairly well haired, faintly pencilled, wholly white, or the median line above slightly darker.

Skull practically a miniature of that of *Ph. Haggardi*, but the zygomatic rather more widely expanded.

Dimensions of the type (measured in the flesh by collector):—

Head and body 82 millim.; tail 90; hind foot (s. u.) 20; ear 17.

Skull: greatest length 24; basilar length 18; zygomatic

breadth 12·3; nasal length 9·5; interorbital breadth 4; palate length from hensenion 10; diastema 6; palatal foramina 5·6; length of upper molar series 3·5.

Hab. Piura, N.W. Peru, alt. 50 m. Other specimens from Catacaos.

Type (female). Original number 496. Collected 12th April, 1899, by Mr. Perry O. Simons. Several specimens examined.

The nearest ally of this striking little mouse is *Phyllotis Haggardi*, which is half as large again and of a general grey colour.

The present is the first record of true desert-coloration in South America, and even in the desert-regions of western North America the only specimens at all approaching *Phyllotis gerbillus* that I have seen are some of the paler examples of *Peromyscus Gambeli*.

Rhipidomys venustus, sp. n.

Of about the same size as *Rh. venezuelæ*, with which it occurs, but distinguished by its slate-mixed belly, more bushy tail, darker coloration, and slightly different skull.

Fur thick and close, not very long, the hairs of the back about 8 millim. in length. General colour above rufous fulvous, of a much deeper tone than in *Rh. venezuelæ*, the head and fore-quarters more fulvous, the posterior back darker and more rufous. Sides with a brighter rufous edging to the belly. Under surface from chin to anus slaty white, the basal halves of the hairs slaty, their tips dull white, line of demarcation on sides not sharply defined. Eyes without darker rings round them. Ears fairly well-haired, dark brown, darker than in the allied species. Hands dull white above, with a slight metacarpal darkening; feet with these colour-contrasts more strongly marked, back of heel dark brown, and a decided patch of dark brown on the terminal part of the metatarsus; proximal part and sides of metatarsus and upper surface of toes yellowish white. Tail long, well-haired, pencilled at tip, the terminal hairs 12–15 millim. in length, uniformly dark brown throughout.

Skull with a narrower interorbital space than in *Rh. venezuelæ*. Nasals also narrowing more rapidly behind, their breadth at about half their length being about 2·5 millim., as compared to 3·0 or 3·2.

Dimensions of the type (measured in skin):—

Head and body 121 millim.; tail 151; hind foot (s. u.) 24·8.

Skull: greatest length 33·5; basilar length 26; greatest breadth 18·2; nasals 12 × 3·7; interorbital breadth 4·3;

brain-case 17.5×13.5 ; palate length from hensenion 13.1 ; diastema 8.7 ; palatal foramina 6.6×2.5 ; length of upper molar series 5 .

Hab. Merida. Type from "Las Vegas del Chama," alt. 1400 m.

Type (female). B.M. no. 99. 12. 1. 1. Collected 14th July, 1896, by S. Briceño.

Three skins of this species have been lying for some time among Sr. Briceño's specimens of *Rh. venezuelæ*, to which I had supposed them to be referable. Now, however, a closer examination shows that they belong to quite a different species, distinguished by the characters above mentioned.

NEACOMYS, gen. nov.

Type. *Oryzomys spinosus*, Thos. P. Z. S. 1882, p. 105.

Further knowledge of South-American Muridæ having failed to reveal any species of "*Oryzomys*" intermediate between the *Acomys*-like "*Hesperomys*" *spinosus* described by me eighteen years ago and the ordinary soft-furred species of *Oryzomys*, I now think it advisable to give that anomalous form a special generic name.

To the cranial characters described previously it may be added that the skull is low and broad, the supraorbital edges distinctly but not excessively beaded, the interparietal of medium size, the bullæ small, and the palatal foramina are unusually short. The molars are of typical *Oryzomys* structure, but are small in proportion to the general size of the skull.

Neacomys spinosus tenuipes, subsp. n.

Very similar to *N. s. typicus* in general appearance, spininess, and colour, but the general tone rather less vivid, the back darker, and the sides shading off into fulvous rather than rufous. Belly-hairs pure white or dull white, not slate-based, though this latter characteristic proves to vary in *N. s. typicus*. Feet very much smaller than in *typicus*, averaging about 2 millim. shorter, and very markedly more slender than in that form.

Dimensions of the type (an adult female, measured in skin):—

Head and body 76 millim.; tail 93; hind foot 20; ear 12.

Hab. Guaquimay, near Bogota. Also from "Quebrada negra" and "Magdalena Valley."

Type. B.M. no. 99. 10. 3. 74. Collected by G. D. Child, 16th January, 1896. Five specimens examined.

Five specimens of the typical form from Peru have the hind feet 22.2 , 22.2 , 22.4 , 22.6 , and 23 millim.; the longest foot among the Bogota series is 20.5 millim. in length.

BIBLIOGRAPHICAL NOTICES.

Rhopalocera Æthiopica. Die Tagfalter des Æthiopischen Faunengebietes. Eine systematisch-geographische Studie. Von CHR. AURIVILLIUS. Mit 6 Tafeln. *Der Königl. Akademie der Wissenschaften vorgelegt den 8 Juni 1898.* (Kongl. Svenska Vetenskaps-Akademiens Handlingar, Bandet 31, No. 5.) Stockholm, 1898 (correctly, 1899). Pp. 561.

Die Lepidopterenfauna des Bismarck-Archipels. Von Dr. ARNOLD PAGENSTECHER. Erster Theil: *Die Tagfalter.* Mit 2 color. Tafeln. (Zoologica, Heft 27.) Stuttgart, 1899. Pp. 160.

Orthopteren des Malayischen Archipels, gesammelt von Prof. Dr. W. KÜKENTHAL in den Jahren 1893 und 1894, bearbeitet von BRUNNER VON WATTENWYL, unter Berücksichtigung neuer verwandter Species. Mit fünf Tafeln. (Abhandl. d. Senckenbergischen naturforschenden Gesellschaft, Band xxiv. Heft 2.) Frankfurt-on-Main, 1898. Pp. 193-288.

A PROMINENT feature of learned Transactions and other Continental scientific publications in quarto is the encouragement which they offer to the issue of large and important works on Entomology, which would otherwise perhaps never see the light, and which are often accompanied with more fitting illustrations than would be possible on octavo plates, which are frequently too small to represent large insects properly. We have grouped three such publications together in the present notice.

Sweden has always been prominent in the study of African Lepidoptera. Many species from North, West, and South Africa are described in Linné's 'Systema Naturæ'; and the papers by Wallengren and Zeller on the species collected by Wahlberg in Caffraria, and published just about the time when Mr. Trimen first went out to the Cape, may be said to have inaugurated a new era in our studies. And now Prof. Aurivillius has given us a synopsis of the butterflies of the whole of Æthiopic Africa and Madagascar, numbering at present 1612 species—a total sure to be largely increased every year, especially now that his book has rendered the determination of species so easy. The Hesperiidæ are not included, being regarded as a separate group from the more typical butterflies.

The book is published in German, as being better known to entomologists in general than Swedish. It could hardly be expected that the species, except novelties, should be described in full; we are, however, not only given synopses of families and genera, but often even of the species in the different genera, such synopses being, in most cases, sufficient for identification.

Before completing his work, Prof. Aurivillius made a tour to inspect the various collections containing African butterflies, visiting Denmark, Germany, Austria, Holland, Belgium, and England; but we regret that he does not appear to have met Mr. Trimen.

A classified list of 142 works on African Lepidoptera, arranged geographically, will be found very useful.

There is much general matter at the beginning and end of the work, including several tables of geographical distribution.

Dr. Arnold Pagenstecher, of Wiesbaden, is as well known to entomologists as his cousin is known to the outside world as an oculist; and the publication before us is an elaborate monograph of the butterflies of an interesting part of the Papuan fauna, some of the islands of which were visited by the French exploring expeditions about 60 or 70 years ago, when various butterflies were collected there. At that time, some of the islands were known as New Britain and New Ireland, but they have received other names since they came into German hands. It is not to be expected that so distant and outlying a fauna should contain many species which are also found in Europe: the only species that strikes us, on glancing through the paper, is *Plebeius boticus*; but this is rather an outlying European representative of a tropical group than a specially European species. The present paper on the Butterflies is to be followed, later, by another on the Moths, which entomologists will doubtless look forward to with much interest.

The third work on our list relates to the Order Orthoptera, and consists of lists of species captured in Batchian, Borneo, Celebes, Halmahera (otherwise called Gilolo), Ternate, and Java, with descriptions of numerous new species; and tables are given of the species included in some of the genera. The descriptions strike us as being, in many cases, rather too short to be quite sufficient for identification; but the measurements are carefully given in all cases, and a considerable number of species are figured, sometimes the whole insect, and sometimes only a leg or pronotum. This work will be very useful to students of Orthoptera, who, however, we fear are not too numerous at present.

New Zealand Moths and Butterflies (Macro-Lepidoptera). By G. V. HUDSON, F.E.S. (Author of 'An Elementary Manual of New Zealand Entomology'). With 13 Plates. 4to. 1898. West, Newman, & Co. Pp. xix, 144.

THE Fauna of New Zealand, as might be expected from its outlying position, is comparatively poor, but extremely interesting from the number of indigenous species absolutely peculiar to the islands. As regards Lepidoptera, the first attempt to bring together the scattered information existing on the subject was made by Dr. A. G. Butler in 1874, who included an account of the order in the "Voyage of the 'Erebus' and 'Terror,'" enumerating 318 species. Of these, 132 were Macro-Lepidoptera, and are represented by 234 species in Mr. Hudson's work, the number of species detected in New Zealand having been nearly doubled by the present time. Consequently we shall probably be not very far wrong if we assume the total number of New Zealand species now known to be about 600, which at a moderate estimate we may expect may ultimately be raised to 800, or perhaps even 1000. The majority of these are moths. Of butterflies Dr. Butler enumerates 9, of which one at least is very doubtful; Mr. Hudson admits 15, and mentions 5 other reputed species, 3

being possibly indigenous and the other 2 accidentally introduced European species. Of the 15, 1 (*Anosia erippus*, Cram.) is introduced, 5 are Australian, and the remaining 9 (or 10 if *Chrysophonus Feredayi*, Bates, is distinct from *C. salustius*, Fabr.) are species absolutely peculiar to New Zealand.

There is a brief but useful introduction dealing with Metamorphosis, Anatomy, Origin of Species, Classification, and Geographical Distribution. In Classification Mr. Hudson follows Mr. Meyrick's system, of which we need only say here that it is too soon yet to predict how far its innovations are likely to be ultimately accepted by entomologists, especially as regards the propriety of placing the butterflies in the middle of the moths, instead of as a perfectly separate group. Even as regards the Hesperiidæ (which, by the way, are not represented in New Zealand) the connecting links between butterflies and moths are so few and uncertain that it appears to many entomologists that to place the butterflies in the middle of the moths is an innovation only likely to further increase the difficulties of a satisfactory classification of Lepidoptera, which has been recognized for the last century as one of the hardest problems of entomology.

All the species known to the author are figured, the original descriptions of others being copied, and full information is given about habits, localities, food-plants, distribution, &c. An Appendix by Florence W. Hudson contains a brief descriptive list of plants mentioned. The first two plates are plain, dealing with structure and neurulation, the third includes coloured figures of larvæ and pupæ, and the remainder are devoted to perfect insects. The large size of the plates is a great economy in allowing a considerable number of figures to be inserted on one plate. We find as many as fifty-two figures on plate viii., which is devoted to "Notodontinæ," which all lepidopterists will recognize as Geometridæ, an innovation for which Mr. Hudson is not responsible, but which is likely, we are afraid, to remind many entomologists of an uncomplimentary expression which sometimes occurs in Euclid.

In some respects we think that Mr. Hudson should have given fuller information, especially as his book is intended for use in a country where entomological libraries cannot always be easy of access. We think the dates of all the references should have been given throughout, and not only occasionally, and the references themselves should have been fuller. It is not sufficient under *Sphinx convolvuli*, L., to quote merely *Protoparce distans*, Butl., without any clue to where the insect is described and figured, nor any remark whatever on the characters which led Koch and Butler to consider the Australian and New Zealand form of the insect distinct from the European. The references are:—

Sphinx roseofasciata, Koch, Indo-Austr. Lep. Fauna, p. 54 (1865).

Sphinx distans, Butl. Lep. N. Zealand (Voy. 'Erebus' and 'Terror'), p. 4, pl. ii. fig. 11 (1874).

There is an extraordinary error on p. 104, where *Hypolimnas bolina*, L., is placed in the genus *Anosia*, as if it was congeneric

with *A. erippus*, Cram., the two butterflies belonging to different subfamilies of the Nymphalidæ.

It is interesting to note that Mr. Hudson thinks the well-known "vegetating caterpillar" of New Zealand will prove to be that of *Porina Mairi*, Buller, and not of *Hepialus virescens*, Doubl. (We cannot understand why Mr. Meyrick and Mr. Hudson should continue to place an insect so dissimilar from the European types of *Hepialus* in the same genus.) Mr. Hudson has already pointed out ('Entomologist,' xviii. p. 36) that the larva of "*H.*" *virescens* lives in the stems of trees, and never goes beneath the ground even to pupate; and in the present work he remarks:—"The real point to be discovered is the precise species of Lepidoptera this caterpillar would develop into if not attacked by the fungus; but at present no definite information has been obtained on the subject." We do not remember that very much has been published on the "Vegetating Caterpillar" of late years, and we are sorry that Mr. Hudson has no more definite information to give us respecting it; and it is rather a pity that he has not given a detailed account of the caterpillar, accompanied with one or more figures, in the present work.

The Butterfly Book, a Popular Guide to a Knowledge of the Butterflies of North America. By W. J. HOLLAND, Ph.D., D.D., LL.D., Chancellor of the Western District of Pennsylvania; Director of the Carnegie Museum, Pittsburgh, Pa.; Fellow of the Zoological and Entomological Societies of London; Member of the Entomological Society of France, &c. With 48 Plates in Color-photography, reproductions of Butterflies in the Author's collection, and many text-illustrations presenting most of the species found in the United States. New York: Doubleday & McClure Co., 1898; new edit. 1899. Roy. 8vo. Pp. xx, 382; col. pls. 48.

THIS is the first approximately complete and practical manual of the Butterflies of North America; for the older publications on the subject are necessarily both obsolete and very incomplete, and most modern books deal only with the fauna of a limited district, and are usually insufficiently illustrated, or else are so costly as to be far beyond the reach of the ordinary student. So great was the need of such a book as Dr. Holland's that many of the entomologists of the United States and Canada eagerly bought it on its first appearance, in many cases almost before it had got into the market at all; and the first edition was nearly exhausted in less than a month after publication, as if it had been a new novel by a popular author; but, we imagine, a quite unprecedented event in the history of any entomological book.

Hitherto Dr. Holland has chiefly been known to entomologists by his papers on African Lepidoptera, but he has not neglected those of his own country, and has had the good fortune to be able to form one of the most complete collections and libraries in North America relating to the subject. The present volume contains over a thousand coloured figures, a large proportion taken from the actual typical specimens, and no less than 150 species are here illustrated

in colour for the first time. With exceptions noticed below, every species of butterfly found on the continent of North America from the Gulf of Mexico to the Arctic Circle is thus illustrated. Five of the earlier plates are devoted to larvæ and pupæ.

There are also nearly 200 plain illustrations in the text, illustrating details of the earlier stages of butterflies, apparatus, neuriation, &c., and *Megathymus yuccæ*. The author adds that there are about 125 other species, chiefly Hesperiidæ, which have not been mentioned; but we may take it that these are obscure and little-known species occurring in out-of-the-way parts of the country, and that, as regards all the more accessible parts of North America, his book may be relied upon as practically complete. We regret, however, that the omitted species should not have been included in an appendix, however brief—were it only a mere list of names.

The letterpress is divided into three sections. The Introduction contains four chapters on the Life-history and Anatomy of Butterflies; the Capture, Preparation, and Preservation of Specimens; the Classification of Butterflies; and Books about North-American Butterflies.

The bulk of the book consists of descriptions (necessarily, but not unduly, brief) of the Butterflies of North America north of Mexico, thus covering the whole ground up to the boundaries of Messrs. Godman and Salvin's 'Biologia Centrali-Americana.' The arrangement followed is *Nymphalidæ* (including *Libytheinæ*), *Lemoniidæ*, *Lycænidæ*, *Papilionidæ* (including *Pierinæ*), and *Hesperiidæ* (including *Megathyminæ*). Scattered through the book are various digressions and quotations, poetical and other.

We hope that the author will carry out his intention of continuing his work by a book on the Moths of North America likewise, for such a work would be of still greater scientific and general value than even that before us.

Dr. Holland appears to have done his work very well, and we hope that it will also be appreciated on this side of the Atlantic, for there are surely many British and European entomologists who will be glad of an opportunity of making themselves acquainted with a fauna which presents such a remarkable resemblance to our own; though, apart from the presence of some purely American or representative forms, the proportion which the number of species of the various groups bears to each other in Europe and North America is often strangely different; for example, the *Satyrinæ*, which form the bulk of the middle-sized butterflies in Europe, are very poorly represented in North America.

MISCELLANEOUS.

Note on Ceroplastes africanus (Family Coccidæ).

By E. E. GREEN, F.E.S.

THE following is an extract from a letter I have received from Mr. E. E. Green. I think I shall best fulfil his wishes by publishing it as it is.

CHAS. O. WATERHOUSE.

"Prof. Cockerell has drawn my attention to the fact that he published a description of a *Cecoplastes egbarum* (from W. Africa) in the 'Entomologist' of May 1899. He has also sent me typical examples of the insect, which show me that it is identical with my *C. africanus* (var. *cristatus*) [Ann. & Mag. Nat. Hist. 1899, iv. p. 190]. Prof. Cockerell in his description gives the number of antennal joints as six only, but he particularly mentions that his specimens were not in very good preservation. . . . I should be greatly obliged if you would send a short note to the 'Annals and Magazine' to correct the name."

E. ERNEST GREEN.

On the Lateral Cephalic Organs of Glomeris.

By N. DE ZOGRAF.

The celebrated German anatomist Francis Leydig has depicted, on one of the plates accompanying his unfinished work 'Ueber den Bau des thierischen Körpers,' published in 1864, a head of *Glomeris*, having on its lateral walls two horseshoe-shaped organs presenting in their interior a somewhat considerable cavity which communicates with the outside by means of a very narrow longitudinal slit. Leydig has shown that the internal wall of these organs is very thick, that it is innervated by a branch coming from the neck in the region of the optic trunk, and hence that these structures ought to be looked upon as organs of sense.

Following Leydig, the Hungarian zoologist Cömösvary described the same organs in several myriapods without giving a more detailed account of them; it is by the name of *Cömösvary* that they are to-day designated. The French zoologist Saint-Rémy and the German entomologist Curt Hennings so call them, the latter having given a description of their histology in the third number of the 'Sitzungsberichte der Gesellschaft naturforschenden Freunde zu Berlin' for the year 1899.

In my article on the relationships of the Arthropoda, published in 1892 in the 'Comptes Rendus du Congrès international de Zoologie,' I pointed out what great morphological interest these organs possess, especially if they are compared with the embryonic cephalic grooves of other myriapods, of some insects and crustaceans, and with the cephalic organs of some annelids, for example the Capitellidæ. Unfortunately *Glomeris* is very rare in Russia and only met with in the south-western portion of the empire: it was not therefore until the summer of 1898 that, through the kindness of M. E. Bouvier, Professor at the Jardin des Plantes, I was able to obtain enough material for my researches. I then received specimens of *Glomeris marginata* which M. Bouvier had collected in the forests in the neighbourhood of Dieppe. Every animal composing two successive consignments had perished during the long journey from Dieppe to Moscow; but a third batch sent after the great heat of the summer arrived safe and sound at Moscow, and provided me with material for my researches.

The lateral cephalic organs of *Glomeris* have a very curious and

original structure. Herr Hennings has shown that the thickness of the inside wall of these structures consists of sensitive epithelial cells, the nuclei of which are found in the proximal parts, while the more superficial layers contain some small granules in the protoplasm of the cells. Herr Hennings rightly considers the cells of this wall of the organs to have a nervous function; those which he represents in his figure 2, and which he calls cells of the sensitive epithelium, are glandular cells. The structure of the internal wall in question of the lateral organ is considerably complicated.

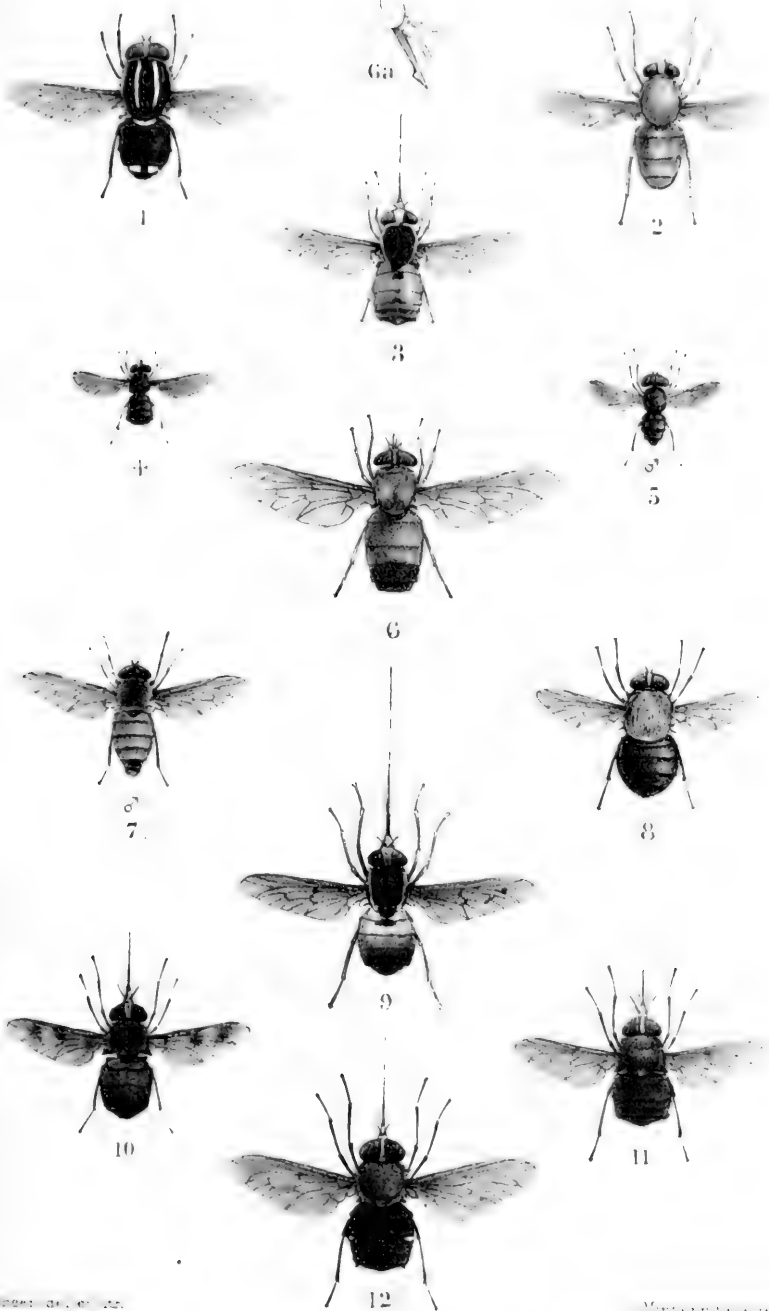
The wall consists of very abundant glandular cells, which communicate by means of very narrow canals with the bottom of the cavity of the organ; on the chitinous surface of the bottom minute pores even may be made out through which the secretion of the cells enters the cavity of the organ.

Besides the glandular cells there are to be seen in the still more proximal layers not far from the cells of the adipose tissue large ganglionic cells, which are prolonged at their proximal ends into the nerves which spring from the main nerve of the organ, while at their distal extremities they are drawn out into long terminal nervous filaments; these filaments, which can be well seen when examined by Ramon y Cajal's method, reach the chitinous layer and sometimes raise it, forming little cushions. If a section is made parallel to the surface of the cavity, it can be distinctly seen that each terminal filament, which has here a structure recalling the rhabdomeres in the sense-organs of Arthropoda, is surrounded by the canals of glandular cells. The latter form polygonal figures recalling the meshes in tulle net, and in the centre of the meshes a nervous filament ends.

Between the canals of glandular cells very abundant concretions are found; these stain with all the colouring reagents and remain after boiling in caustic potash.

The combination of glandular and sense-cells and their structure strongly recall olfactory organs, and I think that one ought to attribute such a function to the organs in question.

The structure as well as the evident function of the lateral cephalic organs of *Glomeris* approach those of the cephalic organs of segmented worms. If we remember that *Peripatus* retains traces in its adult stage of the cephalic organs well developed in the embryos and young examples, and that several other arthropods present in their development traces of remarkable cephalic organs, if we recollect, again, that the relationship between the segmented worms and the arthropods through the link furnished by *Peripatus* becomes more and more evident, we can evolve the hypothesis that the lateral cephalic organs of *Glomeris* are homologous with, and even perhaps analogous to, the cephalic organs of annelids.—*Comptes Rendus*, t. cxxix. (1899) pp. 504-506.





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XVIII.—*On the Nephridium of Nephthys cæca, Fabr.* By
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[Plates II. & III.]

DURING the summer of 1899, while working at the Gatty Marine Laboratory, St. Andrews, it was suggested to me by Professor M'Intosh that, in view of the wonderful supply of living material obtainable in St. Andrews Bay, it might be profitable to continue the work of Mr. Edwin Goodrich on the nephridium of *Nephthys* (Q. J. M. S. no. 157). In so doing I have been able to confirm Mr. Goodrich's results in all points except one—the position of the organ relative to the blood-vessels. This, as described and figured by him, is briefly as follows:—The ciliated organ lies in the angle between the dorso-ventral vessel and the branch *x* (Pl. II. fig. 1); the nephridial tube passes down the dorso-ventral and along the branch *y*, the solenocyte-bearing tuft resting in the angle between the dorso-lateral and the branch *x*.

After a most careful examination of the subject, I have come to a different conclusion. The ciliated organ rests, not between the dorso-ventral and *x* (Pl. II. fig. 1), but at the junction of the ventro-lateral, the dorso-ventral, and *y*; the solenocyte-bearing tuft lies in the angle between the ventro-lateral and the dorso-ventral, not between the dorso-lateral

and x ; while the nephridial tube runs along the branch (y) which passes to the vascular tuft ($c.p$) (not figured by Goodrich), and does not in any part of its course touch the dorso-ventral.

The Excretion of Solid Matter and the Function of the Ciliated Organ.

In examining under the microscope a nephridium which has been carefully dissected out from a hardened specimen, the nephridial canal will be seen as a conspicuous green tube lying along the blood-vessel y (Pl. II. fig. 2) on its outer and posterior side. Up this blood-vessel it runs until it reaches a point opposite the base of the ciliated organ; here it bends sharply round in front of y , passes across to the ventro-lateral branch, and forming a semicircle round this, it appears on the posterior and inner side of the ciliated organ, where it terminates in the solenocyte-bearing tuft (Pl. II. fig. 2, *s.t.*).

It is the portion of the tube between the ventro-lateral and y that demands special attention, for here alone is it in close contact with the ciliated and grooved side of the ciliated organ. Indeed it here forms a miniature barrier at the exact point where the grooves and the streams induced by the ciliary action converge (figs. 3 & 4).

The importance of this disposition is extremely well illustrated by placing a living nephridium in a drop of sea-water laden with carmine particles. The red grains may be seen carried by the currents down the grooves of the ciliated organ, and deposited against the barrier of the nephridial tube until a solid mass is formed.

Again, I observed that the yellow-green coloration caused by the presence of excretory matter in the walls of the tube extends only as far as the ventro-lateral vessel (b , Pl. II. fig. 3), and is not continued up to the solenocyte-bearing tuft.

These considerations suggested that it would be in the short stretch of the tube between the ventro-lateral vessel and y that solid excretory matter would be taken up.

The following facts appear to confirm this view:—

(1) When a nephridium is extracted it may be noticed that there is always present against this barrier a mass of phagocytes from the cœlomic fluid filled with yellow-green excretory matter (figs. 3 & 5). These are evidently carrying waste products to this part of the tube, and I have actually observed one of these cells entering the wall at this point (Pl. III. fig. 4, p).

(2) In specimens injected with powdered carmine (in seawater) the phagocytes laden with the grains collect here, forming a prominent scarlet mass; but only in one case have I found a carmine granule in the wall of the tube.

Before describing the process of excretion some notice of the coelomic fluid is necessary.

Floating free in the fluid are found two varieties of cells:—

(1) Cells of highly granular appearance (Pl. III. fig. 6), which usually present a rounded form, but on careful inspection prove to be amœboid. In some there is the appearance of a firm ectosarc or cuticle, in others small bud-like outgrowths occur, and in several cases I have found them in a state of degeneration when loaded with excretory matter (Pl. III. fig. 8). These cells are the phagocytes already referred to. In almost every case they contain the characteristic yellow-green matter, and in injected specimens are filled with carmine grains.

(2) Oval cells of clear protoplasm (Pl. III. fig. 7). At the narrower end occurs a clear highly refractive nucleus. These cells do not appear to be concerned in excretion, and I have never observed any foreign bodies in them. They are identical in appearance with the corpuscles of the blood.

To sum up, the process of excretion appears to be as follows:—

Whenever a particle of solid excretory matter appears in the coelom it is immediately engulfed by one of the phagocytes. This, when it has become sufficiently loaded, passes into the neighbourhood of the ciliated organs, either by its own amœboid motion or by the agency of the currents raised by the cilia. Here it is swept down one of the grooves, and joins the little mass of its fellows raised against the barrier of the nephridial tube. Partial degeneration now sets in, and the phagocyte appears to bodily enter the protoplasmic wall of the canal (Pl. III. fig. 4, *p*), carrying the foreign matter with it. The latter then passes out either by the lumen of the canal, assisted by the cilia, or by passing along through the wall itself.

The whole nephridium is in a state of constant motion, the ciliated organ swaying up and down, the tube also moving upward and downward on the blood-vessels to a limited extent. These movements no doubt facilitate the ingestion of refuse into the tube, bringing different parts of it into action consecutively.

I have not been able definitely to determine whether the solid excretory matter before being transferred to the nephridial tube is dissolved by the phagocyte or not; but most of the evidence suggests that it is. The green matter in the walls of the canal has the appearance of minute droplets rather than of solid granules, while only in one case have I been able to detect a solid carmine particle in the wall, notwithstanding the fact that great masses of carmine were raised against it by the action of the ciliated organ. In addition, the process at this point is extremely slow—specimens which I have allowed to live for several days after injection still showed great masses of carmine-laden phagocytes at the barrier, although there were none free in the cœlom. This delay seems to point to something more complicated than simple transference of solid particles.

The importance of the above process can only be fully appreciated by noting the resemblance to that in the Glyceridæ, as described by Mr. Goodrich (Q. J. M. S. no. 163). Indeed, if we substitute for the nephridial sac of *Glycera* the short stretch of the nephridial tube between the ventro-lateral vessel and *y*, the processes are largely identical. This portion of the tube is evidently the physiological equivalent of the sac. Morphologically it is also easy to connect the two organs, the tube-barrier of *Nephthys* having broadened and become cup-shaped, while the ciliated organ has grown in as a lining, forming a much more efficient lodgment for the laden phagocytes while discharging their burdens than the more primitive apparatus in *Nephthys* (Q. J. M. S. no. 163, p. 446).

EXPLANATION OF PLATES II. & III.

Reference letters.

<i>d.</i> Dorsal blood-vessel.	<i>c.p.</i> Vascular tuft.
<i>v.</i> Ventral blood-vessel.	<i>neph.tube.</i> Nephridial tube.
<i>dl.</i> Dorso-lateral.	<i>c.o.</i> Ciliated organ.
<i>vl.</i> Ventro-lateral.	<i>s.t.</i> Solenocyte-bearing tuft.
<i>dv.</i> Dorso-ventral.	<i>p.</i> Laden phagocyte.

- Fig. 1.* Diagrammatic transverse section of *Nephthys cæca*, showing position of nephridium relative to the blood-vessels. To the right, as given by Goodrich.
- Fig. 2.* Diagrammatic reconstruction of the nephridium.
- Fig. 3.* Ciliated organ and terminal portion of the nephridium. Corrosive sublimate, sat. sol. Zeiss D.
- Fig. 4.* Nephridial barrier from same. Zeiss F.
- Fig. 5.* Ciliated organ and terminal portion of nephridium. From specimen injected with carmine.
- Fig. 6.* Phagocytes from cœlomic fluid. Zeiss F.
- Fig. 7.* Hyaline corpuscles from cœlomic fluid. Zeiss F.
- Fig. 8.* Laden phagocytes. Zeiss F.

XIX.—*Descriptions of Three new Species of Siluroid Fishes from Southern Brazil.* By G. A. BOULENGER, F.R.S.

THE fishes here described were collected in the Province São Paulo by Mr. H. K. Heyland, and presented by him to the British Museum.

Plecostomus Heylandi.

Head longer than broad, $3\frac{2}{3}$ times in total length, simply convex, without keels; snout rounded, naked at the end; diameter of eye 9 times in length of head, $3\frac{1}{2}$ times in interorbital width; barbel extremely short, about $\frac{1}{2}$ diameter of eye; series of teeth in both jaws forming a doubly curved series interrupted in the middle, about 70 teeth in each series; lower lip much developed, covered with strong flat papillæ, with slightly fringed border; interopercular spines none. Lower surfaces, from the mouth to the anal fin, perfectly naked. Dorsal I 7; first ray scarcely longer than snout, or than the distance from its extremity to the adipose fin. Pectoral spine half length of head, merely rugose. Ventrals I 5, the first ray much thickened. Anal I 4. Caudal squarely truncate. Depth of caudal peduncle 3 times in distance between anal and caudal fins. No posthumeral keel. Scutes on body rough and spinulose, but not keeled; lat. l. 28; 13 scutes between anal and caudal fins. Olive-brown above, without spots; dorsal, pectoral, ventral, and anal fins spotted with black.

Total length 150 millim.

A single specimen from a mountain stream 400 feet above sea-level near Santos.

Loricaria latirostris.

Teeth small, well developed, 14 or 16 in each jaw. Head much depressed, $1\frac{1}{3}$ as long as broad, nearly 4 times in total length; snout rounded, feebly projecting beyond the lip, measuring half the length of the head; head-shields very rough with spinose tubercles; three very obtuse ridges on the snout; long, close-set, hair-like bristles on the sides of the head, from the end of the snout to the gill-cleft; diameter of eye 10 times in length of head, $2\frac{1}{3}$ in interorbital width; a strong postorbital notch; lower labial lobe large, strongly papillose, strongly fringed. Dorsal I 7; first ray $\frac{3}{4}$ length of head, just above middle ventral rays. Pectoral I 6, $\frac{2}{3}$ length of head, rough with small spines. Ventral I 5, as long as

pectoral, reaching origin of anal. Anal I 5. Upper caudal ray but little produced. Lateral scutes 27 or 28, with two obtuse ridges, united on the seventeenth or eighteenth; nuchal shields without keels; 17 scutes between dorsal and caudal, 15 between anal and caudal. Breast naked; ventral shields 4 or 6 transversely enlarged ones on each side and 3 series of small irregular ones in the middle. All the shields spinulose, the spinules larger on the sides. Olive above, with 4 darker transverse bands; the bristles on the side of the head reddish brown.

Total length 360 millim.

Two specimens from the Mogy-guassu River, about 250 miles inland of Santos.

Loricaria paulina.

Teeth small, well developed, 12 or 14 in each jaw. Head much depressed, $1\frac{1}{2}$ or $1\frac{1}{4}$ as long as broad, 4 or $4\frac{1}{4}$ times in total length; snout pointed, projecting beyond the lip, measuring half the length of the head; head-shields rough with small spines; three very obtuse ridges on the snout; two feeble ridges on the occipital shield, diverging behind; diameter of eye 8 times in length of head, nearly twice in interorbital width; a strong postorbital notch; lower labial lobe large, strongly papillose, strongly fringed. Dorsal I 7; first ray nearly $\frac{3}{4}$ length of head, just above middle ventral rays. Pectoral I 6, not quite $\frac{2}{3}$ length of head. Ventral I 5, as long as pectoral, reaching origin of anal. Anal I 5. Caudal truncate, upper ray not produced. Lateral scutes 28, with two obtuse ridges, united on the eighteenth or nineteenth; nuchal shields with two very feeble keels; 17 scutes between dorsal and caudal, 15 between anal and caudal. Breast naked; ventral shields, 5 to 8 transversely enlarged ones on each side and 3 series of small irregular ones in the middle. All the shields spinulose. Olive above, with 5 darker transverse bands; fins white, spotted with black, the spots having a more or less marked tendency to form transverse bands; the edge of the dorsal and caudal white.

Total length 210 millim.

Two specimens from the Mogy-guassu River.

I have hesitated before describing this fish as a new species, as it might prove to be the female of the preceding. Since, however, the differences are greater than such as are known to be merely secondary sexual in other members of the genus, the course I have provisionally followed appears to me the safest from the point of view of scientific accuracy.

XX.—Notes on the Pangoniinae of the Family Tabanidae in the British Museum Collection. By Miss GERTRUDE RICARDO.

[Concluded from p. 121.]

Asia.

PANGONIA, Latr.

PANGONIA, Rond.

- P. rufa*, ♀, Macq., Dipt. Exot. Suppl. 4, p. 18 (1850); Wulp, List Diptera S. Asia, p. 64 (1896).—*Hab.* Bombay, India.
P. obscurata, Loew, Neue Dipt. Beiträge, vi. p. 27 (1853).—*Hab.* Island Rhodes and Asia Minor.
P. fulvipes, Loew, l. c.; Loew, Berlin ent. Zeitschr. xii. p. 369 (1863).—*Hab.* Cilicia, Turkey in Asia.
 **P. zonata*, ♀, Walker, Ent. v. p. 256 (1870).—*Hab.* Tajura Straits, Bab-el-Mandeb.

Subgenus CORIZONEURA, Rond.

- **C. longirostris*, Hardw., Trans. Linn. Soc. xiv.; Wiedem., Auss. zweifl. Ins. ii. p. 621 (1830); Walker, List Dipt. pt. i. p. 131 (1848); Rondani, Canestr. Archiv. per Zool., Anat. e Fis. iii. (1863); Röder, Stett. ent. Zeitschr. xliii. p. 384 (1881).—*Hab.* Nepaul, Thibet.
 **C. taprobanes*, ♀, Walker, List Dipt. pt. v. Suppl. 1, p. 324 (1854).—*Hab.* Ceylon.
C. tigris, Bigot, Ann. Soc. Ent. Fr. (5) x. p. 143 (1880).—*Hab.* North Persia or Caucasus.

PANGONIA, Latr.

- P. amboinensis*, Fabr., Syst. Antl. p. 91. 7 (1805); Wiedem., Auss. zweifl. Ins. i. p. 92 (1828); Walker, List Dipt. pt. i. p. 131 (1848); id. l. c. pt. v. Suppl. 1, pp. 139, 324 (1854).—*Hab.* Amboina.
P. subfasciata, Walker, Ent. v. p. 257 (1870). This type is not to be identified in the Museum coll.—*Hab.* Tajura.

PANGONIA, Latr.

PANGONIA, Rond.

Wings with first posterior cell closed. *Eyes* bare.

Pangonia zonata, ♀, Walker, Ent. v. p. 256 (1870).

This is a female, not a male as Walker states.

The palpi have the first joint twice as long as the second, which is club-shaped and grooved. Wings have a short appendix on fork of third longitudinal vein.

Hab. Tajura Straits, Bab-el-Mandeb (*Lord*).

DIATOMINEURA, Rond.

Subgenus CORIZONEURA, Rond.

Wings with first posterior cell open. *Eyes* bare.*Corizoneura taprobanes*, ♀, Walker, List Dipt. pt. v. Suppl. 1, p. 324 (1854).The type in the Museum is var. *b*; the other is not to be identified.

The palpi are small; the second joint thick at base, tapering to a point, shorter than the first joint. Wings have an appendix on fork of third longitudinal vein.

Hab. Ceylon, Nilghiri Hills (*Hampden*).*Corizoneura longirostris*, ♂ ♀, Hardw. Trans. Linn. Soc. xiv.; Wiedem., Auss. zweifl. Ins. ii. p. 621 (1830); Walker, List Dipt. pt. i. p. 131 (1848); Rondani, Canestr. Archiv. per Zool., Anat. e Fis. iii. (1863); Röder, Stett. ent. Zeitschr. xliii. p. 384 (1881).The males have the prolongation on fore tarsi as in some African species. Röder mentions it. One or two of the females have long bristles on these joints. The first posterior cell is closed in some of the females with a short petiole. Two males, one of which was wrongly labelled "*amboinensis*, Fabr.," seem a variety of this species, having no prolongation on the fore tarsi; the third joint of antennæ is bright red, not black. The yellow colour on the abdomen is more prominent; the face is shining and dark, with hardly any greyish pubescence.*Hab.* North-west India; Muktesar, North-west Provinces (*Lingard*); Thibet (*Landor*).*America.*

PANGONIA, Latr.

North America.

The species north of Mexico are placed first, and lastly those south of the North Mexican boundary, following Osten Sacken's arrangement in his Cat. of North-American Diptera, 1878; but the species from the West Indies are placed under South America.

PANGONIA, Rond.

- *P. fusiformis*, ♀, Walker, Dipt. Saund. pt. i. p. 19 (1854). [? *translucens*, Macq., Dipt. Exot. Suppl. 1, p. 27; var., Walker, *l. c.*; Osten Sacken, Cat. Dipt. N. Amer. (1878).]—*Hab.* N. America.
- P. semiflava*, Wiedem., Auss. zweifl. Ins. ii. p. 622 (1830); Walker, List Dipt. pt. v. Suppl. 1, p. 121 (1854); Bellardi, Saggio, i. p. 51 (1859). [*P. bicolor*, Macq., Dipt. Exot. Suppl. 4, p. 27 (Bellardi) (1849); Osten Sacken, *l. c.*]—*Hab.* Mexico.
- P. planiventris*, Macq., *l. c.* p. 26; Osten Sacken, *l. c.*—*Hab.* Mexico.
- P. nigronotata*, Macq., *l. c.* p. 27; Bellardi, *l. c.*; Osten Sacken, *l. c.*—*Hab.* Mexico.
- *P. atrifera*, ♂, Walker, Trans. Ent. Soc. v. p. 272 (1860); Osten Sacken, *l. c.*—*Hab.* Mexico.
- P. Saussurei*, Bellardi, *l. c.* p. 47; Osten Sacken, *l. c.*—*Hab.* Mexico.
- P. Wiedemanni*, Bellardi, *l. c.* p. 48. [*P. basilaris*, Wiedem., Auss. zweifl. Ins. ii. p. 621 (1830) (name was changed by Bellardi); Osten Sacken, Mem. Boston Soc. Nat. Hist. p. 475 (1876); Osten Sacken, Cat. (1878); see Stett. ent. Zeit. xvii. p. 261 (1886).]—*Hab.* Mexico.
- P. flavohirta*, Bellardi, *l. c.* p. 49; Osten Sacken, Cat. (1878).—*Hab.* Mexico.
- P. Sallei*, Bellardi, *l. c.* p. 50; Osten Sacken, *l. c.*—*Hab.* Mexico.
- P. incerta*, Bellardi, *l. c.*; Osten Sacken, *l. c.*—*Hab.* Mexico.
- *P. tenuirostris*, ♂, Walker, *l. c.*; Osten Sacken, *l. c.*—*Hab.* Mexico.
- P. caustica*, Osten Sacken, Biol. Centr.-Amer., Dipt. i. (1886).—*Hab.* Mexico.

Subgenus EREPHROSIS, Rond.

- E. rostrifera*, Bellardi, *l. c.* p. 47; Osten Sacken, *l. c.*—*Hab.* Mexico.

DIATOMINEURA, Rond.

- D. dives*, Williston, Trans. Kans. Ac. x. p. 130 (1886).—*Hab.* N. America.
- D. californica*, Bigot, Mém. Soc. Zool. Fr. v. p. 618 (1892).—*Hab.* California.
- D. rhinophora*, Bellardi, *l. c.* p. 46; Osten Sacken, *l. c.*—*Hab.* Mexico.

Subgenus CORIZONEURA, Rond.

- C. fera*, Williston, *l. c.*—*Hab.* N. America.
- C. velutinu*, Bigot, *l. c.* p. 615.—*Hab.* California.
- C. ruficornis*, Bigot, *l. c.*—*Hab.* California.

PANGONIA, Latr.

- P. isabellinus*, Wiedem., Auss. zweifl. Ins. i. p. 112 (1830); Walker, Cat. Dipt. pt. v. Suppl. 1, p. 274 (1854); Osten Sacken, *l. c.* (note). [*Silvius isabellinus*, Wiedem., *l. c.*]—*Hab.* N. America.
- P. incisa*, Wiedem., *l. c.* p. 90; Walker, *l. c.* p. 120; Osten Sacken, Western Diptera, p. 214 (1877). [*P. incisuralis*, Say, see Osten Sacken, Cat. (1878).]—*Hab.* Arkansas.
- P. macroglossa*, Westwood, Lond. Edin. Phil. Mag. (1835); see Osten Sacken, Mem. Boston Soc. Nat. Hist. p. 368 (1876); id. Cat. (1878).—*Hab.* Georgia.

- P. tranquilla*, Osten Sacken, *l. c.* p. 367; id. Cat.—*Hab.* Pennsylvania.
P. pigra, Osten Sacken, *l. c.*; id. Cat.—*Hab.* New York.
P. chrysocoma, Osten Sacken, *l. c.* p. 368; id. Cat.—*Hab.* New York.
P. hera, Osten Sacken, *Western Diptera*, p. 214 (1877).—*Hab.* San Francisco.
P. rasa, Loew, *Dipt. Am. Sept.* viii. p. 7; Loew, *Berlin. ent. Zeitschr.* xiii. (1869); Osten Sacken, *Mem. Boston Soc. Nat. Hist.* p. 366 (1876); id. Cat. (1878).—*Hab.* Illinois.
P. awulans, Wiedem., *l. c.* ii. p. 620; Walker, *l. c.* pt. v. Suppl. 1, p. 120 (1854); Osten Sacken, Cat.—*Hab.* Mexico.

PANGONIA, Rond.

Wings with first posterior cell closed. *Eyes* bare.

Pangonia fusiformis, ♀, Walker, *Dipt. Saund.* pt. i. p. 19 (1850); O. S. Cat. *Dipt. N. Amer.* (1878).

Walker's description should be amended thus:—Abdomen with first and second segments transparent yellow, in middle of second segment a long brown spot; third segment brown, its extreme anterior and posterior margins yellow; the remaining segments brown, darker in colour on the posterior margins; on the underside there is no brown spot on the second segment, and only the anterior margin of third segment is yellow. Palpi curved, the same width throughout.

This species belongs to the same group as the South-American species *arcuata*, *filipalpis*, Will., &c.

Hab. Mexico.

Pangonia tenuirostris, ♂, Walker, *Trans. Ent. Soc.* v. p. 272 (1860); O. S. Cat. *Dipt. N. Amer.* (1878).

The wings have a long appendix on fork of the third longitudinal vein.

Hab. Mexico.

Pangonia atrifera, ♂, Walker, *l. c.*; O. S. Cat. *Dipt. N. Amer.* (1878).

The last joint of the palpi is red. There are a few orange hairs on the lateral margins of the last segments. Wings have an appendix.

Hab. Mexico.

South America (including Central America and the West Indies).

PANGONIA, Rond.

- **P. fuscipennis*, Wiedem., Auss. zweifl. Ins. i. p. 95 (1830); Macq., Dipt. Exot. i. p. 103 (1838).—*Hab.* Brazil.
- P. ferruginea*, Macq., *l. c.* vol. i. pt. ii. p. 179; Walker, Cat. Dipt. pt. v. Suppl. 1, p. 129 (1854).—*Hab.* Brazil.
- P. translucens*, Macq., *l. c.* Suppl. 1, p. 27 (1846); Walker, *l. c.* p. 131.—*Hab.* Brazil.
- **P. prasiniventris*, Macq., *l. c.* p. 29; Walker, *l. c.* p. 130; Schiner, Reise der Novara, p. 99 (1866); Osten Sacken, Biol. Centr.-Am., Dipt. i. p. 45 (1886).—*Hab.* Colombia.
- P. incisuralis*, Macq., *l. c.* Suppl. 2, p. 12; Walker, *l. c.* p. 127.—*Hab.* ? Brazil.
- P. testaceiventris*, Macq., *l. c.* Suppl. 3, p. 9; Walker, *l. c.* p. 125; Schiner, *l. c.* p. 99.—*Hab.* Quito, Peru.
- **P. subvaria*, ♀, Walker, *l. c.* pt. i. p. 150, pt. v. Suppl. 1, p. 128. [*Tabanus subvarius*, Walker, *l. c.* pt. i. p. 150.]—*Hab.* Venezuela.
- **P. notabilis*, ♀, Walker, Dipt. Saund. pt. i. p. 18 (1850).—*Hab.* S. America.
- **P. unbra*, ♀, Walker, *l. c.* p. 19.—*Hab.* Chili.
- **P. arcuata*, Williston, Kans. Univ. Quart. iii. p. 190 (1895).—*Hab.* Brazil.
- **P. filipalpis*, Williston, *l. c.*—*Hab.* Paraguay.
- **P. flavescens*, ♀, sp. n.—*Hab.* Brazil.

Subgenus EREPHROSIS, Rond.

- **E. fulvithorax*, Wiedem., *l. c.* p. 89; Osten Sacken, Cat. N. Amer. Dipt. (1878); Williston, Kansas Univ. Quart. iii. p. 189 (1895). [*Sackenymia fulvithorax*, Wiedem., Bigot, Ann. Soc. Ent. Fr. (5) ix. (1879).]—*Hab.* Cuba and Brazil.
- **E. Winthemi*, Wiedem., *l. c.* p. 91; Walker, *l. c.* pt. v. Suppl. 1, p. 127.—*Hab.* Brazil.
- **E. sorbens*, Wiedem., *l. c.* p. 92. [♀ var., Walker, Cat. Dipt. pt. v. Suppl. 1, p. 323 (type not to be identified).]—*Hab.* Monte Video, Santarem.
- **E. leucopogon*, Wiedem., *l. c.*; Macq., Ann. Soc. Ent. Fr. vi. p. 429 pl. xv. (1837); Walker, *l. c.* p. 128.—*Hab.* Brazil.
- **E. Besckii*, Wiedem., *l. c.* p. 97; Walker, *l. c.* pt. v. Suppl. 1, p. 125.—*Hab.* Brazil.
- E. ardens*, Macq., *l. c.* i. p. 103; Walker, *l. c.* p. 130.—*Hab.* St. Leopold, Brazil.
- E. aurimaculata*, Macq., *l. c.* p. 105; Walker, *l. c.* p. 125.—*Hab.* Brazil.
- E. eriomera*, Macq., *l. c.* p. 106; Walker, *l. c.*; Blanchard, Hist. fis. y polit. Chili, vii. p. 389 (1854).—*Hab.* Brazil.
- **E. depressa*, Macq., *l. c.* p. 107; Macq., *l. c.* Suppl. 4, p. 25 (1850); Walker, *l. c.* p. 126; Blanchard, *l. c.* p. 388; Schiner, Verh. z.-b. Gesell. Wien, xv. p. 712 (1865); Schiner, Reise der Novara, p. 120 (1866). [*Pangonia crocata*, Jænnicke, Abh. Senck. Gesell. vi. p. 330 (1868); v. der Wulp, Tijd. Ent. xxiv. (2) p. 156 (1881).]—*Hab.* Chili.
- E. albifrons*, Macq., *l. c.* p. 108; Walker, *l. c.* p. 125; Blanchard, *l. c.* p. 389.—*Hab.* Chili.

- E. xanthopogon*, Macq., *l. c.* vol. i. pt. ii. p. 179; Walker, *l. c.* p. 129.
—*Hab.* Brazil.
- E. fenestrata*, Macq., *l. c.* Suppl. 1, p. 26; Walker, *l. c.* p. 125.—*Hab.* Brazil.
- E. longirostris*, Macq., *l. c.* Suppl. 2, p. 12.—*Hab.* ? Brazil.
- E. minor*, Macq., *l. c.* p. 29; Walker, *l. c.*—*Hab.* ? America.
- E. nigrivittata*, Macq., *l. c.* Suppl. 4, p. 23.—*Hab.* Brazil.
- **E. nigro-hirta*, ♀, Walker, *l. c.* pt. i. p. 131 (1848).—*Hab.* Brazil.
- **E. rufo-hirta*, ♀, Walker, *l. c.*—*Hab.* Brazil.
- **E. badia*, ♂, Walker, *l. c.* p. 132.—*Hab.* Brazil.
- **E. picco-hirta*, ♀, Walker, *l. c.*—*Hab.* Brazil.
- **E. basalis*, ♀, Walker, *l. c.* p. 133. [var. ♀, Walker, pt. v. Suppl. 1, p. 322.]—*Hab.* R. Tapajos, Brazil.
- **E. tenuistria*, ♀, Walker, *l. c.* p. 143.—*Hab.* Brazil.
- **E. fumifera*, ♀, Walker, *l. c.* pt. v. Suppl. 1, p. 324.—*Hab.* Santarem, Brazil.
- **E. nana*, ♂, Walker, Dipt. Saund. pt. i. p. 11 (1850).—*Hab.* Brazil.
- E. laterina*, Rond., Nuovi Ann. Sci. Nat. (3) ii. p. 370 (1850).—*Hab.* Equatorial America.
- **E. rufo-aurea*, Philippi, Verh. z.-b. Gesell. Wien, xv. p. 708 (1865).—*Hab.* Chili.
- E. atripes*, Röder, Stett. ent. Zeit. xlvii. p. 261 (1886).—*Hab.* Bolivia.
- E. bahiana*, Bigot, Mém. Soc. Zool. Fr. v. p. 612 (1892).—*Hab.* Brazil.
- **E. auripes*, ♀, sp. n.—*Hab.* Pará, Amazons.
- **E. fulvitibialis*, ♀, sp. n.—*Hab.* Brazil.

DIATOMINEURA, Rond.

- D. tabanipennis*, Macq., *l. c.* i. p. 105; Walker, *l. c.* pt. v. Suppl. 1, p. 131 (1854).—*Hab.* Brazil.
- D. rufa*, ♀, Macq., *l. c.* p. 106; Walker, *l. c.* p. 130.—*Hab.* Lima.
- D. albithorax*, Macq., *l. c.* p. 107; Walker, *l. c.* p. 125; Blanchard, *l. c.* p. 388; Schiner, Reise der Novara, p. 99.—*Hab.* Chili.
- **D. viridiventris*, Macq., *l. c.* p. 108; Blanchard, *l. c.* p. 389; Schiner, *l. c.*—*Hab.* Chili.
- D. unicolor*, Macq., *l. c.* Suppl. 1, p. 27; Walker, *l. c.* p. 129; Williston, Kans. Univ. Quart. iii. (1895). This would belong to *Erephrosis*, Rond., according to Macq., but Williston gives the first posterior cell open.—*Hab.* Brazil.
- D. dorsoquittata*, Macq., *l. c.* Suppl. 4, p. 25; Blanchard, *l. c.* p. 390.—*Hab.* Chili.
- D. latipalpis*, Macq., *l. c.*; Blanchard, *l. c.*—*Hab.* Chili.
- **D. exeuns*, ♀, Walker, Dipt. Saund. pt. i. p. 12 (1850).—*Hab.* Brazil.
- D. jucunda*, Jænnicke, Abh. Senck. Gesell. vi. p. 327 (1866).—*Hab.* Chili.
- D. grisea*, Jænnicke, *l. c.* p. 331.—*Hab.* Chili.
- D. morio*, Wulp, Tijd. Ent. xxiv. (2) p. 156 (1881).—*Hab.* Argentine Republic.
- D. pyrausta*, O. Sacken, Biol. Centr.-Am., Dipt. i. (1887); Williston, *l. c.* (1895).—*Hab.* Panama.
- D. lasiophthalma*, Wulp, *l. c.* xxxi. p. 365 (1887).—*Hab.* Argentina.
- D. hirtipalpis*, Bigot, Mém. Soc. Zool. Fr. v. p. 618 (1892).—*Hab.* Chili.
- **D. leucothorax*, ♀, sp. n.—*Hab.* Chili.

Subgenus CORIZONEURA, Rond.

- C. longipalpis*, Macq., *l. c.* Suppl. 3, p. 9; Walker, *l. c.* pt. v. Suppl. 1, p. 123.—*Hab.* Brazil.
C. vulpes, Macq., *l. c.* Suppl. 4, p. 24; Blanchard, *l. c.* p. 391.—*Hab.* Chili.

PANGONIA, Latr.

- P. analis*, Fabr., Syst. Antl. p. 91. 6 (1805); Wiedem., *l. c.* i. p. 93; Walker, *l. c.* p. 123. [*Sackenymia analis*, Fabr., Bigot, Bull. Soc. Ent. Fr. (5) ix. (1879).]—*Hab.* S. America.
P. Macquartii, Guérin, Voyage 'Coquille,' ii. pt. ii. p. 289 (1830).—*Hab.* Chili.
P. nigripennis, ♀, Guérin, *l. c.* [? *P. nigro-hirta*, Walker, *l. c.* pt. i. p. 131.]—*Hab.* Brazil.
P. thoracica, Guérin, *l. c.* [? *P. fulvithorax*, Wiedem., *l. c.* p. 89.]—*Hab.* Brazil.
P. venosa, Wiedem., *l. c.* p. 87; Walker, *l. c.* pt. v. Suppl. 1, p. 126 (1854); Williston, Kans. Univ. Quart. iii. (1895).—*Hab.* Brazil.
P. lingens, ♀, Wiedem., *l. c.*; ♂, Macq., *l. c.* i. p. 102; Walker, *l. c.* p. 129; Blanchard, *l. c.* p. 387.—*Hab.* Brazil.
P. molesta, Wiedem., *l. c.* p. 91; Walker, *l. c.* p. 127.—*Hab.* Brazil.
P. marginalis, Wiedem., *l. c.* ii. p. 620; Walker, *l. c.* p. 128.—*Hab.* Cassapawa, Brazil.
P. basilaris, Wiedem., *l. c.* p. 621.—*Hab.* S. America.
P. fasciata, Macq., *l. c.* p. 103; Macq., Hist. Nat. Dipt. i. p. 194; Walker, *l. c.* p. 127.—*Hab.* Brazil.
P. lugubris, Macq., *l. c.* p. 104; Walker, *l. c.* p. 123.—*Hab.* Brazil.
P. fascipennis, Macq., *l. c.* p. 107; Walker, *l. c.* p. 131; Blanchard, *l. c.* p. 387; Schiner, Reise der Novara, p. 98 (1866).—*Hab.* Chili.
P. suturalis, Rond., Studi Ent. Baudi e Turqui, i. p. 107 (1843); Walker, *l. c.* p. 323.—*Hab.* Brazil.
P. chlorogaster, Philippi, Verh. z.-b. Gesell. Wien, xv. p. 703 (1865).—*Hab.* Chili.
P. collaris, Philippi, *l. c.* p. 709.—*Hab.* Chili.
P. atra, Philippi, *l. c.*—*Hab.* Chili.
P. subandina, Philippi, *l. c.*—*Hab.* Chili.
P. australis, Philippi, *l. c.* p. 710.—*Hab.* Chili.
P. obscuripennis, Philippi, *l. c.*—*Hab.* Chili.
P. vittata, Philippi, *l. c.* p. 711.—*Hab.* Chili.
P. diaphana, Schiner, Reise der Novara, p. 99 (1863); Williston, Kans. Univ. Quart. iii. (1895).—*Hab.* Colombia.

PANGONIA, Rond.

Wings with first posterior cell closed. *Eyes* bare.

- Pangonia prasiniventris*, Macq., Dipt. Exot. Suppl. 1, p. 29 (1846); Walker, List Dipt. pt. v. Suppl. 1, p. 130 (1854); Schiner, Reise der Novara, p. 99 (1866); Osten Sacken, Biol. Centr.-Amer., Dipt. i. p. 45 (1886).

Two females belong here which were incorrectly labelled *viridiventris*, Macq.

Hab. Colombia, Venezuela, Trinidad.

Pangonia notabilis, ♀, Walker, Dipt. Saund. pt. i. p. 15 (1850).

The type is a female, not a male as Walker says. The palpi have the second joint long, curved, one width throughout. The underside of the abdomen has three rows of black spots. The wings have an appendix. This and *subvaria*, *umbra*, Walker, *filipalpis*, *arcuata*, Will., *fuscipennis*, Wiedem., and *flavescens*, sp. n., from South America, and *fusiformis*, Wlk., from North America, form a well-marked group, distinguished by the shape of the palpi and antennae, the latter with the first annulation of the third joint wide, and the last one nearly as long as the four preceding together. They are large flies, with long-shaped abdomen.

Hab. South America (*Saunders*).

Pangonia arcuata, Will., Kansas Univ. Quart. iii. p. 190 (1895).

Two females.

Hab. ? Amazons (*Bates*).

Pangonia filipalpis, Will., Kansas Univ. Quart. *l. c.*

One female.

Hab. ? Amazons (*Bates*).

Pangonia flavescens, ♀, sp. n. (Pl. I. figs. 6, 6a.)

This was incorrectly placed by Walker under *Tabanus*, as *T. testaceus*, Macq.; it is a *Pangonia*, apparently undescribed till now. Yellow. Antennae bright yellow, the first two joints greyish, the first annulation of the third joint is wider than the second joint. Proboscis short and stout. Face darker in colour at base, with some black hairs. Beard white. Palpi red, bordered with short black hairs, long and curved, the same width throughout. Ocelli present. Thorax bordered on margin with yellow-orange hairs, as is the scutellum. Abdomen long, slightly darker in colour at the apex. Legs yellow, posterior femora with black pubescence. Wings hyaline, darker on fore border and at base, with a long appendix. Length 18-19 millim.

Hab. Brazil.

Pangonia fuscipennis, ♀, Wiedem., Auss. zweifl. Ins. i. p. 95 (1828); Macq., Dipt. Exot. i. p. 103 (1838).

Two females.

Antennae with first annulation of the third joint wider than

the second joint, and the last joint nearly as long as the four preceding. Ocelli present. Wings have an appendix. The *Tabanus subvarius*, Walker, described by Walker as a variety of this species, is distinct (see below).

Hab. Brazil, Petropolis (*Clark*).

Pangonia subvaria, ♀, Walker, List Dipt. pt. i. p. 150 (1848), pt. v. Suppl. 1, p. 128 (1854). [*Tabanus subvarius*, Walker, l. c. pt. i. p. 150.]

This was incorrectly placed by Walker under *Tabanus* and described by him as *T. subvarius* in List Dipt. i. p. 150 (1848). Later in Cat. Dipt. pt. v. Suppl. 1, p. 128, he says it is a variety of *Pangonia fuscipennis*, Wiedem.; but it is a distinct species and should now stand as above. Walker's description may be enlarged as follows:—Antennæ with the first annulation of third joint wider than the second joint, and the last joint as long as the four preceding. Palpi curved and long, the same width throughout. Wings with an appendix.

Hab. Venezuela.

Pangonia umbra, ♀, Walker, Dipt. Saund. pt. i. p. 19 (1850).

This type is not a male as Walker says, but a female. The palpi are long and curved. Wings with an appendix. This rather resembles the preceding group of species, but as the antennæ are wanting it cannot be placed with them with certainty.

Hab. Chili.

Subgenus EREPHROSIS, Rond.

Wings with first posterior cell closed. *Eyes* hairy.

Erephrosis rufo-hirta, ♀, Walker, List Dipt. pt. i. p. 131 (1848).

The palpi are long and slender, extending but little beyond the projecting face, the two joints about equal in length. Wings with an appendix. This and the five following species are very similar in appearance and in the shape of the abdomen, which is large and convex.

Hab. Brazil (*Noel*).

Erephrosis piceo-hirta, ♀, Walker, List Dipt. pt. i. p. 132 (1848).

This type is a female, not a male as Walker says. Palpi as above. Wings with an appendix.

Hab. Brazil (*Mornay*).

Erephrosis nigro-hirta, ♀, Walker, List Dipt. pt. i. p. 131 (1848).

Palpi as above. Wings with appendix, one female has none.

Hab. Brazil (*Mornay*).

Erephrosis fulvithorax, Wiedem., Auss. zweifl. Ins. i. p. 89 (1828); Walker, List Dipt. pt. i. p. 132 (1848); see Will., Kansas Univ. Quart. iii. p. 189, for characters of male; O. Sacken, Cat. Dipt. N. Amer. (1878).

Sackenymia fulvithorax, Bigot, Ann. Soc. Ent. Fr. (5) ix. (1879).

One male and two females.

Palpi as above. Wings have no appendix. Bigot founded his genus *Sackenymia* for this species, but the bending backward at base of the external branch of the third longitudinal vein (his fourth), taken by him as distinctive for the genus, is not peculiar to it, but is common in *Pangonia*, Latr.

Hab. Brazil (*Mornay*, *Vigors*, *Noel*), Cuba.

Erephrosis badia, ♂, Walker, List Dipt. pt. i. p. 132 (1848).

The type is much denuded. Palpi short, club-shaped, ferruginous, clothed with black hairs. Abdomen reddish brown, clothed with black hairs. Pulvilli of tarsi yellow. Wings with an appendix.

Hab. Brazil (*Tucker*, *Noel*).

Erephrosis Beschii, ♀, Wiedem., Auss. zweifl. Ins. i. p. 97 (1828); Walker, List Dipt. pt. v. Suppl. 1, p. 125 (1854).

The second joint of the palpi is very long and slender, tapering. Wings with an appendix.

Hab. Brazil.

Erephrosis auripes, ♀, sp. n. (Pl. I. fig. 12.)

Dark brown. Antennæ dark red; first joint grey, clothed with long black hairs. Palpi red, the edges and tip black, the second joint very long and tapering. Frontal stripe covered with hoary pubescence on the posterior half near the antennæ; face with hoary pubescence. Beard white. Thorax covered with black pubescence and with black hairs on the anterior half of the lateral margins, then white, and a thick tuft of white hairs at base of wings extending to the scutellum; breast with white hairs on the sides, and black hairs in the centre. Abdomen black; tufts of white hairs on the posterior

lateral margins of second, fifth, and sixth segments, which also appear on the underside, becoming a faint band on the second segment. Legs black; underside of tarsi covered with orange pubescence, extending to the tibia on the anterior legs. Wings hyaline, faintly yellow on the fore border, brown at base, no appendix. Length 16, proboscis 13 millim.

Hab. Para (*Wallace and Bates*).

Erephrosis fulvitibialis, ♀, sp. n. (Pl. I. fig. 11.)

Brown. Antennæ reddish brown. Palpi black, long and slender; second joint equal in length to the first, broader at base, tapering to a point. Face with upper part covered with hoary pubescence. Beard white. Thorax chestnut-brown with some hoary pubescence, white hairs at base of wings. Abdomen shining; a tuft of white hairs on the lateral margins of second, fifth, and sixth segments, on the underside the white hairs become a faint band on the second segment. Legs brown; the tibiæ and the first joints of tarsi yellow, the posterior tibiæ and the tarsi are darker in colour. Wings hyaline, brown at base and on fore border, cross-veins slightly shadowed. Length 15, proboscis 8 millim.

Hab. Brazil (*Mornay*).

Erephrosis depressa, Macq., Dipt. Exot. i. p. 107 (1838); l. c. Suppl. iv. p. 25 (1850); Walker, List Dipt. pt. v. Suppl. 1, p. 126 (1854); Blanchard, Hist. fis. y polit. Chili, vii. p. 388 (1854); Schiner, Reise Novara, p. 120 (1866); Verh. zool.-bot. Gesell. Wien, xv. p. 712 (1865).

Pangonia crocata, Jænnicke, Ab. Senck. Gesell. vi. p. 330 (1868); van der Wulp, Tijds. Ent. xxiv. (2) p. 156 (1881).

Wulp says *crocata* is identical with this species. Wings with first posterior cell closed or nearly so; in one specimen it is open on the one wing and closed on the other. Wulp and Macquart both mention this discrepancy.

Hab. Valdivia, Chili (*Gay*); East Chili (*Darwin*).

Erephrosis rufo-aurea, Philippi, Verh. zool.-bot. Gesell. Wien, xv. p. 708 (1865).

One male and one female.

Hab. Chili.

Erephrosis sorbens, Wiedem., Auss. zweifl. Ins. i. p. 92 (1828).

The var. mentioned by Walker in List Dipt. pt. v. Suppl. 1, p. 323 (1854), is not to be identified.

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Erephrosis leucopogon, Wiedem., Auss. zweifl. Ins. i. p. 92 (1828); Macq., Ann. Soc. Ent. Fr. vi. p. 429, pl. xv.; Walker, List Dipt. pt. v. Suppl. 1, p. 128 (1854).

Three females.

Hab. Brazil (*Noel*).

Erephrosis basalis, ♀, Walker, List Dipt. pt. i. p. 133 (1848).

The type is in very bad preservation. The palpi are long and slender.

Hab. Brazil (*Mornay*).

Erephrosis basalis, var., ♀, Walker, List Dipt. pt. v. Suppl. 1, p. 322 (1854).

This is most probably a distinct species, the palpi being quite different in shape from those of *basalis*, which are long and narrow; these have the second joint broad and concave, ending in a point, light red, with sides and tip black; the proboscis is much shorter and the wings clearer. Another female specimen, labelled in Walker's handwriting as *basalis*, resembles this variety, having the same palpi. The variety and the type are in too poor preservation to distinguish other differences between them.

Hab. R. Tapajos, Brazil, Amazons (*Bates*).

Erephrosis nana, ♂, Walker, Dipt. Saund. pt. i. p. 11 (1850).

In this species the first posterior cell is closed far from margin and more rounded than usual.

Hab. Brazil.

Erephrosis fumifera, ♀, Walker, List Dipt. pt. v. Suppl. 1, p. 324 (1854).

The palpi are long, the second joint broad at base, tapering to a point; wings with no appendix.

Hab. Santarem, Brazil (*Bates*).

Erephrosis Winthemi, Wiedem., Auss. zweifl. Ins. i. p. 91 (1828); Walker, List Dipt. pt. v. Suppl. 1, p. 127 (1854).

One female.

Hab. Brazil.

Erethrosis tenuistria, ♀, Walker, List Dipt. pt. i. p. 143 (1848).

The palpi have the second joint shorter than the first and club-shaped. Wings have no appendix.

Hab. Brazil (*Mornay*).

DIATOMINEURA, Rond.

Wings with first posterior cell open. *Eyes* hairy.

Diatomineura exeuns, ♀, Walker, Dipt. Saund. pt. i. p. 12 (1850).

The palpi in this species have a very short, broad, second joint, triangular and leaf-like in shape, concave in the middle. *Wings* have no appendix.

Hab. Brazil.

Diatomineura leucothorax, ♀, sp. n. (Pl. I. fig. 8.)

This was wrongly labelled *albithorax*, Macq., but it has no golden-yellow pubescence on the hind segments of abdomen. Black. Antennæ and palpi black; the first joint of the former clothed with long black hairs, longer than the second joint. Palpi are short; the second joint concave, broader at base, tapering to a point. The upper part of the face grey, clothed with black hairs; the frontal stripe the same colour, with black pubescence. Beard black. Proboscis short. The thorax and scutellum covered with dense greyish-white pubescence; the hairs on the posterior half are very long, the sides and breast clothed with black hairs. Abdomen wholly black, shining, with some black pubescence. Legs black; the femora clothed with long black hairs, the tibiæ of the posterior legs with whitish pubescence on the outside edge; pulvilli yellow. *Wings* hyaline. Halteres black. Length 12 millim.

Hab. Chili (Edmonds).

Diatomineura viridiventris, Macq., Dipt. Exot. i. p. 108 (1838); Blanchard, Hist. fis. y polit. Chile, vii. p. 389 (1854); Schiner, Reise der Novara, p. 99 (1866).

Three females.

Hab. Chili (Edmonds).

The *Pangonia ocellus* of Walker is not a *Pangonia* at all, but belongs to the Tabaninæ.

Europe.

PANGONIA, Latr.

PANGONIA, Rond.

- **P. marginata*, Fabr. [*Tabanus haustellatus*, Fabr., Spec. Ins. ii. p. 4. 55 (1781); Fabr., Ent. Syst. iv. p. 562 (1794). *Tanyglossa haustellata*, Meig., Klass. i. p. 173 (1804); Meig., Syst. Besch. ii. p. 24 (1838). *Pangonia cellulata*, Brullé, Exp. Mor., Zool. pl. 47. 1 12*

- (1832); Walker, *l. c.* pt. i. p. 133 (1848); id. *l. c.* pt. v. Suppl. 1, p. 118 (1854); Loew, *Neue Dipt. Beiträge*, vi. p. 23 (1853); Schiner, *Cat. European Dipt.* (1863).]—*Hab.* Algiers, S. Europe.
- P. maculata*, Fabr. [*Tabanus proboscideus*, Fabr., *Ent. Syst.* iv. p. 363 (1794). *Pangonia maculata*, Fabr., *Syst. Antl.* p. 90. 3 (1805); Latr., *Gen. Crust. Ins.* iv. p. 282, pl. xv. 4 (1806); Meig., *Syst. Besch.* ii. p. 22. 2; Walker, *l. c.* pt. i. p. 134 (1848); Loew, *l. c.*; Schiner, *Dipt. Austr.* i. p. 44 (1863); id. *Cat.* (1863).]—*Hab.* Hungary.
- **P. ferruginea*, Latr., *l. c.* p. 282. [*Tanyglossa ferruginea*, Meig., *Klass. i.* p. 175 (1804); id. *Syst. Besch.* ii. p. 24 (1838); Loew, *l. c.*; Schiner, *Cat.*]—*Hab.* Portugal, Spain.
- P. variegata*, Macq., *Hist. Nat. Ins.* i. p. 195 (1835); Meig., *Syst. Besch.* vii. p. 57; Loew, *l. c.*; Walker, *l. c.* pt. v. Suppl. 1, p. 119; Schiner, *Cat.*—*Hab.* S. Europe.
- **P. micans*, Meig., *l. c.* ii. p. 25. [*P. ornata*, Meig., *l. c.* p. 26; Loew, *l. c.* p. 23; Walker, *l. c.* pt. i. p. 133; Schiner, *Cat.*]—*Hab.* S. Europe.
- P. pyritosa*, Loew, *l. c.* p. 27 (1853); Loew, *Wien. ent. M.* vi. p. 163 (1863).—*Hab.* Varna, Bulgaria; Brussa, Asia Minor.
- P. fumida*, Loew, *l. c.* p. 28; Schiner, *Cat.*—*Hab.* Andalusia.
- P. affinis*, Loew, *l. c.* p. 29; Schiner, *Cat.*—*Hab.* Spain.
- P. griseipennis*, Loew, *l. c.* p. 31; Schiner, *Cat.*—*Hab.* Spain.
- P. dimidiata*, Loew, *l. c.* p. 50; Schiner, *Cat.*—*Hab.* Andalusia.
- **P. semiviridis*, ♂, sp. n.—*Hab.* Barengo, Spain.

DIATOMINEURA, Rond.

D. aperta, Loew, *l. c.* p. 23; Schiner, *Cat.*—*Hab.* Portugal.

Subgenus CORIZONEURA, Rond.

C. annulata, Bigot, *Mém. Soc. Zool. Fr.* v. p. 612 (1892).—*Hab.* ? S. Europe.

PANGONIA, Latr.

- P. variegata*, ♂, Fabr., *Syst. Antl.* p. 92. 8 (1805). [*Pangonia maculata*, Meig., *l. c.* ii. p. 22. 2; Loew, *l. c.* p. 25.]—*Hab.* S. Europe.
- P. picta*, Macq., *l. c.* p. 195; Meig., *l. c.* vii. p. 58; Walker, *l. c.* pt. v. Suppl. 1, p. 119 (1854); Loew, *l. c.* p. 32; Schiner, *Cat.*—*Hab.* S. Europe.
- P. flava*, Meig., *l. c.* ii. p. 22; Walker, *l. c.* p. 118; Loew, *l. c.* p. 22; Schiner, *Cat.*—*Hab.* S. France.

PANGONIA, Latr.

Schiner, in his 'Catalogue of European Diptera' (1863), gives synonyms of *Pangonia maculata* and *marginata* and others, different from those that Loew gives in his 'Neue Dipt. Beiträge' (1853). I have followed the latter, who goes carefully into all the European species and should be consulted. Some of the species are also common to Asia.

PANGONIA, Rond.

Wings with first posterior cell closed. Eyes naked.

Pangonia marginata, Fabr.

Tabanus haustellatus, Fabr., Spec. Ins. ii. p. 4. 55 (1781); id. Ent. Syst. iv. p. 562 (1794).

Tanyglossa haustellata, Meig., Klass. i. p. 173 (1804); id. Besch. ii. p. 24 (1838).

Pangonia cellulata, Brullé, Exp. Mor., Zool. pl. xlvii. (1832); Walker, Cat. Dipt. pt. i. p. 133 (1848), pt. v. Suppl. 1, p. 118 (1854); Loew, Neue Beiträge, vi. p. 23 (1853); Schiner, Cat. European Diptera (1863).

Two females, one each of the two varieties mentioned by Loew. The wings have an appendix.

Hab. Albania, ? S. Europe.

Pangonia micans, Meig., Syst. Besch. ii. p. 25 (1838).

Pangonia ornata, Meig., l. c.; Loew, Neue Dipt. Beiträge, vi. p. 23 (1853); Walker, List Dipt. pt. i. p. 133 (1848); Schiner, Cat. European Diptera (1863).

Four males and one female. The wings have an appendix.

Hab. S. France.

Pangonia ferruginea, Latr., Gen. Crust. Ins. iv. p. 282 (1806).

Tanyglossa ferruginea, Meig., Klass. i. p. 175 (1804); id. Syst. Besch. ii. p. 24 (1838); Loew, Neue Dipt. Beiträge, vi. (1853); Schiner, Cat. (1863).

One male. The black stripe on the abdomen is not at all distinct. The wings have a short appendix.

Hab. Frejus, France.

Pangonia maculata, Fabr.

Tabanus proboscideus, Fabr., Ent. Syst. iv. p. 363 (1794).

Pangonia maculata, Fabr., Syst. Antl. p. 90. 3 (1805); Latr., Gen. Crust. Ins. iv. p. 282, pl. xv. (1806); Meig., Syst. Besch. ii. p. 22. 2; Walker, List Dipt. pt. i. p. 134 (1848); Loew, Neue Dipt. Beiträge, vi. (1853); Schiner, Dipt. Austr. i. p. 44 (1862); Schiner, Cat. (1863).

One male. The wings have a short appendix.

Hab. France.

Pangonia semiviridis, ♂, sp. n. (Pl. I. fig. 7.)

Two males. Green. Face reddish, covered with yellow-grey tomentum, some yellow hairs at the sides. Beard light yellow. Antennæ and palpi bright red; the latter with the

two joints about equal in length, the second broader, tapering to a point. Proboscis short. Thorax and scutellum reddish, covered with dense orange-red pubescence, thicker at the sides. Abdomen: the first four segments on their posterior borders have a narrow dark band; the first segment has yellow-orange hairs on the sides; segments 2, 3, 4 with a tuft of black hairs on their anterior sides and yellow hair between these; segments 5 and 6 are wholly black, with black hairs at sides. Legs black: the anterior pair red, with the exception of the coxæ, which are black; the posterior pair are reddish brown with lighter knees. Wings reddish brown at base and on the fore border, with an appendix. Length 13-14 millim.

Hab. Barengo, Old Castile, from Saunders coll.

This well-marked species, resembling in general appearance *P. prasiniventris*, Macq., from S. America, does not seem to have been described before; it is labelled Saunders coll., 1868.

From unknown Localities.

DIATOMINEURA, Rond.

D. limbithorax, Macq., *l. c.* Suppl. 5, p. 22.—*Hab.* — ?

PANGONIA, Latr.

P. inconspicua, Walker, *l. c.* pt. i. p. 136 (1848).—*Hab.* — ?

P. hebes, Walker, *l. c.* p. 137.—*Hab.* — ?

The last two Walker types are not to be identified in the Museum coll.

EXPLANATION OF PLATE I.

- Fig.* 1. *Pelecorhynchus Darwini*, ♀.
Fig. 2. — *aurantiacus*, ♀.
Fig. 3. *Corizoneura pallidipennis*, ♀.
Fig. 4. *Diatomineura minima*, ♀.
Fig. 5. — —, ♂.
Fig. 6. *Pangonia flavescens*, ♀.
Fig. 6a. — —. Palpus.
Fig. 7. — *semiviridis*, ♂.
Fig. 8. *Diatomineura leucothorax*, ♀.
Fig. 9. *Corizoneura umbratipennis*, ♀.
Fig. 10. *Erephrosis aureohirta*, ♀.
Fig. 11. — *fulvitibialis*, ♀.
Fig. 12. — *auripes*, ♀

[In the 'Annals' for January, page 119, line 10, for figs. 4 ♂, 5 ♀, read figs. 4 ♀, 5 ♂.]

XXI.—On the Mating Instinct in Moths*.

By ALFRED GOLDSBOROUGH MAYER.

DURING the past summer the author carried out a series of experiments to determine the nature of the mating instincts of *Collosamia promethia*.

A large number of cocoons of this moth were kindly collected for the author by W. L. Tower, Esq., in the neighbourhood of Cambridge, Massachusetts, and others were found by the writer at Maplewood, New Jersey. Altogether 449 cocoons were obtained during the winter of 1898-99. These were allowed to remain out of doors in Cambridge (Mass.), where they were exposed to the winter's cold, and then on May 5 they were taken to Loggerhead Key, one of the Dry Tortugas Islands, Florida.

This situation was most favourable for the prosecution of the experiments, for this insect does not extend south of the Carolinas, and thus the moths were separated many hundreds of miles from others of their species. Moreover, Loggerhead Key is a small sandy island surrounded by many miles of ocean, and thus no interference with the experiments could come from the outside.

The cocoons were hung under the shade of some trees, where they were protected from the direct rays of the sun. It was remarkable that all but five of the moths (three females and two males) issued from the cocoons during the early morning hours between sunrise and 11 o'clock.

The following table will show the rate at which the moths issued from their cocoons:—

Date.	Number of males.	Number of females.	Total.
May 18.....	1	2	3
19.....	1	2	3
20.....	1	2	3
21.....	1	0	1
22.....	1	0	1
23.....	0	0	0
24.....	1	0	1
25.....	1	1	2
26.....	0	0	0
27.....	1	1	2
28.....	0	0	0
Carried forward	8	8	16

* This paper was delivered as the Presidential Address before the Cambridge (Mass.) Entomological Society in January 1900, and published in 'Psyche,' the Journal of the Club, in February.

Date.	Number of males.	Number of females.	Total.
Brought forward....	8	8	16
May 29.....	2	1	3
30.....	0	1	1
31.....	0	0	0
June 1.....	5	2	7
2.....	6	2	8
3.....	3	3	6
4.....	2	3	5
5.....	4	1	5
6.....	3	2	5
7.....	3	3	6
8.....	1	1	2
9.....	6	1	7
10.....	13	3	16
11.....	10	1	11
12.....	7	3	10
13.....	5	3	8
14.....	10	2	12
15.....	8	5	13
16.....	2	9	11
17.....	3	3	6
18.....	4	1	5
19.....	2	1	3
20.....	2	1	3
21.....	1	1	2
22.....	1	2	3
23.....	0	0	0
24.....	0	1	1
25.....	0	0	0
26.....	0	0	0
27.....	0	1	1
Total.....	111	65	176

It will be seen that 63 per cent. of the moths were males and 37 per cent. were females.

As is well known, in this moth the wings of the female are reddish brown in colour, while in the male they are black; also the antennæ of the males are large and bushy and of the females small and slender.

The male possesses the ability to seek out the female even though she be at a considerable distance.

The males usually fly towards the females in the afternoon hours between 2 o'clock and sunset, and it is a common thing to observe several dozen males fluttering about the place where the female is resting.

In seeking the female the male flies up against the wind until he comes into her near presence; then he often flutters to and fro in a bungling manner that for want of better words we might designate as "stupid" and "aimless." Often he may fly into the immediate neighbourhood of the female, and

even then he will often flutter away without attempting to mate with her. At other times, however, he will fly at once to her and mate immediately.

After issuing from the cocoon the female generally remains quiescent for some hours, until she is fertilized, after which she flies actively about and deposits her eggs.

During her period of rest the female remains with wings closed over her back; but when a male moth, or indeed any large object, comes near her within range of her vision she slowly and majestically opens and closes her wings several times.

The males when resting act in a similar manner, but are by no means so sensitive as the females.

In captivity the moths lived from three to five days.

Observations and Experiments.

The first experiments were directed to determine whether the male was attracted by the sight of the female or whether he merely perceived an odour emanating from her.

Five females were placed in a clear glass battery-jar, having a wide open mouth; the mouth was covered with a coarse-meshed mosquito-netting, to allow a free circulation of air between the interior of the jar and the outside.

Five males were liberated about 100 feet away from the jar; they immediately flew to it and fluttered about the mouth.

The jar was then inverted (placed mouth downward) and sand packed around the open end, so as to prevent the air escaping from the interior.

Thus the females remained visible through the glass, but no scent could come from them. Under these circumstances all the males flew away at once and some disappeared from sight.

When, however, the jar was turned open end up again all the males reappeared, flying excitedly round the mouth.

This experiment was often repeated, and always with the same result. The males never pay the least attention to females which are enclosed in a hermetically sealed preserving-jar of clear glass.

Assuming that the males are able to see through glass which appears transparent to us, we may conclude that sight alone is not sufficient to attract the male toward the female, or even to retain him in her presence when he is within a few inches of her.

Another experiment, which seems to show that the male

depends solely upon scent in seeking the female, may be performed as follows:—A female is wrapped in loose raw cotton, so as to be invisible and yet allow a scent to emanate from her. The males then fly to the cotton and, crawling all over it, flutter their wings excitedly and grasp the cotton repeatedly with their abdominal claspers.

In another series of experiments, the females were enclosed in a wooden box having a paper chimney rising from one end, the other end being open and covered with mosquito-netting.

This box was so arranged that a current of air blew in through the open end and out of the chimney. The females were invisible from the outside, and yet any scent from them would be carried up the chimney into the outer air.

When the males were liberated they flew to the mouth of the chimney and fluttered about in its neighbourhood. None came to the large open end of the box, into which the air was blowing.

I then poured some CS_2 in a large, flat, evaporating-dish, and placed it near the open end of the box, in such a manner that the fumes passed up the chimney and mingled with the scent from the female moths. The males, however, paid no attention to the new odour, and still fluttered around the chimney; nor did they seem to be disturbed by the fumes of ethyl mercaptan, which possesses a most nauseating and putrid odour. Evidently the scent arising from the females is sufficient to overpower the fumes of CS_2 or ethyl mercaptan, if, indeed, the males have any perception of the latter odours.

The entire abdomens of five females were cut off and placed upon a table, while the males were placed in a large mosquito-net cage about 5 feet away. Two males were liberated within five minutes of the time when the abdomens were cut off. They both flew to the recently severed abdomens and paid no attention to the abdomenless females in an adjacent cage.

I repeated this experiment many times, but in all subsequent trials the males paid no attention either to the severed abdomens or to the mutilated females. So far as positive results go, however, it appears that the scent which attracts the males emanates from the abdomen of the females.

When the eggs are cut out of the female she no longer attracts the males, nor do the detached eggs attract them.

Dead or dying females have no attraction, nor do the males come to the empty cocoon from which a female has issued.

When a female remains for some time in any place she seems to impart an odour to the locality, for males will continue to come to it for about two hours after she has left.

It is interesting to notice that the females increase in attractiveness as they grow older. This was repeatedly demonstrated as follows:—

Several females, all of which were about six hours old, were confined in a large cage made of mosquito-netting, thus allowing a free circulation of air. The same number of females about thirty hours old were placed in another similar cage about six feet away from the younger females. Out of thirty-seven males thirty-five came exclusively to the cage containing the older females. Of the two remaining males one came to the younger females and one divided his attention between both cages. When the females are made to exchange cages the males will still go to the cage containing the older females.

Upon testing females thirty hours old against females fifty-five hours old, it appeared that they were equally attractive. Of seven males three came to the females thirty hours old, one divided his attention between both cages, and three came to the fifty-five hour females. It thus appears that females about six hours old are not so attractive as are females one or two days old.

Virgin females are somewhat more attractive than fertilized ones of the same age. When the virgins are placed in a cage five feet away from a cage containing an equal number of fertilized females the majority of the males fly to the virgins. Thus out of eleven males eight came to the virgin females, two to the fertilized ones, and one to both cages.

Fertilized females are still quite attractive to males, however, and the males will readily mate with them. This last was first observed by Miss Caroline G. Soule in 1894. She had two female *promethia* moths, each one of which was mated with four males and still remained attractive to other males. In fact, as long as the female remained alive and in good health she held attractions for the male.

One of my males mated four times with three females, and three others mated three times each. The males will make frantic efforts to mate with a female which is at the time coupling with another male.

The male will fly toward the female with normal eagerness even though his entire abdomen be cut off, and he will still seek the female when, in addition to this, the sides of his thorax are covered with impervious glue. It is therefore evident that the spiracles are not the seat of the organs by which the male perceives the female scent.

If, on the other hand, the antennæ of the male be covered with shellac, glue, paraffin, Canada balsam, celloidin, or

photographic paste*, he no longer seeks the female, and displays no excitement even though within an inch of her. In five instances I removed the paste by dissolving it in water, and in four of these cases the males readily mated with the females. Upon again covering the antennæ with the paste the males again failed to notice the females when in close proximity to them.

There can be but little doubt that the organs by which the male perceives the female are situated in the antennæ; indeed it has long been recognized that the olfactory organs of insects are found chiefly upon the antennæ. Hauser (1880) and Kraepelin (1883) have given excellent descriptions of the minute anatomy of these organs, Hauser having carried out an elaborate series of physiological experiments to determine their functions. He cut off the antennæ of several species of insects and found that their sense of smell was then either greatly impaired or totally lost; covering their antennæ with melted paraffin gave the same results.

Hauser also found that when the antennæ of the male (*Saturnia pavonia*) were removed the moth never makes any attempt to mate.

Packard (1898) gives an excellent review of all researches relating to the anatomy and physiology of the olfactory organs in insects.

If the eye of a male (*Callosamia promethia*) be covered thickly with pitch or Brunswick black †, so as to preclude the possibility of sight remaining, the male will still mate in a normal manner when placed near the female.

It will be remembered that in this moth the male is black while the female is reddish brown; in accordance with the well-known theory of Darwin, the peculiar coloration of the male might be due to sexual selection on the part of the female. We might suppose, indeed, that the female preferred dark-coloured males, and thus under the influence of sexual selection the males became darker and darker, until the present melanic colour has been attained.

In 1897 the author showed that the melanic colour of the male of this moth is phylogenetically newer than the colour-pattern of the female, and this fact, so far as it goes, lends support to this theory of Darwin's.

In order to test this hypothesis I cut off the wings of a number of females, leaving only short stumps, from which all

* The photographic paste mentioned was "Stafford's white paste"; probably any impervious paste would serve as well.

† This substance is commonly used as microscopic cement, and is of a pitchy consistency and a dense brown-black colour.

the scales were carefully brushed. Male wings were then neatly glued to the stumps, and thus the female presented the appearance of a male. Under these circumstances the males mated with the female quite as readily as they would have done under normal conditions.

I then tried the experiment of gluing female wings upon the male. Here again the mating seemed to occur with normal frequency, and I was unable to detect that the females displayed any unusual aversion toward their effeminate-looking consorts.

It is also interesting to note that normal males pay no attention to males with female wings.

In another series of experiments the wings were cut entirely off of males and females and the scales brushed off of their bodies; and yet these shabby males were readily accepted by normal females, nor could I see that normal males displayed any aversion to mating with wingless females.

We are therefore forced to conclude that the melanic coloration of the male has not been brought about through the agency of sexual selection on the part of the female. In this connexion it is interesting to notice that Plateau (1897) concludes that insects are attracted only by the odours of flowers, and not at all by their colour.

In conclusion, it gives me great pleasure to express my gratitude to Miss Caroline G. Soule for advice and aid; to W. L. Tower, Esq., for his kindness in collecting many cocoons of the moth; and to Dr. Robert W. Fuller, who provided me with the reagents used in the manufacture of ethyl mercaptan.

Summary of Conclusions.

The male is positively chemotactic toward some substance which emanates from the abdomen of the female, and which he perceives through olfactory organs situated upon his antennæ.

Females thirty to sixty hours old are much more attractive to males than are young females five to ten hours old.

Virgin females are somewhat more attractive than are fertilized ones of the same age.

The male will mate at least four times either with the same or with different females.

Neither males nor females pay any attention to the appearance of their partners.

The melanic colour of the male has not been brought about by sexual selection on the part of the female.

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XXII.—*On British Species of Siphonostoma.*

By M. I. NEWBIGIN, D.Sc. (Lond.).

[Plate IV.]

THE two most familiar species of *Siphonostoma* (*Flabelligera*) are *S. affinis*, the typical northern form, and *S. diplochaitos*, the typical Mediterranean form. It is, however, worthy of notice that while Cunningham and Ramage* suggest that the two are identical, St. Joseph † says there can be no possibility of confusion between the two. In the vicinity of Millport Marine Station a species of *Siphonostoma* occurs in great abundance in the nests of *Lima hians*, and a collection made there during this summer has enabled me to make some observations on the specific characters. For purposes of comparison, Mr. E. J. Allen, of the Plymouth Marine Station, kindly furnished me with twenty-one specimens of the species found in the neighbourhood of Plymouth. The two forms are distinct, the Millport specimens agreeing most closely with *S. diplochaitos*, Otto, the Plymouth specimens with *S. affinis*, Sars, as defined by St. Joseph. Before proceeding to describe the specimens, it may be well to give in tabular form St. Joseph's list of the specific differences between the two:—

* “*Polychæta Sedentaria of the Firth of Forth*,” *Trans. Roy. Soc. Edin.* xxxiii. (1888), p. 677.

† “*Annélides Polychètes des Côtes de Dinard*,” *Ann. Sci. Nat. (Zool.)* xvii. (1894) p. 96.

<i>S. affinis</i> (specimens from Dinard).	<i>S. diplochaetos</i> (Naples specimens).
Length 20-40 millim.	Length 70-80 millim.
Breadth 2-3 millim.	Breadth 7 millim.
Segments 30-47.	Segments 39-40.
Gills 40-50.	Gills 80-100.
Cephalic bristles 60-80.	Cephalic bristles 200 or more.
Notopodial bristles 4-5.	Notopodial bristles 12-14.
Neuropodium with 1-2 hooks and 6 simple bristles.	Neuropodium with 4-5 hooks and 6 simple bristles.

Thus, apart from size, the differences chiefly consist in the disparity in numbers of the various appendages. These distinctions are somewhat vitiated by the fact that St. Joseph is inclined to regard *Chloroma Dujardinii*, Qfg., as the young of *S. affinis*, and it differs in the diminished number of segments, gills, and cephalic bristles. It is obvious that if in *S. affinis* these structures increase in number throughout life, they may also do the same in *S. diplochaetos*, and the young stages of the latter may thus resemble the adults of *S. affinis*. In fact this is precisely what the Millport specimens show. St. Joseph, however, further seeks to differentiate the two species by the minute characters of the bristles, and states that these are of much importance in distinguishing the species in the genus. The special points upon which he relies are the following:—

In *S. affinis* the distance between the successive annuli of the cephalic bristles is 0.025 millim. The hooks have the following structure: immediately below the hooked region there are 86 annuli, the intervening spaces gradually increasing, but never exceeding 0.02 millim.; there is then a long gap of 0.1 millim. in length, followed by 10-20 annuli separated by spaces of about 0.02 millim.

In *S. diplochaetos* the distance between the successive rings of the cephalic bristles is only 0.0168 millim. In the hooks the hooked region is less curved; it is followed by 50-60 annuli placed very close together, then by 4 annuli separated by distances of 0.048 millim., finally by 50 closely aggregated annuli.

As to my own observations, the Plymouth specimens agreed very closely with St. Joseph's description of *S. affinis*. The length varied from 15-25 millim., with a usual breadth of 2 millim. The number of segments varied from 39-45, and there were about 40 gills. In regard to the cephalic bristles, there were some slight differences; usually numbering about 80, in one case at least a very careful count gave over 100, though some of these were short and small. As to the

distance between the annuli, the specimens did not display the constancy indicated by St. Joseph's descriptions of Dinard specimens. Not only was there variation in the different bristles of the same worm, but the same bristle often gave varying figures for its different annuli. The following are some typical measurements:—0·021 millim., 0·034 millim., 0·036 millim., 0·039 millim., 0·057 millim. The dorsal bristles usually numbered 5–6 instead of 4–5, and not infrequently in addition there were one or two small bristles embedded in the substance of the papilla and not projecting from its surface. There was a wide range of variation in regard to the distance of the annuli apart (see Pl. IV. fig. 5). The total length of the bristles varied slightly in the different specimens; the longest was usually 1·6 millim. to 1·2 millim. in length; this agrees very closely with St. Joseph's description for the Dinard specimens. In regard to the ventral hooks and their associated simple bristles, the specimens agreed closely with St. Joseph's description, but the minute characters of the hooks did not entirely agree with his account (see fig. 6).

In general the Plymouth specimens, though agreeing very closely with St. Joseph's Dinard specimens, showed variation in three points:—(1) the number of cephalic bristles, (2) the number of notopodial bristles in the other regions of the body, (3) the minute structure of the bristles. All three are characters which, according to St. Joseph, enter into the definition of the species.

The Millport specimens of *Siphonostoma* showed a great variation in size, some reaching a length of 70 millim., with a breadth of 7 millim., and others being only 25 millim., with a breadth of 3 millim. All were taken in the same locality (neighbourhood of Tan Buoy), and all from the interior of *Lima* nests. As large and small specimens occur together in the same nest, it seems legitimate to conclude that the latter are merely young stages of the former.

The large specimens—those of 60–70 millim. in length—are readily distinguished from the Plymouth species. As obvious distinguishing features we have not only the length of the body and the breadth of the anterior region, but the more distinct tapering of the posterior region and the large size of the notopodial bristles, which project in a very conspicuous way. Specimens of 25 millim. in length, on the other hand, show a much greater resemblance to the Plymouth form. We shall consider separately the characters of the large and small specimens, but it should be noted that specimens

of intermediate length are intermediate in character between the two.

Specimens of 60–70 millim. in length had 40–45 segments. This does not agree with St. Joseph's statement for *S. diplochaïtos*, but Bles*, in speaking of this species (Naples specimens) says 40–50 segments, so that there must obviously be variation in this respect. The gills in these full-grown specimens numbered about 100, the cephalic bristles 200 or more; but in the structure of notopodium and neuropodium they showed less close agreement with St. Joseph's specimens. The notopodium bore usually 10–12 long annulated bristles, but in addition there were about 10–13 other short bristles buried in the substance of the papilla, and hardly, if at all, visible externally (see Pl. IV. fig. 1). The distance of the annuli apart varied from 0.026 millim. to 0.071 millim. in the cephalic bristles, and from 0.0079 millim. to 0.023 millim. in the other notopodial bristles (see fig. 3). The range of variation in this respect is thus very wide. As to the hooks of the neuropodium, these did not exceed 3 in number (in place of 4–5), and in many instances 1 or 2 only were present; but it may be noticed that the hooks fall out very readily. The annulation was often indistinct throughout a portion at least of the hook (see fig. 4), and in no case did I succeed in finding any one hook which displayed all the characters described by St. Joseph. He describes his specimens of *S. diplochaïtos* as having less distinctly recurved hooks than those of *S. affinis*; but my specimens showed no such distinction. Embedded in the neuropodial papillæ and surrounding the base of the hooks there are, as in *S. affinis*, short annulated bristles whose slender tips only project from the surface of the papilla (see fig. 2). In the Millport specimens instead of 6 of these there were usually about 13: of these about 7 actually projected from the papilla; the other 6, though identical in structure, lay entirely within the substance of the papilla (see fig. 2). It seems impossible to doubt the identity of these Millport specimens with *Siphonostoma diplochaïtos* of the Mediterranean; but they differ especially in the diminished number of ventral hooks and in the presence of small bristles in the notopodial papilla, in addition to the typical number.

The small Millport specimens differed in several respects from the large. Specimens of 25 millim. in length had 34–35 segments, but one of 38 millim. had 43 segments. In specimens of 25–40 millim. the number of cephalic bristles

* Brit. Assoc. Report, 1891.

varied from 140-150, as contrasted with over 200 in the adult; the number of gills varied from 60-80, as compared with about 100 in the adult. The distance of the annuli apart varied from 0.0158-0.0342 millim. in the cephalic bristles. The notopodial papillæ bore usually 6 long projecting bristles (cf. *S. affinis*), but there were 8-9 small additional bristles buried in the substance of the papilla. These small bristles are not visible except after careful search, and under a low power the general aspect of the papilla closely resembles that of *S. affinis*. The only constant difference which I could find lies in the fact that, in specimens of the two species of the same body-length, the dorsal bristles of *S. diplochaïtos* are longer than those of *S. affinis*. Thus in specimens about 25 millim. long those of the latter species are 1.6-1.2 millim. long, those of the former 2.16-2.37 millim.

The small specimens of *S. diplochaïtos* displayed on their neuropodial papillæ 1-2 hooks whose bases were surrounded by 6 simple bristles. The hooks did not agree closely in their minute characters with those of St. Joseph's specimens.

This description shows that *S. diplochaïtos* changes in character during growth, the changes occurring in those special characters which serve to differentiate the adult from *S. affinis*. Thus the young as compared with the adult show a diminished number of segments, gills, cephalic bristles, ordinary notopodial bristles, and neuropodial hooks; and it is precisely the numbers of these structures which constitute the distinguishing marks of the species. In other words, the young *S. diplochaïtos* approximates in character to the adult *S. affinis*. The present observations do not support St. Joseph's suggestion that the minute characters of the bristles are of specific importance. In view of the approximation of the young *S. diplochaïtos* to the characters of the adult *S. affinis*, it must be doubtful how far the two are entitled to rank as separate species.

It may seem remarkable that the Plymouth specimens of *S. affinis* should agree so closely with St. Joseph's descriptions, while the Millport specimens should differ so markedly from his descriptions of *S. diplochaïtos*; but it is to be noticed that in the case of *S. affinis* the two sets of specimens are both Channel forms, while the specimens of *S. diplochaïtos* come from such widely separated localities as the Bay of Naples and the Firth of Clyde.

It is interesting to note that St. Joseph describes from Saint-Jean-de-Luz* a new *Siphonostoma* under the name of

* "Annélides Polychètes des Côtes de France," Ann. Sci. Nat. (Zool.) v. (1897) p. 363.

Flabelligera Claparedii, which differs from *S. diplochaitos* chiefly in having 23–25 notopodial bristles, 1–2 ventral hooks, and different forms of papillæ. Now if in the Millport specimens the short notopodial bristles be counted in addition to the long ones, this would make the number the same as in St. Joseph's species, and the number of ventral hooks is the same. It seems probable that *S. diplochaitos* is a very variable species, exhibiting a strong tendency to run into local races, and that the three "species," *S. diplochaitos*, *S. affinis*, and *S. Claparedii*, are only varieties of the same species.

EXPLANATION OF PLATE IV.

- Fig. 1.* Cluster of bristles from one of the posterior notopodia of *S. diplochaitos*, showing eleven long bristles, represented as if cut short, and ten short bristles scarcely projecting from the surface of the papilla. The line *aa* represents the outline of the papilla. $\times 50$.
- Fig. 2.* Neuropodial papilla of *S. diplochaitos* with hooks removed, to show the short simple bristles, here twelve in number. $\times 50$.
- Fig. 3.* Fragment of dorsal bristle of *S. diplochaitos*, to show the varying distances at which the annuli are placed. $\times 300$.
- Fig. 4.* Hook of *S. diplochaitos*, to show annuli. In the median region no annuli could be seen even with a high magnification. $\times 40$.
- Fig. 5.* Fragment of dorsal bristle of *S. affinis*, to show annuli. $\times 300$.
- Fig. 6.* Hook of *S. affinis*, to show annuli. $\times 90$.

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XXIII.—On an Unnamed Species of Cervus from Turkestan.
By R. LYDEKKER.

ON pages 108 and 109 of my work entitled 'The Deer of All Lands' brief mention is made of a stag recently (and perhaps still) living in the zoological gardens at Moscow, which at the time in question I was unable to refer to any known species, though I refrained from giving it a scientific name till further information was obtained. The specimen, of which a figure, copied from a photograph, was given, was reputed to have come from Turkestan, and in the characters of its antlers, of which a cast pair are in the possession of the Duke of Bedford, is evidently allied to the shou (*Cervus affinis*) of the district north of Bhutan.

Recently the Duke of Bedford has received a stag from the neighbourhood of Tashkend, which is now living in the park at Woburn Abbey, and which, although it has at present no antlers, I have no hesitation in referring to the same species

as the Moscow specimen. Its resemblance to the latter is especially shown by the remarkably short and thick neck, as well as by the pelage being ashy grey at all seasons. Assuming this reference to be correct, we have the reputed place of origin of the Moscow specimen confirmed, and thus evidence that a shou-like deer inhabits the Turkestan district, part of which was included in the old kingdom of Bactria.

Although our information with regard to the shou is very imperfect, yet it appears to have tawny-coloured hair during at least a portion of the year, and its antlers have five tines, whereas those of the Moscow specimen have normally but four, owing to the absence of the bez-tine*. Apart from this, it is altogether unlikely that the range of the shou should extend from the neighbourhood of Bhutan to Turkestan, especially since it is unknown in the intermediate area.

Accordingly all the evidence seems to point to the specific (or subspecific) distinctness of the Turkestan deer, which I propose to call *Cervus bactrianus*, the pair of shed antlers at Woburn Abbey forming the type.

The species may be defined as allied in the general form of its antlers to *C. affinis*, but the size apparently smaller, the colour of the coat ashy grey at all seasons, and the antlers normally with but four tines on each side, the bez-tine being missing. Another feature is the shortness and breadth of the head and neck.

When the Tashkend specimen at Woburn develops its new antlers, I hope to give a further notice of the species.

XXIV.—*British Amphipoda: Fam. Lysianassidæ (concluded)*.

By Canon NORMAN, M.A., D.C.L., LL.D., F.R.S., &c.

[Plate VI.]

Fam. II. *Lysianassidæ* (continued from p. 144).

Genus 7. *SOPHROSYNE*, Stebbing.

(Report 'Challenger' Amphipoda, p. 652.)

25. *Sophrorsyne Robertsoni*, Stebbing & Robertson.

1890. *Sophrorsyne Robertsoni*, Stebbing & Robertson, "Four new British Amphipoda," Trans. Linn. Soc. vol. xiii. p. 31, pl. v. A.

Hab. The Clyde (*D. R.*); Upper Loch Fyne (*J. Murray*); Loch Fyne (*T. S.*).

* In the pair at Woburn there are five tines on the left side, apparently due to abnormal development, the terminal fork being smaller on this side than on the other.

Distrib. 'Porcupine,' 1869, St. 36, lat. 48° 59' N., long. 11° 9' W., *i. e.* outside the entrance to the English Channel, in 725 fathoms: *Mus. Nor.*

[Genus 8. CYCLOCARIS, Stebbing.

(Report 'Challenger' Crustacea, p. 664.)

[*Cyclocaris faroensis*, sp. n. (Pl. VI. figs. 5-15.)

The form of the head, the general character of the antennæ, of the gnathopods and peræopods, of all the coxæ, of the dorsal impression of the first segment of the urosome, and of uropods and telson show remarkable resemblance to *Cyclocaris tahitensis*, Stebbing, the type and only previously known species of a very marked genus. So remarkable is the resemblance, that the differences seem scarcely varietal; but I hesitate to unite a form found in the Faroe Channel with one from so distant a locality as Tahiti.

The *cephalon* has a similar concavity between the bases of the two pairs of antennæ as in *C. tahitensis*, and similarly leaves the base of the lower pair fully exposed to view.

The *upper antennæ* or antennules have the peduncle shorter than the cephalon; the flagellum twelve-jointed, the first of these joints is fully as long as the cephalon, the distal lower corner of this and of the four following joints is furnished with long slender spines: the secondary appendage is composed of six articulations, of which the first is the longest; it reaches to the seventh joint of the flagellum.

The *lower antennæ* have the peduncle short, the last two joints of the peduncle subequal, and the flagellum consists of twenty-two articulations.

No *eyes* are visible. The remarkable *mandible* (fig. 5) closely corresponds with that of the type species.

The *first maxillæ* (fig. 6) have the basal lobe narrowed almost to a point below, whence it swells out into a nearly semicircular form, furnished on the inner margin with short stiff setæ, which are verticillately plumed; the masticatory lobe is elongated and narrowed to the extremity, furnished with long flexuous spines, bearing a tooth on the side, and also with slender setæ: the palp is narrow, the last joint arcuate, and terminating in three teeth tipped with spine-points; of these the central is the longest; outside these at the outer corner is a small short spine and a small seta, and on the hinder margin another and larger seta.

The *second maxillæ* (fig. 7) have the outer lobe much longer than the inner, the latter is margined with two distinct

rows of setæ; the setæ in one of these rows are verticillately plumose, in the other simply plumose.

The basal lobe of the *maxilliped* (fig. 8) widens distally and the extremity is rather oblique and flexuous; a row of setæ is situated on the middle of the lobe; the masticatory lobe is remarkable for its great breadth and widely rounded extremity, the inner margin is faintly crenulated, the outer and distal margins are set round with simple setæ at nearly equal intervals; the palp is stout, its terminal nail strong, the antepenultimate joint just overtops the masticatory lobe.

The *gnathopods* have the coxæ small and almost entirely concealed by the overlying coxa of the first peræopod. Both pairs of gnathopods (figs. 9 & 10) closely resemble those of *C. tahitensis*, but the first pair are much more stoutly built than in that species.

The *peræopods* with their coxæ (figs. 11 & 12, coxæ of second and third pair) are in close agreement with those of the type. A comparison of fig. 13 of the last peræopod with Stebbing's figure of the same limb in *C. tahitensis* shows the remarkable resemblance, seen even in the hinder margin of the basos, which in the lower portion is slightly concave and devoid of the serrations which are present in the upper portion of the margin.

The *third segment* of the metasome has the hinder corner of the epimera slightly produced and pointed (fig. 14).

The first segment of the *urosome* has a dorsal sinus. The second uropods are longer than the first, but do not reach to more than half the length of the rami of the largely developed last pair, which have their rami fully twice as long as their peduncle: the outer branch is two-jointed; its inner margin bears four or five small spinules, and under a high power the margin itself is seen to be delicately serrulated. The *telson* (fig. 15) is narrow, very long and produced, and cleft almost to the base; it extends beyond the extremities of the first and second uropods.

Length 19 millim.

Two specimens taken by Sir John Murray in the 'Triton' Expedition of 1882, Stat. 8, Faroe Channel, lat. 60° 18' N., long. 6° 15' W., in 640 fathoms, temperature 30° Fahr.

The features which distinguish this species from the type are chiefly the more robust character of the first gnathopods and the form of the hinder margin of the third segment of the metasome.]

Genus 9. *ARISTIAS*, Boeck.

26. *Aristias neglectus*, Hansen.

1872. *Aristias tumidus*, Boeck, (138) p. 148, pl. iii. fig. 4 (but not *Anonyx tumidus*, Kröyer, or any other synonyms).
 1887. *Aristias neglectus*, H. J. Hansen, (141) p. 67, pl. ii. fig. 4.
 1890. *Aristias neglectus*, Meinert, (71) p. 153.
 1890. *Aristias Audouinianus*, G. O. Sars, (142) p. 48, pl. xvii. fig. 2.
 1895. *Aristias neglectus*, id. *ibid.*, Appendix, p. 675.
 1893. *Aristias neglectus*, Della Valle, (139) p. 844, pl. vi. fig. 9, pl. xxvi. figs. 16-31 A

Hab. Shetland, 170 fathoms, the largest specimens that I have seen, and in Ascidians at lesser depths; Sleat Sound, Skye (*A. M. N.*): *Mus. Nor.*

Distrib. Trondhjem and Hardanger Fiords, Norway, 40-150 fathoms (*A. M. N.*); Naples (*Della Valle*): *Mus. Nor.* Kattegat (*Meinert*).

In cases where in the past *Aristias tumidus* has been recorded from stations in the British Isles it may be assumed that *A. neglectus* was the species taken.

Genus 10. *PERRIERELLA*, Chevreux & Bouvier, 1892.

= *Pararistias*, D. Robertson, 1892.

27. *Perrierella Audouiniana* (Spence Bate).

1861. *Lysianassa Audouiniana*, Bate & Westwood, (1) vol. i. p. 79.
 1890. *Aristias Audouinianus*, Meinert, (71) p. 152, pl. i. figs. 1-6.
 1892. *Perrierella crassipes*, Chevreux & Bouvier, Bull. Soc. Zool. de France, vol. xvii. p. 50, & woodcut.
 1892. *Pararistias Audouinianus*, D. Robertson, "Second Contrib. Cat. Amphip. and Isop. of Firth of Clyde," Trans. Nat. Hist. Soc. Glasgow, vol. iii. p. 7.
 1893. *Perrierella crassipes*, Chevreux & Bouvier, "Amphip. de Saint-Vaast-la-Houge," Ann. des Sci. Nat. sér. 7, vol. xv. p. 113, pl. ii. figs. 1-12.
 1893. *Perrierella Audouiniana*, J. Bonnier, "Les Amphipodes du Boulonnais, III.," Bull. Sci. de France et Belgique, vol. xxiv. p. 175, pl. v. figs. 1-10.
 1895. *Perrierella Audouiniana*, Walker, "Revision of Amphipods of the L. M. B. C. District," Trans. Liverpool Biol. Soc. vol. ix. p. 291.

This is unquestionably Spence Bate's *Lysianassa Audouiniana*. Mr. Walker has examined Spence Bate's single specimen in the British Museum, and in my own collection are examples from Polperro and others from Shetland which were examined and named by Bate as above.

Hab. Shetland; in Ascidians, Oban; near Duke Buoy, Plymouth, 7 fathoms (*A. M. N.*); Polperro (*Laughrin*): *Mus. Nor.* Mull (*G. Brook*); Clyde and Loch Fyne (*D. R.*);

North Wales and Isle of Man (*A. O. W.*); Jersey (*Chevreux*).

Distrib. Trondhjem Fiord, Norway (*A. M. N.*); Denmark (*Copenhagen Museum*): *Mus. Nor.* West coast of France and Mediterranean (*Chevreux*).

Another synonym is *Aristias tumidus* of Bonnier and of Chevreux (not Kröyer).

Genus 11. CALLISOMA, A. Costa.

28. *Callisoma Hopei*, A. Costa.

1851. *Callisoma Hopei*, A. Costa, in Hope, Cat. Crost. Ital. p. 44, & plate, fig. 2; id. Fauna del Reg. di Napoli, Crost. p. 5, pl. viii. bis, fig. 1.

1857. *Scolopecheirus crenatus*, Bate, Ann. & Mag. Nat. Hist. ser. 2, vol. xix. p. 138.

1861. *Callisoma crenata*, Bate & Westwood, (1) vol. i. p. 120.

1890. *Callisoma crenata*, G. O. Sars, (142) p. 53, pl. xix. fig. 1.

1893. *Callisoma Hopei*, Della Valle, (139) p. 839, pl. vi. fig. 11, & pl. xvi. figs. 1-15.

Neapolitan specimens examined by me have the carpus of the first gnathopods longer in proportion to the hand and the telson to the last uropods than Della Valle's figures represent, and I have no doubt as to the identity of the Mediterranean and more northern forms.

Hab. Shetland; Sleat Sound, Skye; Firth of Clyde (*A. M. N.*); Seaham, Co. Durham (*G. Hodge*); 25 miles off May Island, Firth of Forth, 35 fathoms (*Sir J. Murray*); Polperro, Cornwall (*Laughrin*); off S.W. Ireland, 165 fathoms (*Bourne*); Banff (*T. Edward*): *Mus. Nor.* Northumberland coast; Inverary, N.B. (*A. M. N.*); St. Andrews (*M'Intosh*); 70-80 miles off Spurn Head (*T. S.*); N. Wales and Galley Head, Co. Cork (*A. O. W.*).

Distrib. Bergen and Trondhjem Fiords, Norway (*A. M. N.*); Naples (*Della Valle*): *Mus. Nor.* West coast of France (*Chevreux*). It has not been found within the Arctic Circle.

29. *Callisoma Kröyeri* (Bruzelius).

1859. *Anonyx Kröyeri*, Bruzelius, Skand. Amphip. Gammar. p. 45, pl. ii. fig. 7.

1872. *Callisoma Kröyeri*, Boeck, (138) p. 134.

1890. *Callisoma Kröyeri*, G. O. Sars, (142) p. 54, pl. xix. fig. 2.

Hab. Recorded by Mr. Walker from off the Skilligs and Ballycotton, S.W. Ireland, in 30-62 fathoms.

Distrib. Bohuslän, Sweden (*Prof. Lovén*); Fosse de Cap Breton, Bay of Biscay, in 35-60 fathoms (*A. M. N.*); 'Por-

cupine,' 1869, Stat. 17, lat. $54^{\circ} 25' N.$, long. $11^{\circ} 44' W.$, 1230 fathoms: *Mus. Nor.* Trondhjem Fiord, Norway, 30-40 fathoms (*G. O. Sars*); Finmark (*Bruzelius*).

Genus 12. HIPPOMEDON, Boeck.

30. *Hippomedon denticulatus* (Bate).

1861. *Anonyx denticulatus*, Bate & Westwood, (1) vol. i. p. 101.
 1872. *Hippomedon Holbölli*, Boeck, (138) p. 136, pl. v. fig. 6, & pl. vi. fig. 7 (nec *Anonyx Holbölli*, Kröyer).
 1890. *Hippomedon denticulatus*, G. O. Sars, (142) p. 56, pl. xx.

Hab. Shetland; Firth of Clyde; Durham coast (*A. M. N.*); 25 miles off May Island, Firth of Forth, 35 fathoms (*Sir J. Murray*); *Mus. Nor.* Hebrides; Loch Fyne; near Farne Islands, Northumberland (*A. M. N.*); St. Andrews (*M. Intosh*); 70-80 miles E. by N. from Spurn Head (*T. S.*); Isle of Man; Valentia, Ireland, and off Galley Head, Co. Cork (*A. O. W.*).

Distrib. Bergen and Trondhjem Fiords, Norway; Vadsö, E. Finmark (*A. M. N.*); Tromsö (*Schneider*); 'Porcupine,' 1869, Stat. 51, lat. $60^{\circ} 6' N.$, long. $8^{\circ} 14' W.$, in 440 fathoms; Naples (*Della Valle*): *Mus. Nor.* Sweden, Denmark, and Western France.

31. *Hippomedon propinquus*, G. O. Sars.

1890. *Hippomedon propinquus*, G. O. Sars, (142) p. 57, pl. xxi. fig. 1.

Hab. Shetland (*A. M. N.*); 'Porcupine,' 1869, Stat. 74, to the west of Shetland, 203 fathoms: *Mus. Nor.*

Distrib. Vadsö and Sydvaranger, East Finmark (*A. M. N.*); Tromsö (*Schneider*): *Mus. Nor.* Sars speaks of this as a northern form which he has not found south of the Trondhjem Fiord, but found thence northward to Vadsö in 20-100 fathoms.

[Genus 13. PARATRYPHOSITES, Stebbing.

[*Paratryphosites abyssi* (Goës).

1866. *Lysianassa abyssi*, Goës, "Crust. Amphip. Maris Spetsbergiam alluentis &c.," *Øfvers. K. Vet.-Akad. Förhand.* p. 3 (separate copy), pl. xxxvii. fig. 5.
 1870. *Hippomedon abyssi*, Boeck, (137) p. 23.
 1872. *Hippomedon abyssi*, Boeck, (138) p. 138.
 1887. *Hippomedon abyssi*, H. J. Hansen, (141) p. 66.
 1899. *Paratryphosites abyssi*, Stebbing, "Revision of Amphipoda," *Ann. & Mag. Nat. Hist.* ser. 7, vol. iv. p. 206.

Taken by the 'Valorous,' 1875, Stat. 2, off Hare Island,

Greenland, in 175 fathoms, and Stat. 3, off Disco, Greenland, in 100 fathoms.

[This species is as yet only known in the Greenland seas.]

Genus 14. ORCHOMENE, Boeck.

32. *Orchomene humilis* (A. Costa).

1853. *Lysianassa humilis*, A. Costa, Rend. Accad. fis. mat. Napoli, p. 172 (*vide* Della Valle).

1857. *Lysianassa humilis*, A. Costa, "Ricerche su Crost. Amphip. del Reg. di Napoli," Mem. del. R. Accad. del. Sc. di Napoli, vol. i. p. 187, pl. i. fig. 6.

1861. *Anonyx Edwardsii*, Bate & Westwood, (1) vol. i. p. 94.

1867. *Anonyx melanophthalmus*, Norman, "Report Committee Dredging Hebrides," Brit. Assoc. Rep. for 1866, p. 201.

1876. *Anonyx serratus*, Stebbing, "The Genera *Hyale* and *Anonyx* and on a new *Probolium*," Ann. & Mag. Nat. Hist. ser. 4, vol. xvii. p. 340, pl. xix. figs. 3 & 3 a-e (nec *Orchomene serratus*, Boeck).

1882. *Orchomene Batei*, G. O. Sars, (102) p. 81.

1890. *Orchomene Batei*, Sars, (142) p. 60, pl. xxii.

1893. *Anonyx humilis*, Dalla Valle, (139) p. 817, pl. xxvi. figs. 32-37.

Hab. Shetland; Sleat Sound, Skye; Oban; Durham coast; Starcross, Devon; Jersey; Guernsey (*A. M. N.*); Isle of Cumbrae (*D. R.*, received as *O. pinguis*): *Mus. Nor.* Loch Fyne (*D. R.*); near Bass Rock, Firth of Forth (*T. S.*).

Distrib. West Norway (*Sars*); Naples (*Della Valle*): *Mus. Nor.* Sars speaks of it as occurring in a few localities in the south and west of Norway. West France (*Chevreux*).

I have examined specimens of *A. humilis* received from Della Valle, which are the same as our northern species.

33. *Orchomene pectinatus*.

1882. *Orchemene pectinatus*, G. O. Sars, (102) p. 80, pl. iii. fig. 5.

1890. *Orchomene pectinatus*, Sars, (142) p. 64, pl. xxiii. fig. 3.

Hab. 'Porcupine,' 1869, Stat. 23 a, lat. 56° 13' N., long. 14° 18' W., that is south of Rockall, 420 fathoms: *Mus. Nor.*

Distrib. Bugo in the Varanger Fiord, East Finmark, in 120 fathoms; at three stations outside the great fishing-banks of the N.W. coast of Norway, and Arctic Ocean W. of Bear Island by the 'Vöringen' Exped. (*G. O. Sars*).

[*Orchomene serratus*, Boeck, has been three times recorded as British (by Robertson, Stebbing, and Scott), but the records have been subsequently found to be erroneous.]

Genus 15. TRYPHOSA, Boeck.

= *Orchemenella*, G. O. Sars.34. *Tryphosa nana* (Kröyer).

1846. *Anonyx nanus*, Kröyer, Naturhist. Tidsskr., 2 Rækkes, vol. ii. p. 30; Voyage en Scand. &c. pl. xvii. fig. 2.
 1876. *Tryphosa nana*, Boeck, (138) p. 181.
 1882. *Tryphosa ciliata*, G. O. Sars, (102) p. 81, pl. iii. fig. 4.
 1888. *Tryphosa ciliata*, A. O. Walker, Proc. Biol. Soc. Liverpool, vol. ii. p. 172, pl. xiii. figs. 1-4.
 1891. *Orchemenella ciliata*, G. O. Sars, (142) p. 69, pl. xxv. fig. 2.
 1893. *Tryphosa nana*, J. Bonnier, "Les Amphipodes du Boulonnais, III.," Bull. Sci. France et Belgique, vol. xxiv. p. 191, pl. vi. figs. 1-9.
 1895. *Orchemenella nana*, G. O. Sars, (142) Appendix, p. 683.

Hab. Shetland; Durham coast (*A. M. N.*); Isle of Cumbræ (*D. R.*); Polperro, Cornwall (*Laughrin*); Firth of Forth (*T. S.*); 'Porcupine,' 1869, off W. Ireland, 40 fathoms: *Mus. Nor.* 70-80 miles off Spurn Head, near Hull (*T. S.*); Isle of Man; North Wales; Valentia Harbour and Bray Head, Ireland (*A. O. W.*).

Distrib. South Norway (*G. O. Sars*); Denmark (*Copenhagen Museum*): *Mus. Nor.* Jædaren, south coast of Norway (*G. O. Sars*); west coast of France (*Chevreux*).

My friend the late Dr. D. Robertson wrote of this species in his "Second Contribution":—"This seems to be one of the sea-scavengers. A fisherman brought to me portions of the crab *Lithodes maia* from his bait-creel, and every part of it was crowded with this species clustered on the top of each other. All the flesh was as perfectly cleaned off the body, legs, and claws of the crab as if the parts had been bleached on the shore for a twelvemonth. The number of these Amphipods was quite surprising, and I had a six-ounce bottle filled with them. So far as I have seen, they are all of the same species. The wonder is why they remained on the empty shell of the crab after having cleaned out all the soft parts, unless, like the boa-constrictor after a great feast, they require a long time to digest it. . . . It is a curious fact that the Amphipoda met with at these great banquets, so far as I have seen, are mostly of one species. Sometimes they are exclusively *Tryphosa nanoides*, or at other times wholly *Lafjystius sturionis*, *Orchemenella nana* (= *ciliata*), or *Callisoma crenatum*. Whether each species has its own particular prey, or whether the weaker species give way to the stronger, cannot easily be proved." It is not always so, for I may mention that at Falmouth on a dead fish in a crab-pot I found *Orchemene humilis* and *Socarnes crythrophthalmus*

associated in thousands of each species enjoying their dinner in mutual respect. At Shetland I obtained *Tryphosa nanoïdes* in great abundance on a dead fish.

As *Orchemenella ciliata*, G. O. Sars, has been shown by J. Bonnier to be a synonym of *Tryphosa nana* (Krøyer), Boeck, and Sars has acquiesced in this view, and as *Tryphosa nana* was made by Boeck the type of his genus *Tryphosa*, it is necessary that both generic and specific names employed by Sars should give way to those which are earlier.

34*. ? *Tryphosa minuta* (Krøyer).

? 1861. *Anonyx minutus*, Bate & Westwood, (1) vol. i. p. 108.

1876. *Orchomene minuta*, Boeck, (138) p. 174, pl. v. fig. 3.

1890. *Orchemenella minuta*, G. O. Sars, (142) p. 67, pl. xxiv. fig. 1.

This is a species found throughout the Arctic Ocean, Siberian Sea, and Greenland, and though found throughout Norway, it becomes scarcer southwards.

Hab. Is *Anonyx minutus*, Bate & Westwood, this species? I do not think it can be, and am inclined to believe that the Amphipod figured and described by them was a young male of *Orchomene humilis*, Costa, which species is found abundantly at Polperro and Plymouth, whence Bate had specimens of "*Anonyx minutus*." Both figures and description accord with *O. humilis*, except the description of the posterior peræopoda, which description, however, does not accurately apply to any allied form known to me. The only other record of the occurrence of the species in our fauna is given thus by Mr. T. Scott:—"This species is reported from Minard (Loch Fyne), where it was collected in 1870 by Murray." It must be observed that Sir J. Murray does not study the Amphipods, and we do not know the authority who identified the species.

35. *Tryphosa pinguis* (Boeck).

1860. *Anonyx pinguis*, Boeck, Forh. ved de Skand. Naturf. 8de Møde, p. 642.

1876. *Orchomene pinguis*, Boeck, (138) p. 176, pl. v. fig. 1.

1890. *Orchemenella pinguis*, G. O. Sars, (142) p. 67, pl. xxiv. fig. 2.

1893. *Tryphosa pinguis*, J. Bonnier, "Les Amphipodes du Boulonnais, III.," Bull. Sci. France et Belgique, vol. xxiv. pp. 172, 196.

The above names will show the confusion which has existed among the small Lysianassids, as it seems to me from multiplying genera on insufficient characters; but not wishing to increase confusion, I have adopted for them M. Bonnier's revision.

Hab. "Dredged west of the Tan Buoy, Cumbrae, in

18 fathoms" (*D. R.*). These are the specimens which were recorded in Dr. Robertson's first paper as "*Anonyx serratus*." This is the only record of the species as British.

Distrib. Trondhjem Fiord, Norway (*A. M. N.*); Malangen Fiord, West Finmark (*J. S. Schneider*); *Mus. Nor.* Siberian Polar Sea (*Stuxberg*).

Genus 16. *TRYPHOSELLA*, J. Bonnier.

= *Tryphosa*, G. O. Sars (non *Tryphosa*, Boeck, typica).

36. *Tryphosella Sarsi*, J. Bonnier.

1891. *Tryphosa nana*, G. O. Sars (not *Anonyx nanus*, Kr.), (142) p. 76, pl. xxvii. fig. 1.

1893. *Tryphosella Sarsi*, J. Bonnier, *l. c.* p. 170, note.

Hab. Bressay Sound, Shetland; mouth of the Yealm, near Plymouth; Clew Bay, Co. Mayo (*A. M. N.*); *Mus. Nor.* Puffin Island, North Wales, Menai Strait, and Jersey (*A. O. W.*); Upper Loch Fyne (*T. S.*).

Distrib. South and west coasts of Norway (*Sars*).

37. *Tryphosella Höringii* (Boeck).

1870. *Tryphosa Höringii*, Boeck, (137) p. 38.

1876. *Tryphosa Höringii*, Boeck, (138) p. 182, pl. iv. fig. 4.

1891. *Tryphosa Höringii*, G. O. Sars, (142) p. 77, pl. xxvii. fig. 2.

1893. *Tryphosella Höringii*, J. Bonnier, *l. c.* p. 171.

Hab. It has been recorded from the ambulacral grooves of starfish, Bull Bay, Anglesey (*A. O. W.*); Loch Linnhe (*G. Brook*); Firth of Forth (*T. S.*).

Distrib. Trondhjem Fiord, Norway, 150 fathoms (*A. M. N.*); Denmark (*Copenhagen Mus.*); *Mus. Nor.* Sars speaks of it as found in Norway and up to Lofoten generally in the region of deep-sea corals in 50-150 fathoms. Bohuslän, Sweden (*Gunhilds Expedition*, fide *Sars*).

[*Tryphosella abyssi*, sp. n. (Pl. VI. figs. 16-20.)

Male.—In describing this form I shall take advantage of the figures on Sars's pls. xxvii. and xxviii. for illustrations of characters. Cephalon with lateral corners produced and acute (as in *Tryphosites*) (fig. 16). Coxæ of fourth segment of mesosome (fig. 17) with the posterior projection completely rounded above and below, those of fifth pair (fig. 18) as broad as deep; these characters as in *T. Sarsi*; epimera of third segment of metasome with the hinder corner well rounded (fig. 19), without any indication of an angle. First segment

of urosome deeply grooved in front, humped and distally truncate (exactly as *T. angulata*) (fig. 20). Antennæ of both pairs very much as figured for male of *T. Høringii*, but basal joint of upper less stout; flagellum of eighteen articulations, the first nearly equal in length to the basal joint of the peduncle, accessory appendages of seven articulations, first only slightly longer than the second; flagellum of lower antennæ with twenty-five articulations; both pairs furnished with calceolæ. Gnathopods of both pairs of the usual form in the genus and very like those of *T. Sarsi*; first slender, the hand slightly shorter than the wrist; the second with hand obovate, somewhat wider than the wrist, finger well developed. Last uropods with long rami and fully twice the length of the telson, which bears three pairs of lateral spines. In all that has been said this species closely resembles the characters of the genus *Tryphosella*; but on examining the mouth-organs it is seen that instead of the epistoma overhanging the upper lip, the upper lip projects beyond the epistome as in *Orchemenopsis* or as in *Tryphosa nana*, which in this respect differs from other species which Sars assigns to that genus. Indeed, these allied genera seem constituted on very unsatisfactory characters, and I cannot but think that an amalgamation is desirable.

Length 6 millim.

The angular projection of the sides of the cephalon, the character of the epistoma, the rounded hind corner of the third segment of the metasome, and the form of the first segment of the urosome distinguish this species from allies.

A single specimen taken by Sir J. Murray in H.M.S. 'Triton' in 1882, Stat. 7, lat. 60° 19' N., long. 7° 10' W., in the cold area of the Faroe Channel, 585 fathoms.]

38. *Tryphosella nanooides* (Lilljeborg).

1865. *Anonyx nanooides*, Lilljeborg, On the *Lysianassa magellanica* &c. p. 25, figs. 32-34.

1876. *Tryphosa nanooides*, Boeck, (138) p. 186.

1891. *Tryphosa nanooides*, G. O. Sars, (142) p. 79, pl. xxviii. fig. 2.

1893. *Tryphosella nanooides*, J. Bonnier, l. c. p. 171.

Hab. Shetland*, in great numbers on a dead fish; Polperro, Cornwall, on a skate (*A. M. N.*); Ardbear Bay, Ireland (*Brady & Robertson*).

Distrib. Greenland (*Copenhagen Mus.*): *Mus. Nor.* West Norway and Finmark, in 50-100 fath., and, like myself, Sars

* In my Shetland Report young specimens of this species were rightly referred to it, but full-grown examples were wrongly named "*Anonyx ampulla*."

has taken it abundantly on the back of a living skate. Bohuslän, Sweden (*Bruzelius*); Denmark (*Meinert*); off Jan Mayen ('*Vöringen*' *Exped.*).

[*Tryphosa pusilla*, G. O. Sars ('*Crustacea Norwegian North-Atlantic Exped.*,' 1885, p. 151, pl. xiii. figs. 2, 2*a*), has been recorded by the late Dr. Robertson as taken near the Tan Buoy, Cumbrae, in 12 fathoms. There is probably a mistake. *Tryphosa pusilla* is a blind species, dredged in the Arctic Ocean in 1004 fathoms, and is hardly likely to have been found under such circumstances. The species obtained may have been *Tryphosella Sarsi*, J. Bonnier.]

Genus 17. *NANNONYX*, G. O. Sars.

39. *Nannonyx Goëssii* (Boeck).

1870. *Orchemene Goëssii*, Boeck, (137) p. 36.

1876. *Orchemene Goëssii*, Boeck, (138) p. 177, pl. iv. fig. 5.

1891. *Nannonyx Goëssii*, G. O. Sars, (142) p. 72, pl. xxiv. fig. 3.

Hab. Plymouth (*A. M. N.*): *Mus. Nor.* Puffin Island, N. Wales, at spring-tides, and Jersey (*A. O. W.*).

Distrib. Two specimens at Folgerö, west coast of Norway, in 40 fathoms (*Sars*); La Croisic, France (*Chevreux*).

40. *Nannonyx spinimana*, A. O. Walker.

1895. *Nannonyx spinimana*, A. O. Walker, "Revision Amphipoda of L. M. B. C. District," *Trans. Liverpool Biol. Soc.* vol. ix. p. 292, pl. xviii. figs. 1-11, & pl. xix. fig. 6*a*.

Hab. This new species was found by Mr. Walker on two occasions on a rocky bottom in 5-8 fathoms by the Menai Bridge, North Wales.

Genus 18. *TRYPHOSITES*, G. O. Sars.

41. *Tryphosites longipes* (Bate).

1861. *Anonyx longipes*, Bate & Westwood, (1) vol. i. p. 113, ♀.

1861. *Anonyx ampulla*, id. *ibid.* p. 116, ♂.

1876. *Tryphosa longipes*, Boeck, (138) p. 184, pl. v. fig. 8, pl. vi. fig. 5.

1891. *Tryphosites longipes*, G. O. Sars, (142) p. 81, pl. xxviii. fig. 3, pl. xxix. fig. 1.

Hab. Shetland; the Minch; Oban; Isle of Cumbrae; Berwick-on-Tweed; Durham coast (*A. M. N.*); 25 miles off May Island, Firth of Forth (*Sir J. Murray*); Aberdeenshire (*Mr. R. Dawson*); 'Porcupine,' 1869, Stat. 23*a*, south of Rockall, 420 fathoms, and off S.W. Ireland, 110

fathoms: *Mus. Nor.* Galley Head, Co. Cork; off Skilligs and off Bull Rock, S.W. Ireland (*A. O. IV.*); 70-80 miles off Spurn Head (*T. S.*); Loch Fyne (*Sir J. Murray*).

Distrib. Florö and Hardanger Fiord, Norway, down to 150 fathoms; Vadsö, East Finmark; Fosse de Cap Breton, Bay of Biscay, 30-60 fathoms (*A. M. N.*): *Mus. Nor.* Sars speaks of it as one of the commonest Lysianassidæ of the Norwegian coast. Denmark (*Meinert*); west coast of France (*Chevreux*); Mediterranean (*Sars & Della Valle*).

Genus 19. SCHISTURELLA*, gen. nov.

Allied to *Tryphosa* and *Uristes*, and in the structure of the maxillipeds agreeing with the latter in having the masticatory lobe scarcely reaching to the end of the antepenultimate joint of the palp, which is elongated, its terminal joint claw-like. *Epimera of first segment of mesosome rudimentary* and almost entirely concealed by the epimera of the second segment. Antennules and antennæ without calceolæ. Eyes well developed. First gnathopod with oblong hand, the palm very oblique. *Telson divided to the very base, so that it consists of two pieces.*

42. *Schisturella pulchra* (H. J. Hansen).

1887. *Tryphosa pulchra*, H. J. Hansen, (141) p. 78, pl. ii. figs. 6-6 e.

Hab. 'Porcupine,' 1869, a single specimen taken, Stat. 65, lat. 61° 10' N., long. 2° 21' W., 345 fathoms. This is to the N.W. of Shetland and exactly on the line which I have proposed should form the limit of the British area.

Distrib. Four examples are in the Copenhagen Museum which were taken on as many different occasions in the Greenland seas in 15-100 fathoms.

The 'Porcupine' specimen agrees closely with Hansen's description and figures. The figure shows a dorsal sinus on the fourth segment of the metasome; there is no such sinus in my specimen, and Hansen in his description says "Segmentum quartum caudæ dorso integro, non carinato." Of the third segment Hansen writes, "Angulus infero-posteriori segmenti tertii caudæ rotundatus incisura perparva supra angulum in margine posteriore adest." I should have rather described it as a spine-point placed rather above the angle (Sars's figure of the same segment in *Calliopius Rathkei* gives an idea of it, the spine-point, however, being a little

* σχιστός, divided, οὐρά, tail. I have adopted the form *Schisturella*, because *Schistura* is in use, as is also *Scissurella*.

higher up). The marked characteristics of this species are the general structure of the antennal organs, the remarkable epimera of the first segment of the mesosome, and the absolutely divided telson. The first gnathopods have the hand shorter than the wrist, oblong, very slightly tapering, the palm very oblique, defined by a cluster of setæ, and bearing on its edge a remarkably delicate plate cut into serrations, the serrations very fine and not densely placed*; nail strong, bearing a secondary tooth near the apex as in the genus *Hoplonyx*. But the character which first caught my eye as distinguishing the species from any other *Lysianid* known to me, though figured by Hansen, is not mentioned in his description. From the end of the first long joint of the filament of the antennules there is projected a very long and slender spine (see Hansen, fig. 6 a), which reaches to the middle of the fifth following articulation.

Genus 20. URISTES, Dana.

= *Pseudotryphosa* (G. O. Sars).

43. *Uristes umbonatus*, G. O. Sars.

1886. *Ichnopus umbonata*, G. O. Sars, (102) p. 79, pl. iii. fig. 2.

1891. *Pseudotryphosa umbonata*, G. O. Sars, (142) p. 83, pl. xxix. fig. 2.

1899. *Uristes umbonatus*, Stebbing, Ann. & Mag. Nat. Hist. ser. 7, vol. iv. p. 211.

Hab. A single specimen, 'Porcupine,' 1869, Stat. 82, lat. 60° 0' N., long. 5° 13' W., in 312 fathoms. This station is directly north of Cape Wrath, and is on the "Wyville Thomson Ridge."

This, like the last, is a species taken by the 'Porcupine' exactly on the line which I regard as limiting the British area.

Distrib. Two other specimens are known, one taken by Sars at Hvitingsö, west coast of Norway, in 150 fathoms, the other at Skagarak (*Gunhild's Exped.*, fide Sars), in 400-420 fathoms.

Genus 21. ANONYX, Kröyer.

44. *Anonyx nugax* (Phipps).

1774. *Cancer nugax*, Phipps, Voyage towards the North Pole, p. 192, pl. xii. fig. 2.

* This serrated edge exactly corresponds in character with that figured by Stebbing as developed on the palms of *Platamon longimanus*, Report 'Challenger' Amphip. pl. xiii. fig. *gn*¹.

1838. *Anonyx lagena*, Krøyer, Grönlands Amphipoder, pp. 237 & 244, pl. i. fig. 1, ♀.
 1838. *Anonyx appendiculata*, id. ibid. pp. 240 & 244, pl. i. fig. 2, ♂.
 1840. *Anonyx appendiculata*, H. Milne-Edwards, Hist. Nat. des Crust. vol. iii. p. 21.
 1845. *Anonyx ampulla*, Krøyer (not Phipps), Naturhist. Tidsskr., 2 Rækkes, vol. i. p. 578; Voyage en Scandinavie &c. pl. xiii. fig. 2.
 1891. *Anonyx nugax*, G. O. Sars, (142) p. 88, pl. xxxi.
 1893. *Anonyx nugax*, T. Scott, Eleventh Annual Rep. Fish. Board Scotland, p. 212.

Hab. "Several specimens of this fine species were obtained in February 1889 near May Island, Firth of Forth, the largest measuring 20 mm. (fully three quarters of an inch) in length. The eyes are lageniform, and, being large and black, give a marked character to the species." Mr. Scott has kindly allowed me to see the specimens and given me one of them.

The occurrence of this truly Arctic species so far south is of great interest. In 1869 I recorded this species as having been found by me in Shetland; but this was subsequently found to be a mistake, the specimens proving to be large examples of *Tryphosa nanoides*, Lilljeborg.

Not only are these specimens interesting as an addition to our fauna, but also on account of their size and *the time of the year* (February) in which they occurred. Sars gives as dimensions "usual length of adult female 18 mm.; maximum length of Arctic specimen 40 mm." The largest specimen I have in my collection is 43 mm. (Kara Sea). Now I have large numbers of examples of what I take to be this species procured by myself on the Norwegian and Finmarkian coasts *in the summer months*; but none of these exceed 11 mm., which is the measurement which Sars gives for *Anonyx Lilljeborgii*. Is the life of the *Anonyx* limited to a year, and do all the females after they have produced their young in the spring months then die? Herr I. Sparre Schneider has suggested that this is the case with certain Amphipods. As regards these small summer-captured specimens of *Anonyx*, are they the young of *A. nugax*, and is also *Anonyx Lilljeborgii* the equivalent of those young? I am disposed to think so. My specimens vary to some extent, but in the main agree very fairly with Sars's description and figures of *A. Lilljeborgii*. The characters of this form are mostly comparative, and, as has already been pointed out by Stebbing (*Amphipoda* 'Willem Barents'), are such as might naturally be expected as results of a younger stage. One point Sars mentions as though it were important:—"The two anterior pairs of pereopoda with a very conspicuous obtuse denticle at the end of the propodos immediately below the dactylus." This denticle is very

conspicuous in small specimens, but apparently does not increase in size with the growth of the rest of the limb; it thus becomes less and less conspicuous as the animal is more developed, but if looked for it can be found in the largest examples of *A. nugax*.

Distrib. Circumpolar throughout the Arctic regions, including the Siberian Polar Sea and Behring Strait. Examples in my own collection are from Trondhjem Fiord, Norway, 3-10 fathoms; Bog Fiord, 3-5 fathoms, and Vadsö, both in East Finmark (*A. M. N.*); 'Porcupine,' 1869, Stat. 65, Faroe Channel, 345 fathoms; 'Knight Errant,' Stat. 8, Faroe Channel, 540 fathoms; 'Valorous' and 'Alert,' Greenland, 1875; Spitsbergen (*Lovén*); Kara Sea (*Stebbing*); Vineyard Sound, N.E. America (*S. I. Smith*): *Mus. Nor.*

Genus 22. HAPLONYX, G. O. Sars.

45. *Haplonyx cicada* (Fabricius).

1780. *Oniscus cicada*, O. Fabricius, Faun. Groenl. p. 258.

1844. *Anonyx gulosus*, Kröyer, Naturh. Tidsskr., 2 Række, vol. i. p. 611; Voyage en Scand. &c. pl. xiv. fig. 2.

1851. *Anonyx norvegicus*, Lilljeborg, Ælvers. af Kong. Vet.-Akad. Förhand. p. 22.

1861. *Anonyx Holbölli*, Bate & Westwood, (1) vol. i. p. 104 (not *Anonyx Holbölli*, Kröyer).

1872. *Anonyx gulosus*, Boeck, (138) p. 157, pl. v. fig. 4.

1891. *Haplonyx cicada*, G. O. Sars, (142) p. 93, pl. xxxii. fig. 2.

Hab. Shetland; Northumberland and Durham coasts; Isle of Cumbræ; Isle of Skye; Guernsey (*A. M. N.*); 'Porcupine,' 1869, Stats. 6 and 23, off west of Ireland, 90 and 630 fathoms; Stat. 74, to the west of Shetland, 203 fathoms; 'Research,' 1890, off west of Ireland, in 165 fathoms; off S.W. Ireland (*Prof. Haddon*): *Mus. Nor.* Lower Loch Fyne, 20-29 fath. (*T. S.*); Jersey (*Sinel & Hornell*).

Distrib. Bergen Fiord, Norway; Varanger Fiord, East Finmark (*A. M. N.*); Tromsö (*Schneider*); 'Porcupine,' 1869, Stat. 77, Faroe Channel, 560 fathoms; 'Valorous,' 1875, Greenland; Spitsbergen (*Lovén*): *Mus. Nor.* Iceland; Kara Sea; Matotshkin Scar; Bohuslän, Sweden.

46. *Haplonyx similis*, G. O. Sars.

1891. *Haplonyx similis*, G. O. Sars, (142) p. 93, pl. xxxiii. fig. 1.

1895. *Haplonyx similis*, A. O. Walker, "Revision of Amphip. of L. M. B. C. District," Trans. Liverpool Biol. Soc. vol. ix. p. 294.

Hab. A single specimen has been recorded by Mr. Walker from Laxey Bay, Isle of Man, 8 fathoms, and the late Mr. D. Robertson gives "Off Fairland Point, Cumbræ, in 20 fathoms."

Distrib. Off Midtö Lighthouse, in the Hardanger Fiord, 150–180 fathoms, and Rödberg, Trondhjem Fiord, 150–180 fathoms (*A. M. N.*); ‘Porcupine,’ 1869, Stat. 77, in the Faroe Channel, 560 fathoms: *Mus. Nor.* Sars says that “it would seem to occur along the whole west coast of Norway at least as far up as the Trondhjem Fiord, in 50–150 fathoms.”

[*Haplonyx leucophthalmus*, G. O. Sars.

1891. *Haplonyx leucophthalmus*, G. O. Sars, (142) p. 97, pl. xxxiv. fig. 1.

With the exception of the character of the eyes, this *Haplonyx* (I cannot call it a species) is indistinguishable from *H. similis*, G. O. Sars. I assign to it a specimen procured by Sir J. Murray in the ‘Triton,’ 1882, in the Faroe Channel, in a tow-net sunk to 570 fathoms, because I can see no trace of eyes in the spirit-preserved specimen, and the depth makes it probable that the specimen belonged here rather than to *H. similis*. It has been found by Prof. Sars in the Hardanger and Trondhjem Fiords, Norway, in about 150 fathoms.]

[Genus 23. ALIBROTUS, Milne-Edwards.

[*Alibrotus littoralis* (Kröyer).

1844. *Anonyx littoralis*, Kröyer, Naturhist. Tidsskr., 2 Rækkes, vol. i. p. 621; Voyage en Scandinavie &c. pl. xxiii. fig. 1.

1876. *Onesimus littoralis*, Boeck, (138) p. 161, pl. v. fig. 7.

1891. *Alibrotus littoralis*, G. O. Sars, (142) p. 102, pl. xxxv. fig. 2.

Greenland, ‘Valorous,’ 1875.

Distrib. In several places in Sydvaranger, East Finmark, by washing mud between tide-marks (*A. M. N.*); Spitsbergen (*Lovén*): *Mus. Nor.* Widely distributed in the Arctic regions.]

[Genus 24. ONESIMUS, Boeck.

[*Onesimus Edwardsii* (Kröyer).

1846. *Anonyx Edwardsii*, Kröyer, Naturhist. Tidsskr., 2 Rækkes, vol. ii. p. 1; Voyage en Scandinavie &c. pl. xvi. fig. 1.

1876. *Onesimus Edwardsii*, Boeck, (138) p. 167, pl. vi. fig. 4.

1886. *Onesimus Edwardsii*, H. J. Hansen, (140) pl. xxi. fig. 8.

1891. *Onesimus Edwardsii*, G. O. Sars, (142) p. 105, pl. xxxvi. fig. 1.

Greenland, ‘Valorous,’ 1875, Stat. 4, lat. 67° 56' N., long. 55° 27' W., 20 fathoms.

Distrib. Finmark and West Norway (*G. O. Sars*). In

the Arctic Ocean widely diffused, but I hesitate to quote localities, as several allied forms have been confused which Hansen has separated under the names *O. caricus*, *O. brevicaudatus*, and *O. affinis*.]

Genus 25. MENIGRATES, Boeck.

47. *Menigrates obtusifrons*, Boeck.

1860. *Anonyx obtusifrons*, A. Boeck, Forhandl. ved de Skand. Naturf. Sde Møde, p. 643.
 1861. *Anonyx plautus*, Bate & Westwood (not of Krøyer), (1) vol. i. p. 111.
 1865. *Anonyx brachycercus*, Lilljeborg, On *Lysianassa magellanica* and Crustacea subfam. Lysianassina, p. 27, pl. iv. figs. 42-49.
 1876. *Menigrates obtusifrons*, Boeck, (138) p. 169, pl. vi. fig. 2.
 1891. *Menigrates obtusifrons*, G. O. Sars, (142) p. 111, pl. xxxviii. fig. 1.
 1896. *Menigrates obtusifrons*, Walker & Hornell, Journ. Marine Zool. & Microsc. vol. ii. p. 54.

Hab. Guernsey (*Hornell*). The specimen recorded by Bate and Westwood was received from Thomas Edward of Banff.

Distrib. Soolvær, Lofoten Islands (*A. M. N.*). Rare on the Norwegian coast and chiefly within the Arctic Circle (*G. O. Sars*).

Genus 26. LEPIDEPECREUM, Bate.

48. *Lepidepecreum longicorne* (Bate).

1861. *Anonyx longicornis*, Bate & Westwood, (1) vol. i. p. 91, ♂.
 1862. *Anonyx longicornis*, Spence Bate, Cat. Amphip. Brit. Mus. p. 72, pl. xi. fig. 4, ♂.
 1869. *Lepidepecreum carinatum*, Bate & Westwood, (1) vol. ii. p. 509, ♀.
 1890. *Lepidepecreum mirabile*, Meinert, (71) p. 153, pl. i. figs. 7-12.
 1891. *Lepidepecreum carinatum*, G. O. Sars, (142) p. 113, pl. xxxviii. fig. 2, pl. xxxix. fig. 1.

Hab. Shetland (*A. M. N.*); 25 miles off May Island, Firth of Forth, 35 fathoms (*Sir J. Murray*); *Mus. Nor.* Off St. Monan and other parts of the Firth of Forth, and in the Moray Firth (*T. S.*); off Galley Head, Co. Cork, and off Teelin, Co. Galway, in 33-37 fathoms; also at Guernsey (*A. O. W.*), Jersey (*Sinel & Hornell*).

Distrib. Most southern part of Norway (*G. O. Sars*); Denmark (*Meinert*); Spezia, Mediterranean (*G. O. Sars*); west coast of France (*A. Dollfus*).

Genus 27. EUONYX, Norman.

49. *Euonyx chelatus*, Norman.

1867. *Euonyx chelatus*, Norman, "Report Comm. Explor. Coasts of Hebrides," Brit. Assoc. Rep. for 1866, p. 202.

1869. *Opis leptochela*, Bate & Westwood, (1) vol. ii. p. 501.

1891. *Euonyx chelatus*, G. O. Sars, (142) p. 117, pl. xl. fig. 1.

Hab. Sleat Sound, Isle of Skye, on *Echinus esculentus* (A. M. N.); Puffin Island, North Wales, off the lighthouse; between Holyhead and Isle of Man, 50 fathoms, on *Echinus esculentus*; 10-17 miles N.W. of Mersey Bar, on *Echinus* (A. O. W.). The localities given in Bate and Westwood are Shetland (*Jeffreys*), Isle of Man, on *Echinus esculentus* (*G. S. Brady*).

Distrib. Trondhjem Fiord, Norway, in 100-150 fathoms, among deep-sea corals; and at Vardö, East Finmark, in 50-60 fathoms (*G. O. Sars*).

EXPLANATION OF PLATE VI.

- Fig.* 1. *Lanceola Murrayi*, sp. n. First gnathopod.
Fig. 2. Ditto. Second gnathopod.
Fig. 3. Ditto. Last peræopod.
Fig. 4. Ditto. Sheath and nail of last peræopod.
 (For description of *Lanceola Murrayi* see p. 135.)
Fig. 5. *Cyclocaris faroensis*, sp. n. Mandible.
Fig. 6. Ditto. First maxilla.
Fig. 7. Ditto. Second maxilla.
Fig. 8. Ditto. Maxilliped.
Fig. 9. Ditto. First gnathopod.
Fig. 10. Ditto. Second gnathopod.
Fig. 11. Ditto. Coxa of second peræopod.
Fig. 12. Ditto. Coxa and basos of third peræopod.
Fig. 13. Ditto. Last peræopod.
Fig. 14. Ditto. Hinder margin of third segment of metasome.
Fig. 15. Ditto. Telson.
Fig. 16. *Tryphosella abyssii*, sp. n. Front margin of cephalon.
Fig. 17. Ditto. Second peræopod.
Fig. 18. Ditto. Third peræopod.
Fig. 19. Ditto. Hind margin of third segment of metasome.
Fig. 20. Ditto. Urosome.

(The figures of the Plate are of various degrees of magnification.)

XXV.—*A new Flying-Squirrel from Borneo.*

By CHARLES HOSE.

AMONG some mammals that I have brought home from Sarawak there occurs a beautiful flying-squirrel of the same

vivid colour as *Petaurista melanotis**, but smaller, and differing from it in details of coloration and in its cranial and dental characters.

I would propose to name it

Petaurista Thomasi, sp. n.

Size rather smaller than in *P. melanotis*. Colour nearly of the vivid rufous characteristic of that animal, but rather deeper and richer. This rich colour in *P. Thomasi* is absolutely uniform over the whole animal, the face, ears, feet, and tail-tip, all more or less black in *P. melanotis*, being here also rufous. Under surface paler, the middle line of the belly and the parachute rather darker than the flanks. Fur of back softer and more woolly than in *P. nitida*, paler basally than terminally, not black-tipped. Ears comparatively very small, not tufted, thinly clothed with pale rufous hairs. Posterior half of sole hairy; sole-pads narrower and more sharply defined than in the larger species.

Skull, as compared with that of *P. melanotis*, much smaller, with the zygomata more evenly and widely expanded anteriorly. Nasals more uniform in breadth, the posterior more than half the anterior breadth; behind, they reach beyond the premaxillary processes. Interorbital region narrow, flat, not concave as in *P. melanotis*. Bullæ comparatively small. Teeth much smaller and lighter than in the larger species, the breadth of *p.*⁴ only 3·37 millim.

Dimensions of the type (an adult female, measured in skin):—

Head and body 350 millim.; tail 340; hind foot (dry) 60; ear (dry) (c.) 19.

Skull: greatest length 61; basilar length 51; zygomatic breadth 41; nasals 16·5 × 10·5; interorbital breadth 13·5; tip to tip of postorbital processes 33; palate length 28·8; diastema (to *p.*⁴) 13·7; length of upper molar series (excluding *p.*³) 14·2.

Hab. Silat River, about 70 miles south of Claudetown, Eastern Sarawak.

Type. Female. B.M. no. 99. 12. 9. 32. Presented by myself. Obtained by native collector in February 1897.

As it is of the same general appearance and colour, I have thought it better to compare this species with *P. melanotis* in the description; but it is, I believe, more closely allied to

* It remains to be proved whether *P. melanotis* is or is not synonymous with the Javan *P. nitida*. For the moment I use the name *P. melanotis* as representing the Bornean form of the group.

some of the smaller forms, such as *P. phœomelas*, Günth., and others, but is readily distinguished from any of them by its splendid rufous colour.

This species is one of the handsomest of the mammals that I have been fortunate enough to discover in Sarawak, and I have ventured to apply to it the name of my friend Mr. Oldfield Thomas, of the British Museum, to whose help and encouragement I owe much of the success that has attended my work on the mammals of Borneo.

XXVI.—*Description of a new Fruit-Bat from New Guinea.*
By OLDFIELD THOMAS.

Cephalotes aello, sp. n.

Most nearly allied to *C. major*, Dobs., but larger and much more prominently striped dorsally.

Form, judging from skin and shape of skull, stout and heavy. Fur straighter, crisper, and less woolly than in *C. major*. General colour above brownish buff, more buffy on the head, browner on the shoulders, becoming yellow on the loins; dorsal stripe very broad and prominent, blackish brown, commencing on the occiput and running right through on to the interfemoral membrane, more than half an inch broad in the centre of the back, where it prominently contrasts with the yellow on each side of it. Fur along flanks above also brown, edging the yellow externally. Cheeks and chin grey. Under surface deep reddish, the middle line of the chest yellower.

Ears apparently rather larger and more pointed than in *C. major*. Distribution of fur much as in that species. Interfemoral membrane comparatively broad, about 15 millim. deep in the centre; only surpassed by the tail by about 2 millim., but the latter is perhaps imperfect, although its end looks much as in the other species, where it surpasses the membrane by 10 millim. or more.

Skull broader, heavier, and with more widely expanded zygomata than in *C. major*. Orbits very large, their greatest transverse diameter nearly 12 millim., as against 9 millim. in *C. major*. Teeth broad and heavy, worn down in the type, but their cusps apparently as in *C. major*.

Dimensions of the type (in skin):—

Forearm 86 millim.

Head and body (stretched) 120; tail 22; ear (dry) 17; thumb, without claw, 30; fifth finger 110.

Skull : greatest breadth 26·5 ; tip of nasals to angle behind postorbital processes 18·8 ; least interorbital breadth 7·2 ; palate length from gnathion 19·5 ; width outside last molars 12·2 ; front of canine to back of last molar 14·3.

Hab. Milne Bay, S.E. New Guinea.

Type B.M. no. 99. 12. 3. 1. Collected 5th April, 1899, by Mr. A. S. Meek.

This fine species may be readily distinguished from its ally *C. major* by its larger size, striking coloration, and (if that organ is perfect) shorter tail. Like that species, it no doubt belongs to the subgenus "*Bdelygma*," separated by Dr. Matschie from the typical *Cephalotes* ; but I confess I can see no sufficient reason for subdividing the genus. The second lower premolar in some specimens of *C. cephalotes* has the second cusp said by Dr. Matschie to be characteristic of *Bdelygma*.

It may also be noted that of specimens referred to *C. cephalotes* those from Celebes, Amboina, and Timor Laut have markedly larger skulls and longer forearms than those of the rest of the Papuan subregion. The smaller form should apparently be distinguished under the name of *C. albiventer*, Gray. Of this latter the Museum possesses examples from Morty Island (type), Admiralty Islands, Key Islands, British New Guinea, and Cape York. Whether its range overlaps that of the larger *C. cephalotes* remains to be proved.

With the *Cephalotes* Mr. Meek has sent home a number of specimens of *Pipistrellus papuanus*, Pet., and these prove that the species is subject to the peculiar form of erythrism already described in several other bats, some of the specimens being bright rufous, while others are dark brown.

Another species discovered by the same collector, *Emballonura Meeki*, Thos., found by him in the Trobriand Islands, has recently turned up in a somewhat distant locality, namely in the Key Islands, where it occurs in the same collection as the remarkable *Rhinolophus achilles* described in the last number of the 'Annals.'

XXVII.—*Descriptions of new Neotropical Mammals.*
By OLDFIELD THOMAS.

Conepatus zorilla, sp. n.

Size medium, about as in *C. chilensis*, smaller than in *C. quitensis*. Fur comparatively very short, fine, glossy, almost without underfur, quite different to the long, coarse,

shaggy hair of most species of the genus; longest hairs of back seldom attaining an inch in length. Hairs of face and head directed backwards as far as a line across the occiput, where there is a distinct "meeting ridge"; from this point to the withers and on the sides of the neck they are directed forwards; on the withers there are no very distinct whorls*, the change of direction to the backwardly-pointing body-hairs being rather gradual. General colour deep brownish black. Marking of the usual furcate type; lateral white lines (which are more truly white and less cream-coloured than usual) about half an inch in breadth in front of the withers, then broadening to about an inch to the loins, where they die away into narrow lines of isolated white hairs leading towards but not on to the top of the base of the tail. Median black line commencing on the occiput about half an inch in front of the transverse crest, evenly broadening backwards, about three fourths of an inch broad on the neck, and just over 2 inches broad at its widest point in the middle of the back. Terminal half of tail grizzled, the under hairs black, the longer ones, which may attain 3 inches in length, white.

Skull rather narrow, with widely expanded zygomata. Teeth of medium size.

Dimensions of the type (measured in flesh):—

Head and body 400 millim.; tail 210, including terminal tuft 274; hind foot (s. u.) 67; ear 31.

Skull: basal length 69·5; occipito-gnathic length in middle line 80·5; greatest zygomatic breadth 51·4; least breadth above meatus 38·3; greatest breadth behind meatus 42·2; least intertemporal breadth 19; palate length from gnathion 33. Outer length of upper carnassial 7·1; greatest diameter of upper molar 8·7; length of lower carnassial 8·9.

Hab. Eten, Peru. Alt. 15 m. "Among sand-dunes."

Type. Male. Original number 601. Collected 22nd September, 1899, by Perry O. Simons.

This handsome animal is evidently the skunk of the low hot desert regions along the coast of Northern Peru, and is consequently distinguished by its unusually short thin pelage, the fur being barely half the length of that of the allied species and the underfur practically absent. In this respect and in general appearance it has unusual resemblance to the African zorilles. As was the case with the fox discovered by Mr. Simons, it is probably a northern representative of the Chilian form, but is clearly too different to bear the same name.

* There is a sort of whorl on one side, but this appears to be due to an unfortunate crease in the skin just at this point.

Proechimys * *rosa*, sp. n.

Size about as in *P. chrysæolus*, Thos. Back coarsely spinous, sides rather less so, rump and outer sides of limbs without spines; spines of back about 20 millim. long (without terminal bristles) by 1·2 millim. wide. General colour rather similar to that of *P. chrysæolus* and equally heavily black-lined, but more fulvous and less rufous, the hairs of the back with deep fulvous subterminal and black terminal bands. Forehead, cheeks, and sides of neck greyer. Rump and hips brownish fulvous. Under surface pure white. Outer sides of arms and legs brownish, inner sides white; upper surface of hands and feet pale brownish, becoming white at the bases of the toes. Tail fairly well haired, black above, dull whitish below.

Skull large and heavily built; nasals very long, reaching back past the front edge of the orbit, narrow, evenly tapering backwards; supraorbital edges broadly ridged, the ridges evenly continuous posteriorly with those that run forwards from the outer corners of the interparietal; molars narrow vertically; hamular processes of pterygoids broad and spatulate; bullæ rather small.

Dimensions of the type (measured in the flesh by collector):—

Head and body 235 millim.; tail 168; hind foot (s. u.) 52; ear 27.

Skull: greatest length 60; basilar length 43·5; greatest breadth 28·2; nasals 22·6 × 7·1; interorbital breadth 12·6; greatest breadth across temporal ridges 22·3; height of molar in centre 3·3; palate length 21; diastema 13·3; palatal foramina 5 × 3·3; breadth of hamular processes 2·4; breadth between bullæ on basilar suture 3·6; length of upper molar series 9·5.

Hab. Santa Rosa, S.W. Ecuador. Alt. 10 m.

Type. Male. B.M. no. 0. 1. 1. 40. Original number 434. Collected 29th June, 1899, by Mr. Perry O. Simons. Three specimens.

Mr. Simons obtained six specimens of *Proechimys* at Santa Rosa, and these prove to belong to two species—one paler, with white feet, broader nasals, and broader malars, which appears to belong to the group containing *P. semispinosus*, Tomes, and *P. decumanus*, Thos., to the former of which I provisionally refer it; and the second, now described, darker coloured and with brownish feet, evidently most nearly allied to *P. chrysæolus*. From that animal, whose habitat is

* *Echimus*, rictorum. See Allen, Bull. Am. Mus. xii. p. 257 (1899).

Bogota, it is distinguishable by its more fulvous colour, more uniformly brownish feet, longer and narrower nasals, connected parietal ridges, and broader hamular processes. It is also allied to the Central-American species *P. centralis*, to the dark form of which (subsp. *chiriquinus*) it bears considerable external resemblance, though its long narrow nasals form a readily distinguishing mark.

Proechimys centralis panamensis, subsp. n.

Closely similar to *P. c. typicus* in size and general coloration, but with the head and fore-quarters greyish brown, darker in the middle line, paler on the cheeks and sides of neck, but on both very different to the rich rufous of the back. In *typicus* the forehead and cheeks are of the same rufous hue as the body. Limbs also greyer than the back. Upper surface of hind feet uniformly brown or with a faint lighter patch on the metatarsus.

Skull about as in *typicus*, but the nasals are rather more produced posteriorly, and in all the examples there is a slight irregularity in the posterior part of the parietal ridges. Hamular processes broad and spatulate.

Dimensions of the type (measured in flesh by collector):—

Head and body 297 millim.; tail 178; hind foot (s. u.) 49, (c. u.) 54; ear 26.

Skull: basilar length 43; greatest breadth 29; nasals 24×6.5 ; interorbital breadth 13.2 ; greatest breadth on ridges 23.6 ; length of upper molar series 8.9 .

Hab. Panama. Type from the "Savanna near Panama"; others from Pocoumé, Panama.

Type. Male. Original number 10. Collected 1st March, 1899, by E. André. Five specimens examined.

Proechimys centralis chiriquinus, subsp. n.

General colour much darker than in *P. c. typicus* and *panamensis*, the centre of the back being more spinous than usual, and the dark tips to the spines consequently predominating over the rufous of the hairs. Rump coarsely haired, similar in colour to the rest of the back. Face dark, as in *panamensis*, sides more greyish or greyish brown. Spines of back numerous, coarse, about 1.5 millim. broad and 22 millim. in length. Feet brown, with a slight metatarsal lightening.

Skull with a broader and heavier muzzle than in the other subspecies; nasals short and broad; supraorbital edges very broadly ridged, the ridges running backwards across the

parietals, but apparently not coalescing with those that run forwards from the outer corners of the interparietal. Hamular processes spatulate, much broader than those of *E. chrysavolus*.

Dimensions of the type (measured in the flesh by collector):—

Head and body 300 millim.; tail 150; hind foot (s. u.) 51, (c. u.) 55; ear 14.

Skull: bregma to nasal tip 42; greatest breadth 31; nasals 23.5×7.5 ; interorbital breadth 15.8; greatest breadth on ridges 25; palate length from hensenion 23; diastema 14.2; palatal foramina 6.5×3.7 ; length of upper molar series 9.2.

Hab. Bogava, Chiriqui, N.W. Panama. Alt. 250 m.

Type. Male. Original number 6. Collected 3rd September, 1898, by Mr. H. J. Watson. Six specimens examined.

The very dark colour of this *Echimys* will readily distinguish it from the other Central-American forms.

Marmosa cauce, sp. n.

Allied to *M. incana*, Lund, and *M. fuscata*, Thos., but smaller than the first and paler-coloured than the second.

Size about as in *M. fuscata*. Fur soft, short, and close, about 7–8 millim. long on the back. General colour above uniform soft fawn-grey, not unlike that of *M. incana*, but rather more fawny, and also more uniform, less wavy; centre of face rather paler than back; black eye-patch present above and below (though not behind) the eye, extending forwards to the roots of the whiskers; its edges not sharply defined. Ears naked, rather small as compared with the large ears of the allied species, their anterior bases without marked projection. Under surface pale yellowish white, the hairs of chin, throat, chest, and a narrow line down belly of this colour to their bases, those of the sides of the belly slaty for two thirds of their length. Outer sides of limbs like back, inner sides like sides of belly; hands and feet thinly haired, dull whitish above, wrists and ankles brown. Tail as in the allied species, rather shorter, but doubtfully perfect in the single specimen.

Skull on the whole very similar in general shape to that of *M. incana*, and therefore quite different to that of all the species of the *M. murina* group. Nasals broadened posteriorly, their extension behind the broad part not so elongated as in *M. incana*. Supraorbital region long, narrow, nearly parallel-sided, flattened above, its edges rounded, without ridges or processes. Anterior palatal foramina extending to

the level of the base of the canine; posterior palatal vacuities opposite the molars and last two premolars*. Molars small and delicate.

Dimensions of the type (measured by collector in the flesh):—

Head and body 168 millim.; tail 120; hind foot 25; ear 18.

Skull: extreme length 35; greatest breadth 17.8; nasals 16×4.2 ; interorbital breadth 6.3; palate length from hensenion 17.5; breadth at corners of $m.^2$ 10; palatal foramina, length 3.2; combined lengths of $pm.^4$ and $ms.^{1-2}$ ($ms.^{1-3}$ of Catalogue) 5.6.

Hab. Rio Cauqueta, a tributary of the Cauca, near Cali, Colombia. Alt. 1000 m.

Type. Male. B.M. no. 99.9.6.51. Original number 470. Collected August 1897 by J. H. Batty.

This species is evidently a Colombian representative of the Brazilian *M. incana* and the Venezuelan *M. fuscata*, but may be readily distinguished from either of them by the characters above given. The three form a special group characterized by their small brain-cases and long narrow unridged interorbital regions.

XXVIII.—*The Generic Name Thylacomys.*

By EDGAR R. WAITE, F.L.S.

MR. T. S. PALMER'S paper "On *Thylacomys*, Owen" †, recalls my note, published the previous year ‡, on the spelling of this name, and on its possibly jeopardizing a term applied by myself to a new genus of Australian rodents §. In this note I mentioned that, not having access to the work in which the name originally occurred—namely, Blyth, in Cuvier's 'Animal Kingdom,' 1840, p. 104,—I had referred to the editions of 1849 (p. 104) and 1863 (p. 92), but there found the spelling to be *Thalacomys*, not *Thylacomys*. As a result of my note I almost expected that some zoologist in London to whom the 1840 edition is available would have cleared up the matter; but I have not seen any further reference to it.

* Accepting the cheek-tooth formula as four premolars and three molars, the third of the premolars being the " $p.^4$ " of the Catalogue, and being the only tooth of the "permanent" series (see Lydekker, P. Z. S. 1898).

† Palmer, Ann. & Mag. Nat. Hist. (7) iv., Oct. 1899, p. 300.

‡ Waite, *loc. cit.* (7) ii., Aug. 1898, p. 196.

§ Waite, Proc. Roy. Soc. Vict. (n. s.) x. 1898, p. 121.

Mr. Palmer, of Washington, writes to establish the name *Thylacomys* in lieu of *Peragale* for the Bielby or Rabbit-Bandicoot, but, like myself, he has not access to the 1840 edition, and quotes as his authority the two editions consulted by me (*vide* his footnote). Mr. Palmer has evidently not seen my note and has failed to perceive that in the editions examined the spelling of the word is *Thalacomys*. Under these circumstances I would request the editors of the 'Annals' to kindly examine the original (1840) edition, and publish the information desired for the benefit of the benighted workers in Washington and Sydney*.

[This case is more difficult of decision than Mr. Waite supposes, for although in the 1840, as well as in the later editions, of his 'Animal Kingdom' Blyth spells the name *Thalacomys*, yet Palmer is, as I have verified, perfectly correct in quoting the first mention of it, in the 'Athenæum' of 1838, as *Thylacomys*, and in the 'Catalogue of Marsupials,' equally anterior to Mr. Waite's rodent *Thylacomys*, it is also spelt in the same way.

This being the case, I hardly think that the name *Thylacomys* could be regarded as a name still valid in 1898 for another genus, even if that form of it be not adopted for the Rabbit-Bandicoot. No doubt the 'Athenæum' reference might be treated as a *nomen nudum* did it stand alone †; but the other references, incorrect as Blyth's was and indirect as was my own, yet together seem to make it impossible that *Thylacomys* should be used elsewhere in zoology.

The following additional note by Mr. Waite is therefore published at his request in case *Thylacomys* were considered invalid for the rodent.—O. THOMAS.]

Inquiry therefore brings out the fact that the form *Thylacomys* has been used. For my present purpose it is of no consequence whether the genus has been sufficiently diagnosed or not. The word has been used in scientific literature, and is therefore not again available in zoology.

In place of *Thylacomys*, Waite, I propose the name *Asco-pharynx*.

Australian Museum, Sydney.
16th November, 1899.

* In the 1840 edition the name is given as *Thalacomys*, Owen.—Eds.]

† So far as the form to be used is concerned I should do this, calling the Rabbit-Bandicoot *Thalacomys lagotis*.

XXIX.—*On new Species of Histeridæ and Notices of others.*
By G. LEWIS, F.L.S.

List of Species.

Placodes opacus.	Hister meridanus.
Platylister mirabilis.	— lævimargo.
Platysoma sulcisternum.	— planimargo.
Phehister illustris.	— cinctipygus.
— festivus, <i>Lew.</i>	— terræmotus.
— chapadæ.	— sessilis, <i>Lew.</i>
Omalodes felix.	— pinnulæ.
— striatipectus.	— vacillans.
— sinuaticollis, <i>Mars.</i>	Epiurus fœderatus.
Hister congonis.	Tribalus amnicola.
— Holubi, <i>Sch.</i>	Sternocœlis ovalis.
— sinuosus.	Saprinus amethystinus.
— gibberosus.	

Placodes opacus, sp. n.

Oblongus, convexiusculus, opacus, niger, rugoso-punctissimus; fronte stria biarcuata; pronoto stria marginali obsoleta, laterali in angulo desinente, interstitio 4-punctato; elytris striis indistinctis; propygidio pygidioque grosse et dense punctatis; prosterno haud striato; mesosterno profunde inciso, antice immarginato.

L. $15\frac{1}{2}$ mill.

Oblong, somewhat convex, opaque, black; the head, frontal stria complete and biarcuate, but somewhat obscured by the rough sculpture behind the stria, on either side is a coarse dense punctuation, which does not, however, close in at the base; the thorax is wholly punctured, punctures coarse at the side, marginal stria scarcely noticeable, lateral stria ceases behind the eye and is not conspicuously deep, the interstice has four rather small punctures set at equal distances along it; the elytra densely rugose and the striæ obscurely marked, two humeral and six dorsal, all apparently complete, but only just traceable along the punctate surface, 3, 4, 5, and sutural punctiform; the propygidium and pygidium are very coarsely and densely punctate; the prosternum, keel without striæ, rather densely punctate at the base and between the coxæ, anterior lobe somewhat similarly punctured, intervening area with sparser punctures, on either edge of the keel before the coxæ is a small but distinct fovea; the mesosternum is deeply incised anteriorly and faintly marginate at the sides only; the anterior tibiæ have two broad teeth, intermediate widely emarginate on the outer edge at the tarsal end and terminating in a rather acute tooth.

This species in its opacity and surface-sculpture is similar to *Psiloscelis Harrisii*, Lec.; it is rather more oblong than *Placodes caffer*, Er.

Hab. Kailu, French Congo (*Mocquerys*, 1892). One example.

Platylister mirabilis, sp. n.

Oblongus, subdepressus, niger, nitidus; fronte concava, stria bisinuata utrinque interrupta; clytris striis dorsalibus 1-3 integris, 4 in medio subinterrupta, 5-6 apicalibus; pygidio dense ocellato-punctato; mesosterno stria late interrupta; tibiis intermediis in medio bispinosis, posticis unispinosis.

L. 11 mill. (absque mandibulis).

Oblong, somewhat depressed, black and shining; the head finely punctured, anteriorly with the epistoma concave, transverse stria not deeply impressed, bisinuous, and not reaching the edge on either side; mandibles robust, each with two teeth on the inner edge, left mandible concave at the base; the thorax transverse, marginal stria very fine and sinuous behind the middle, lateral stria deep at the sides, especially behind the anterior angle, complete behind the head and at the base it is continued round the angle to a point opposite the base of the third dorsal stria, scutellar fovea small but very distinct; the elytra, lateral margin with two fine and complete striæ, both strongly and similarly sinuous in the middle; dorsal striæ, 1-3 complete, rather wide but shallow, 2 bent at the base towards 3, 4 less marked than the third and evanescent before the middle, 5 apical and not reaching the middle, 6 shorter and partly punctiform, the only humeral stria visible is an oblique stria at the base which is very fine; the propygidium has shallow ocellate punctures, somewhat irregular and rather closely set, the posterior margin is smooth; the pygidium has similar punctures, but they are more evenly and more closely set, and the posterior margin is slightly raised and smooth; the prosternum is finely punctulate and its anterior lobe is margined by a semicircular well-marked stria; the mesosternum is emarginate and the striæ are lateral only and not close to the edge; the anterior tibiæ are 4-dentate, intermediate with two teeth close to the tarsi and two very distinct near the middle on the outer edge, posterior has two tarsal teeth and one acute spine behind the middle on the outer edge.

Except the large size of this species and its peculiar tibial spines, I cannot find any characters to separate it generically from *Platylister ovatus*, Er.

Hab. Khasia Hills.

Platysoma sulcisternum, sp. n.

Oblongo-ovatum, depressiusculum, nigrum, nitidum; fronte punctulata, stria utrinque semicirculari; pronoto stria integra; elytris striis 1-3 integris, 4 vix dimidiata; pygidio convexo, punctulato; prosterno lobo anteriori utrinque sulcato; mesosterno marginato; tibiis anticis 5-dentatis.

L. $3\frac{1}{2}$ - $4\frac{1}{4}$ mill.

Oblong-oval, rather depressed, black and shining; the head is impressed in the middle behind the clypeus, labrum narrowly transverse, with the suture angulate in the middle, surface punctulate, stria sometimes broken (when complete it is transversely bent towards the neck) and is semicircular over the eyes; the thorax is also punctulate, arched at the sides, stria complete and formed laterally like that of *P. confucii*, Mars., but the margin is less broad; the elytra, oblique humeral stria very fine, humeral and subhumeral wanting, 1-3 dorsal complete, 4 apical, straight, and nearly reaching the middle, the rest wanting; the propygidium and pygidium are distinctly but not very densely punctulate, the latter is convex and without a rim; the prosternum, anterior lobe punctulate, with a well-marked rather deep stria or sulcus on either side, leaving a fairly wide margin (fig. 1); the keel

Fig. 1.



Platysoma sulcisternum, Lew.

appears impunctate except under the microscope; the mesosternum is sinuous behind the keel, with a sinuous stria which at the lateral angles is somewhat distant from the edge; the anterior tibiæ are 5-dentate.

In its general outline this species agrees best with *P. completum*, Mars., especially in the shape of the thorax, but it is more oblong and less convex.

Hab. Sydney, Australia (*A. M. Lea*). Six examples.

Phelister illustris, sp. n.

Ovalis, convexus, subtus cyaneo-niger, nitidus; fronte leviter excavata, stria late interrupta; pronoto stria marginali integra,

lateribus punctatis; elytris violaceis vel purpureis, striis dorsalibus 1 et 4 parum abbreviatis, 2-3 suturalique integris; prosterno bistriato; mesosterno marginato, stria transversa nulla; tibiis anticis 4-dentatis.

L. $2\frac{2}{3}$ mill.

Oval, convex, body and legs blue-black; head cyaneous; thorax and elytra rich dark violet, changing to purple in certain lights; the head moderately excavated, striate over the eyes only, punctuation much scattered; the thorax with a distinct impression behind the anterior angle, stria complete, punctate on the lateral border, with finer points extending towards the disk and gradually becoming less dense, scutellar puncture minute; the elytra, striæ, outer humeral wanting, inner very short, basal, but clear, 1 shortened well before the apex, 2-3 complete and almost joining apically, 4 a little longer than the first, 5 wanting, sutural complete and parallel to the suture, apical border sparsely punctured; the propygidium is clearly but sparsely punctured, the punctures are chiefly at the base; the pygidium is very minutely punctured and the points are more evenly scattered; the prosternum is rather wide, keel impunctate, anterior lobe with a few scattered punctures, bistriate, striæ diverging at either end, but widening out most anteriorly; the mesosternum, marginal stria rather fine, posterior suture visible, but there is no transverse stria; the first abdominal segment has a conspicuous bent stria on either side; the tarsi are dull brown and the anterior tibiæ are 4-dentate, the two central teeth are widest apart.

Most of the brightly coloured species of this genus are not convex; but this and *P. varicolor*, Mars., are the two exceptions known at present.

Hab. Brazil (*ex coll. Barton*).

Phelister festivus.

Epiurus festivus, Lew. Ann. & Mag. Nat. Hist. ser. 7, vol. ii. p. 171 (1898).

By an oversight I omitted in my description to refer to the tibiæ of this species. The anterior tibiæ are 3-dentate, the two nearest to the tarsi are somewhat close together, the third is further apart; this form of the tibia and the somewhat curved tarsal grooves show that it belongs to the genus *Phelister*.

Phelister chapadæ, sp. n.

Orbicularis, convexiusculus, niger, nitidus, supra punctulatus; antennis pedibusque rufis; fronte impressa stria late interrupta;

pronoto lateribus punctato, stria marginali integra; elytris striis dorsalibus 1-3 integris, 4-5 apicalibus, suturali obliqua basi abbreviata; prosterno haud striato; mesosterno bistriato; tibiis anticis 4-5-dentatis.

L. $3\frac{1}{8}$ mill.

Orbicular, somewhat convex, black and shining, surface above finely punctulate; the head is similar in form and sculpture to that of *P. 4-punctulus*, Mars., but the epistoma and mandibles are longer; the thorax is transverse, more than twice as broad as long, marginal stria fine and complete, the lateral border is distinctly punctured, scutellar puncture well-marked, basal edge irregularly punctured; the elytra, striæ, subhumeral absent, inner humeral very fine and oblique, dorsal 1-3 strong and complete, 4-5 apical, coequal, and not quite reaching the middle, sutural shortened anteriorly for about a quarter of the elytral length, somewhat oblique and gradually becoming closer to the suture towards the apex; the propygidium is punctured like the thoracic border and is faintly impressed on either side behind; the pygidium, the basal half is punctured and the apical half is smooth; the prosternum is without striæ and widens out very sharply at the base; the mesosternum, anterior stria marginal and parallel to the edge, second stria transversely arched and it is clearly anterior to the meso-metasternal suture, and it continues laterally (irregularly crenulate) to the base of the metasternum; the anterior tibiæ are 4-5-dentate.

The above belongs to the same section of the genus as *P. 4-punctulus*, Mars., and others, but its stature and relatively greater breadth render it conspicuously different.

Hab. Chapada, Matto Grosso (*H. H. Smith*). One example.

Omalodes felix, sp. n.

Ovatus, convexiusculus, niger, nitidus; fronte clypeoque dense punctatis, illo in medio profunde sulcata; pronoto leviter 4-foveolato, lateribus dense punctatis; elytris striis 1-2 integris, 3 in medio interrupta et postice punctis formata; propygidio pygidioque dense punctatis; prosterno haud striato; mesosterno stria marginali late interrupta; tibiis anticis 5-dentatis.

L. $9\frac{1}{4}$ mill.

Oval, slightly convex, black and shining; the head with the clypeus and mandibles densely but not very coarsely punctured, stria complete, the median sulcus similar but wider than that figured for *O. angulatus*, Mars. (Mon. 1853,

t. xv. fig. 3e); the thorax laterally is densely, not coarsely punctured, with two shallow foveæ on either side well behind the anterior border, innermost fovea is in a line behind the eye, the smaller and outer is between it and the lateral margin, there is a fine marginal stria which ceases behind the eye and posteriorly is not visible from above on the basal half of the thoracic length, the lateral stria is well-marked and anteriorly is bent on either side behind the eyes and is slightly angulate behind the middle of the neck, the scutellar puncture is minute and surrounded by a shallow depression; the scutellum is small and has a median puncture; the elytra, striæ, outer humeral is faintly seen before the middle, inner is broken in the middle and somewhat irregular in its course, 1-2 dorsal rather deep and complete, 3 broken in the middle and then continued to the apex by a line of punctures; the propygidium and pygidium are coarsely punctate, the first with two posterior impressions; the prosternum and mesosternum are minutely punctured, the second has a short bent stria on either side; the anterior tibiæ are 5-dentate, the apical tooth being bifid at the apex.

The outline of this species agrees with that of *Psiloscelis Harrisii*, Lec., a form not seen in any other species known to me.

Hab. Central Argentina.

Omalodes striatipectus, sp. n.

Ovatus, latus, subconvexus, niger, nitidus; fronte punctata in medio foveolata; pronoto lateribus punctato; elytris striis 1-2 integris, 3 abbreviata; pygidio profunde punctato; prosterno punctato et distincte bistriato.

L. $9\frac{1}{2}$ mill.

Oval, rather broad, somewhat convex, black and shining; the head distinctly and rather closely punctured, also the clypeus and the labrum, stria complete but a little irregular, vertex with a well-defined fovea; the thorax has a lateral band of punctures, lateral stria rather strong, especially at the anterior angles, and continued behind the head, anterior angles rather pointed; the elytra, dorsal striæ, 1-2 complete but punctiform at the apex, 3 extremely fine, basal and dimidiate; the propygidium bifoveolate, somewhat sparsely punctate, especially on the disk; the pygidium very evenly and wholly punctate, punctures very clear and larger than those of the propygidium and fairly closely set; the prosternum is evenly, not densely nor coarsely punctured, keel clearly bistrate, striæ widening out at the coxæ but not continuing round the

base ; the mesosternum is emarginate, with a curved stria on either side, and the spaces before and behind the striæ are punctate ; the anterior tibiæ 5-dentate.

The striæ on the prosternal keel are well-marked and complete and are a good distinguishing character for the species, which in outline corresponds with *O. grossus*, Mars.

Hab. Rio Cachiyaçu, Iquitos (*Stuart*, 1893).

Omalodes sinuaticollis, Mars.

This species has two conspicuous foveæ in the elytra at the base of the third dorsal stria. I believe the type of this species came to me in the Chevrolat collection ; in it the pin pierces the fovea on one side, and probably Marseul thought the fovea on the other accidental. I have received fresh specimens lately from Mr. H. H. Smith taken at Rio Janeiro.

Hister congonis, sp. n.

Breviter ovalis, depressiusculus, niger, nitidus ; fronte punctulata, antice foveolata, stria transversa utrinque deflexa tenuiter impressa ; thorace stria externa abbreviata, interna integra ; elytris striis 1-3 integris, 4 basi evanescenti, suturali basi abbreviata ; pygidio vix dense punctato, postice marginato ; tibiis anticis 4-dentatis.

L. vix 6 mill.

Shortly oval (elytra wider than the thorax and widest behind the shoulder), somewhat depressed, black and shining ; the head punctulate and foveolate anteriorly, stria fine and nearly straight across the fovea, and then it is markedly deflected on either side, in front of each eye there is a remarkable obtuse projection, mandibles are concave above, with a very robust tooth on the inner edge, labrum is transverse and semi-circular on the anterior edge ; the thorax is transverse, widest at the base, marginal stria ceasing behind the eye, outer lateral is somewhat hamate at the anterior angle and posteriorly it reaches a little beyond the middle, inner lateral is strong at the sides, slightly sinuous, and it is much nearer the edge behind the neck than behind the angles ; the elytra, striæ, inner humeral is deep and apical and reaches beyond the middle, apically it nearly joins the first dorsal, dorsal 1-3 complete, 4 evanescent at the base and rather fine, 5 dimidiate, sutural well shortened at the base and bending away from the suture before and behind ; the propygidium is not closely punctured and the points vary in size, those on either side are the largest, some are very minute ; the

pygidium is evenly, almost densely, set with larger punctures, and there is a granulate surface between the punctures which may be seen under the microscope, posteriorly there is a smooth narrow rim; the prosternum is narrow, anterior lobe punctulate and bordered laterally with two striæ; the mesosternum is almost truncate, with a marginal stria which continues along the sides of the metasternum; the anterior tibiae are 4-dentate.

Hister circulus, Sch., and *H. circularis*, Lew., somewhat resemble this species in general facies. The ocular projections resemble those of certain *Hololeptæ*, and they are seen but are very minute in *H. circularis*.

Hab. Lokolela, Congo River (*J. A. Clark*).

Hister Holubi, Sch.

Hister Holubi, Sch. Deutsche ent. Zeitschr. p. 153 (1889).

Mr. Guy A. K. Marshall has sent me a series of this species found at Salisbury in Mashonaland among rotten horns and hoofs. Mr. Marshall says:—"I was pleased in being able to ascertain the reason of its presence there; I find that it lives on the larvæ of the large horn-destroying 'micro' *Tinea vestella*, L., for on several occasions I captured the beetles in the act of devouring the larvæ, and they are, as a rule, chiefly found in the larval cases."

Hister Holubi is somewhat like a species of *Pachycrærus* in outline, and I give a figure (fig. 2) to show the striæ of the prosternal lobe. In several African species the lobe is similarly bistriate.

Fig. 2.



Hister Holubi, Sch.

Hister sinuosus, sp. n.

Ovalis, convexus, niger, nitidus; fronte minutissime punctulata, stria irregulariter impressa; pronoto stria interna valida sinuata, margine laterali elevato, post angulos sinuato; elytris striis 1-3 integris, 4-5 et suturali abbreviatis; propygidio pygidioque leviter, haud dense, punctulatis; tibiis anticis 5-dentatis.

L. $4\frac{1}{2}$ mill.

Oval, convex, black and shining, with a very minute and sparse punctuation; the head, frontal stria somewhat irregular but complete; the thorax is thickened laterally between the marginal and inner stria, and the edge is distinctly sinuous behind the anterior angle, marginal stria fine and only seen from above at and near the anterior angle, inner lateral is strong and rather widely sinuous in the middle, and continues behind the head, where it is somewhat crenulate and fine, the scutellar puncture is small but clear; the elytra, striæ, outer humeral is faintly crenulate, bending inward towards the apex, inclining outward anteriorly, and shortened before the base, inner humeral wanting, but there is a short basal oblique stria joined to the first dorsal, 1-3 dorsal complete, 4 finer and reaching just beyond the middle, 5 shorter, sutural nearly as long as the fourth; the propygidium and the pygidium are clearly, rather finely, and not closely punctured; the prosternum is without striae, the surface (and that of the mesosternum) is microscopically strigose, and the anterior lobe is conspicuously margined with a strong stria or sulcus, which is nearest the edge at the apex; the mesosternum is widely sinuous, with the marginal stria complete; anterior tibiæ 5-dentate.

Hister relictus, Mars., which has been likened to the European *corvinus*, Germ., and *H. cognatus*, Lec., and *H. marginicollis*, Lec., all somewhat resemble the above species, but the pygidia of these species are densely punctate.

Hab. Texas. Taken by the late Mr. Julius Flohr in the winter of 1893. I have only one example, but it is probable there are more in the museum in Berlin, to which institution Mr. Flohr left his collections.

Hister gibberosus, sp. n.

Ovalis, convexiusculus, niger, nitidus; fronte stria valida, supra oculos angulata; clytris striis 1-3 validis integris, 4 leviter impressa completa, 5 et suturali apicalibus; propygidio bi-impresso, grosse et dense punctato; pygidio bilobo, necnon grosse punctato; prosterno bistriato, striis antice et postice junctis; tibiis anticis 4-dentatis.

L. $5\frac{1}{2}$ mill.

Oval, somewhat convex, black and shining; the head is feebly bi-impressed behind the frontal stria, stria strong, sinuous behind the mandibles, deep and angulate over the eyes, and continues transversely along the base of the head; the thorax, the marginal stria is fine and most conspicuous at the anterior angle, lateral stria ceases anteriorly behind the eye, inner

stria complete and the interstice between it and the lateral stria is rather broad, only narrowing at the base; the elytra, striæ 1-4 complete, 1-3 strong and rather wide, 4 finer, 5 and sutural apical, short and broken, humeral striæ absent; the propygidium is coarsely and thickly punctate, with a rather wide impression on either side; the pygidium is also coarsely punctate, with a gibbosity on either side near the base (resembling *H. coronatus*, Mars., in this character); the prosternum, anterior lobe with scattered shallow punctures, keel bistriate, striæ joining before and behind, are rather fine and before the coxæ sinuous; the mesosternum is slightly sinuous behind the keel of the prosternum, marginal stria rather fine and crenulate; the metasternum has a similar stria which follows the sutural line and widens out laterally behind; anterior tibiæ 4-dentate, apical tooth bifid.

This species must be placed in the American series close to *H. nodatus* and *bullatus*, Lew., and near to *H. coronatus*, Mars., which it resembles in the form of its pygidium.

Hab. Mexico (*J. Flohr*). One example.

Hister meridanus, sp. n.

Breviter ovalis, convexus, niger, nitidus; fronte stria valida; pronoto stria externa dimidiata, interna integra; elytris striis 1-4 integris, 5 brevissima, suturali utrinque abbreviata; propygidio pygidioque dense et grosse punctatis, hoc leviter bilobo; prosterno bistriato, striis postice et antice conjunctis; tibiis anticis 5-6-dentatis.

L. $4\frac{1}{3}$ mill.

Rather shortly oval, convex, black and shining; the head very finely, not densely punctulate, stria rather strong, arched anteriorly, angulate above the eyes, and joining a transverse stria before the neck; the thorax, marginal stria very fine, visible above at the anterior angles, outer lateral stria ceases behind the eye and continues halfway down the lateral edge, inner is complete and slightly crenulate, especially behind the anterior angles, the basal edge is punctate, but the points do not reach the scutellar region; the elytra, dorsal striæ, 1-4 complete, 5 apical and very short, sutural much shortened in front and a little shortened behind; the propygidium and pygidium are densely and coarsely punctate, the former is impressed on either side behind, the latter is slightly bilobed; the prosternum, anterior lobe margined with a fine stria and has large shallow conspicuous punctures, keel bistriate, striæ clearly joined before and behind and are widely sinuous in the middle; the mesosternum is feebly sinuous in

front, with a complete marginal stria; the metasternum also has a somewhat similar and independent stria, but the stria is without the sinuosity; the first abdominal segment has a well-marked lateral stria; the anterior tibiæ are armed with two strong teeth, the apical one bifid, and three small ones behind.

Hister meridanus may be associated with *H. nodatus* and *H. gibberosus*, Lew.

Hab. Yucatan (*Donckier*). Two examples.

[To be continued.]

XXX.—*On the Absence of Regeneration in the Posterior Limbs of the Orthoptera saltatoria and its probable Causes.*
By EDMOND BORDAGE*.

UP to the present opinions have been divided with regard to the regeneration of the posterior limbs of the Orthoptera saltatoria. Among naturalists denying the possibility of such regeneration I may mention Heineken, Graber, Durieu, Frédéricq, Contejean, Werner, and Peyerimhoff. Among those who admit it I may mention Professor Griffini (of Turin).

In the attempt to settle this debated question I undertook a very large series of experiments upon representatives of three families of Orthoptera saltatoria, choosing for my subjects *Phylloptera laurifolia* and *Conocephalus differens* among the Locustidæ, *Acridium rubellum* among the Acrididæ, and *Gryllus capensis* among the Gryllidæ.

The experiments in question have led me to the conclusion that regeneration of the jumping-legs does not take place. I have, in fact, not been able to find the least trace of regenerative power.

Here is a fact which at first sight seems to be contrary to the law of Lessona, for the jumping-legs are those which are most exposed to injury by enemies, and can be detached from the body by self-mutilation as a means of escape, as well as *in casting the skin* [*exuvial self-mutilation*]. We shall see, however, that this case by no means forms an exception to the law of the celebrated Italian biologist.

I have in fact been able to note with regard to larvæ kept in captivity how difficult the moults became after the loss of

* Translated from 'Comptes Rendus,' cxxix. (July 10, 1899) pp. 120-123, by Wilfred Mark Webb, F.L.S. From a separate impression communicated by the Author.

jumping-legs. Difficulties presented themselves especially at the last moult, when the Orthopteron must free his wings from their covering. His big hind legs would have allowed him to brace himself up to his work more effectively, giving him a valuable means of support at the time when he had to make his laborious efforts to free himself from his chitinous envelope. Almost all die before having rid themselves of this wrapper. Among the rare survivors, with one or two exceptions, I have only seen completely disabled insects with wings all crumpled, and sometimes even atrophied, creeping along with difficulty. These points were specially striking in *Phylloptera laurifolia*.

Supposing for a moment that instead of being safe from their numerous enemies, as they were in the cages where I had reared them, these damaged Orthoptera had been left to themselves. It now becomes evident that the few examples which had managed to survive the dangers presented by the process of moulting would have, in spite of this fact, but little chance of reaching the perfect state. Let us admit even that some among them, having escaped all their enemies, had attained their complete development after having undergone the last and most formidable moult. It still seems impossible to me that these insects would be able to pair. In the first place, whatever their sex, the absence of their big legs would completely prohibit it; in the second place, granting once more that it was not found to be an insurmountable obstacle, it is only right to admit that the mutilated insects in question would be left on one side by reason of the sexual selection which appears to have been clearly proved among Orthoptera saltatoria*. Finally, among certain of the Orthoptera with fighting tendencies, such as the crickets, which not only quarrel over the females, but engage in mortal combats for the possession of the hole which serves them for a dwelling,

* See Charles Darwin, 'The Descent of Man and Sexual Selection' (French edition, 1891, pp. 311-318). Among the most interesting cases quoted in this book occurs that of *Pachytylus migratorius*. Körte has pointed out the choice exercised by the female with respect to the male. The male of this species when paired with a female shows his anger by stridulations when another male comes near. If the musical apparatus plays a part in sexual selection, Orthoptera saltatoria deprived of their jumping-legs, and which in spite of this have reached the perfect state, must be in a condition of great inferiority when compared with their rivals, for, as I have already remarked, their wings being quite bruised and sometimes even atrophied, their musical apparatus is incapable of acting. In the Acrididae especially the emission of musical notes is rendered quite impossible, as the femora of the jumping-legs take part in their production.

the absence of hind legs would put them to a very great disadvantage.

There is then every reason to allow that these various causes prevent mutilated individuals among the *Orthoptera saltatoria* from taking part in the reproduction of the species. This evidently explains the absence of the power of regeneration.

In several species of *Orthoptera saltatoria* the trochanter of the hind limbs is quite withdrawn (*telescoped*, to use the picturesque expression of Messrs. Sharp and Brindley) into the interior of the coxa. I thought at first that this arrangement might perhaps prevent regeneration. I found afterwards that this could not be, for there is the same absence of regeneration in insects which do not show it.

The cases of inequality in the size of the jumping-legs recorded by Griffini in *Pristes tuberosus* and in species belonging to the genera *Ædipoda* and *Gomphocerus* appear to me to be due to atrophy and not to regeneration*. I have been able to find analogous peculiarities in *Phylloptera laurifolia*. Sometimes immediately after a moult an arrest of the growth takes place with regard to one of the two jumping-legs, which up to that time had been perfectly equal. I have even noticed the same thing in the case of the wings in the same species of locust. When this insect undergoes its last moult, the wings on one side of the body develop completely, while those on the opposite side remain rudimentary, their size not exceeding that of the wing-coverings of the nymph.

I am, however, constrained to add that there is good reason for Professor Griffini's belief that regeneration of the two anterior pairs of limbs may take place in *Orthoptera saltatoria*, judging from an observation made on *Platyphyllum Regimbarti*.

In a forthcoming communication I propose to show the truth of Griffini's hypothesis and to prove the possibility of the regeneration of the limbs in question as well as the regeneration of the tarsi in the three pairs of limbs in the *Orthoptera saltatoria*.

The determination of the phenomenon of exuvial self-mutilation furnishes a complete explanation of the facts in accordance with the law of Lessona.

* Griffini states elsewhere that he never found any traces of regeneration in the insects which he reared in captivity.

XXXI.—*Regeneration of the Tarsus and of the Two Anterior Pairs of Limbs in the Orthoptera saltatoria.* By EDMOND BORDAGE *.

I.—IT would be useless to try and provoke self-mutilation of the first two pairs of limbs in the *Orthoptera saltatoria*. By giving, however, a strong pull to the legs, they may be separated from the body. Such separation rarely takes place at the joint between the femur and trochanter †, but much more often at that between the latter and the coxa. The injury thus inflicted upon the insect is generally fatal; the muscles break irregularly, making a ragged tuft, while bleeding is copious. When the Orthopteron survives, if it still be in the larval state, regeneration can act and produce either a perfect limb when separation has taken place at the joint between femur and trochanter, or a more or less rudimentary stump when the trochanter has been severed from the coxa.

These facts seem in a twofold manner to invalidate the law of Lessona:—1stly, because there is regeneration at points where mutilations do not appear to be normally produced; 2ndly, because regenerations at the two places are most frequent in the one where pulling more rarely leads to the separation of the limb, and because they are without any comparison more complete in the same region.

If we notice what happens during the changes of skin, we shall see that this double paradox breaks down before an examination of the normal facts.

In point of fact, it is by no means rare during moulting for one of the limbs to be detached from the body by *æuvial self-mutilation*. Contrary to what we found before, separation takes place almost always at the joint between the femur and the trochanter, and very rarely at that between the latter and the coxa. In the first of these cases bleeding is comparatively insignificant, while in the second it may be fatal. Mutilation in such a way is much less severe and less frequently followed by death than if it had been produced experimentally. The power of regeneration often acts in the first case, and may sometimes produce a perfect limb ‡. When

* Translated from 'Comptes Rendus,' cxxix. (July 17, 1899) pp. 169-171, by Wilfred Mark Webb, F.L.S. From a separate impression communicated by the Author.

† It is impossible sometimes even to separate it at this point by pulling. In *Gryllus campestris*, for instance, I have to make use of scissors to effect the removal.

‡ Among the *Orthoptera saltatoria* the parts in process of regeneration grow slowly, from which the experimenter may be at first tempted to believe that such regeneration does not exist. Also a reproduced limb

regeneration occurs in the second case, a jointless stump is formed hardly 2 or 3 millim. in length. The facts described explain themselves completely.

On the other hand, however, it may seem inexplicable that exuvial self-mutilation should show itself in the case of limbs which it appears *à priori* ought to experience no difficulty in withdrawing from their old chitinous covering, such limbs being of sufficiently restricted dimensions. I should, however, call attention to the fact that among the Arthropoda when moulting there is not a single appendage (leg, antenna, palp), however modest its dimensions may be, in which there may not at the particular moment happen to be accidental adhesions between the new chitinous covering and the old. The Arthropod which cannot when moulting overcome these difficulties is infallibly doomed to die. This furnishes the explanation why in moulting Arthropoda there ought to be but very few appendages in which one cannot find traces of more or less marked exuvial self-mutilation *, either complete or partial, and at the same time of regenerative power. It may even sometimes be possible to discover regeneration in certain parts belonging to limbs specially modified for quite particular functions. This is the case with the tarsi of the preying-legs of the Mantidæ and those of the digging-legs in the mole-crickets. Further mutilation of these limbs would end in death either indirectly or after a brief delay and by bleeding.

II.—In the *Orthoptera saltatoria* regeneration of the tarsi in the three pairs of limbs takes place with ease; this is to be expected, seeing that the tarsi are frequently damaged as a result of the struggles made by the insect to free itself when moulting. It is particularly well marked in the elongated tarsi of the jumping-legs. Regeneration here takes place even after artificial cuts removing the tarsus, and even a little piece of the terminal portion of the tibia, which is reproduced as well. The presence of the regenerative power in the last-mentioned region is easily explained when it is taken into consideration that its muscular fibres are often damaged when the tarsus is torn off either during moulting or, more rarely, by the unsuccessful attack of some natural enemy.

III.—In *Phylloptera laurifolia* and *Conocephalus differens* regeneration gives a tetramerous tarsus (tetramery is the rule

never reaches the length of the corresponding one that remains in place, and it is often incapable of rendering any real service. It is probably this slowness of growth that led Graber to conclude too hastily that regeneration of the tarsus did not take place.

* The greater perfection of exuvial self-mutilation is properly directed to the difficulties which appendages, owing to their shape or size, experience in disengaging themselves from their old chitinous coat.

in Locustidæ). In *Gryllus capensis* regenerated tarsi still show three joints, but the new tarsus in this case is in some respects more massive than the normal one. The third joint is nearly equal to the first, while in the normal tarsus it is considerably longer than the latter. Finally, the second joint, which in the ordinary tarsus is very small and almost entirely hidden, is quite visible in the regenerated one. This difference is particularly noticeable in the case of the posterior limbs*.

So far as the nature of the tarsal regenerations is concerned in *Acridium rubellum* I cannot at present speak, my experiments with this species not being yet completed †.

BIBLIOGRAPHICAL NOTICE.

Die Fledermäuse des Berliner Museums für Naturkunde.—Neunzig, unter Leitung von Prof. W. Peters und Paul Matschie, gezeichnet und lithographirte Tafeln. Bearbeitet und durch Verbreitungskarten und Bestimmungstabellen für alle bekannten Arten ergänzt.

VON PAUL MATSCHIE, Kustos am Museum für Naturkunde zu Berlin. Berlin: Georg Reimer.

Erste Lieferung. Megachiroptera. Pp. 103, pls. i.–xiv., 1899. 24 Marks.

For many years every student of the Chiroptera has known of, and hoped for the publication of, the magnificent series of plates to illustrate this group of animals drawn by the famous draughtsman J. D. L. Franz Wagner under the direction of the late Prof. Peters. A foretaste of their quality was given by the publication of a few of them in illustration of some of Prof. Peters's papers, but otherwise, although many of them are now more than 30 years old, no one had been able to see them except at Berlin or at Genoa, to whose Museum Prof. Peters had given a set.

Now at last an instalment of them is published in illustration of a general work on Bats by Dr. Paul Matschie, accompanied by further plates drawn by that author's deceased wife.

This work will be of the greatest utility to all students of Bats, and abounds with evidences of the author's care and of the richness of the materials on which it is based. Synoptical tables are given of all the genera, subgenera, and species; and although some of those we have tried have not quite responded to the call made upon them, yet they give a most useful index to the characters mainly relied upon by the author in distinguishing the various forms.

* It should be stated that the regenerated tarsus represents one of the organic positions of stability intermediate between the actual normal form and an ancestral one.

† In Locustidæ and Gryllidæ the tibia of regenerated anterior limbs does not possess the *tympanic* apparatus which exists on the original limb.

The author's great interest in geography has, we think, led him to divide up some of the genera rather on geographical than zoological grounds, and on this account to "split" too liberally: the genera *Eponophorus* and *Macroglossus* are examples of this tendency. On the other hand (presumably through want of material), some forms are lumped which seem scarcely to deserve it. Thus to find *Pteralopex* reduced to a subgenus of *Pteropus*, on the same level as such scarcely definable subgeneric groups as *Sericonycteris*, *Acerodon*, or *Spectrum*, while *Pteropus Wallacei* is made the type of a new genus, shows to our mind rather a want in the power of balancing the value of zoological characters. The mere number of the teeth is of but little importance compared with their structure, and the absence of an incisor in *Pteropus Wallacei* is surely of less importance than the marked differentiation of nearly the whole dentition of *Pteralopex*.

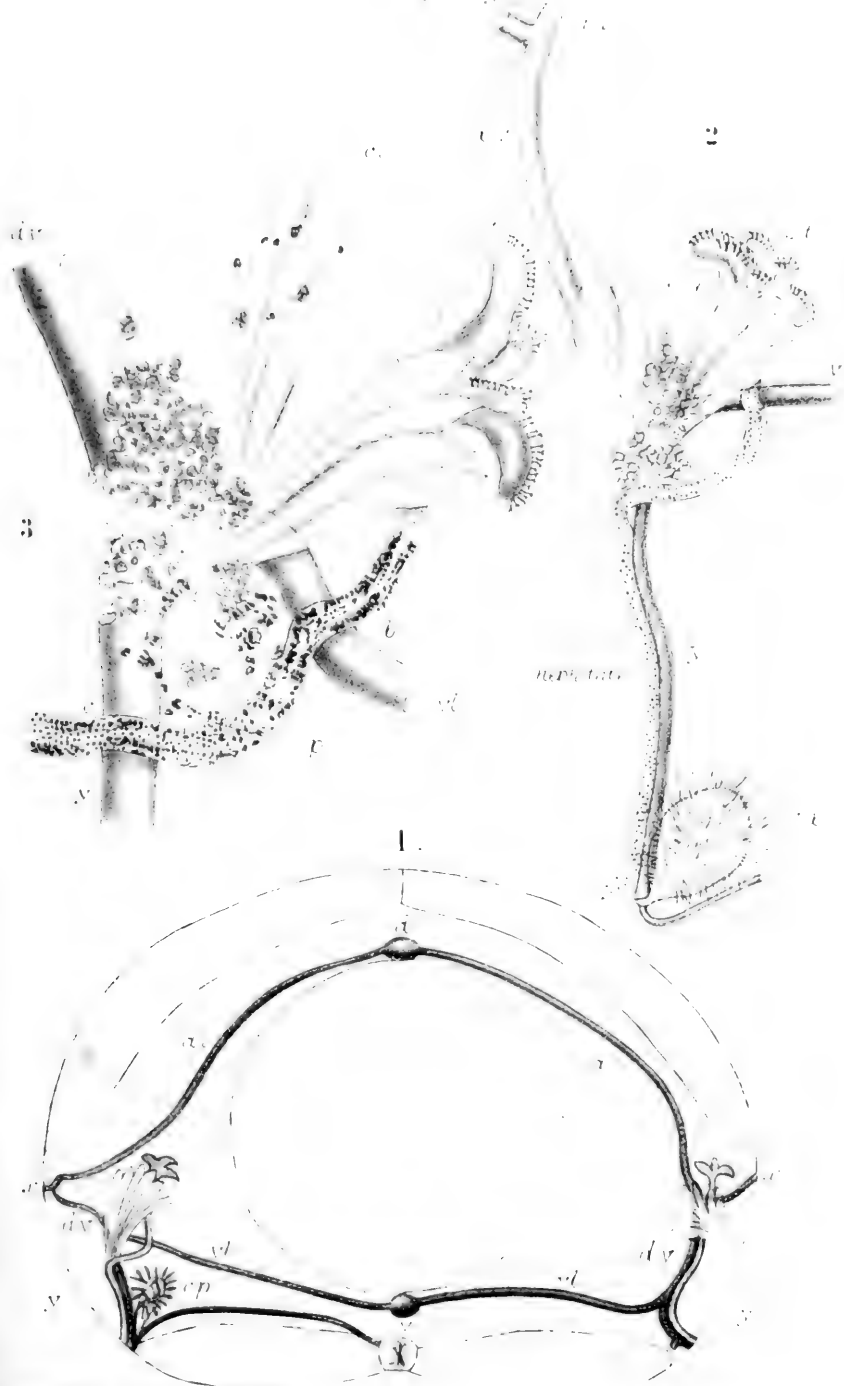
In giving his lists of specimens in the collection at Berlin, Dr. Matschie prefaces them by the letters B.M.: a rather unfortunate choice, for "B.M." has been used for more than 60 years by a multitude of authors to indicate the British Museum; and as the two Museums, of Berlin and London, possess two of the four greatest collections of Bats, it seems a pity that initials which have always been used for the one should now be most confusingly dragged in for the other. Prof. Peters himself again and again used M.B., standing of course for Museum Berolinense. Some indication of the condition of the specimens, whether in spirit or in skin, would also have been of service to other workers.

Dr. Matschie is exceedingly fond of subgenera, subdividing many genera on rather slight grounds, and adding a serious number of technical names to our already overburdened lists. The synopses of species are placed under the respective subgenera, an arrangement which does not appear to increase the facility with which specimens can be determined, as compared with the more usual arrangement of placing the whole synopsis of a genus together.

The author omits to explain, nor is it possible to guess, why he shifts Linnæus's name "*vampyrus*" from what Dobson calls *Pteropus edulis* to *P. vulgaris*. Shiftings of names are always unfortunate, but a shifting without explanation cannot be too strongly protested against.

We heartily commend the care Dr. Matschie has taken with the nomenclature and his rigid adherence to the rules. Had Dr. Dobson been equally particular, the nomenclature of Bats might have been settled 30 years ago. Only we should prefer to accept Mr. Palmer's ruling in the difficult case of "*Cephalotes*," on the ground that the name itself is a sufficiently clear indication of the species Geoffroy had in mind when founding the genus. The restoration of the familiar terms *Macroglossus* and *Megaloglossus* is a good result of the newly accepted principle of the rigid adherence to the original spelling of generic names in all cases.

Altogether Dr. Matschie may be sincerely congratulated on the excellent way he has risen to the great opportunity which the publication of Wagner's beautiful plates has given him. O. T.

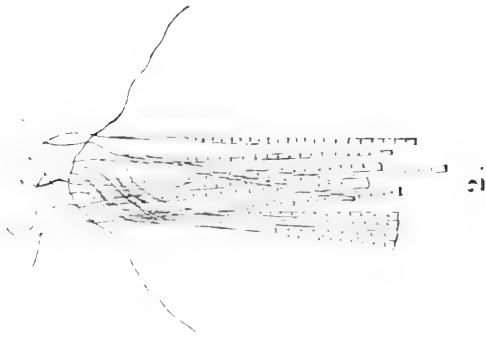
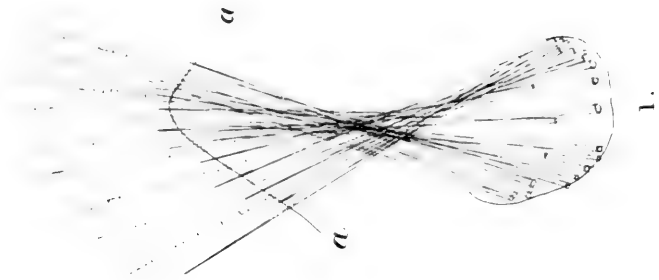


Microscopio etiam descriptum
et in Museo ...

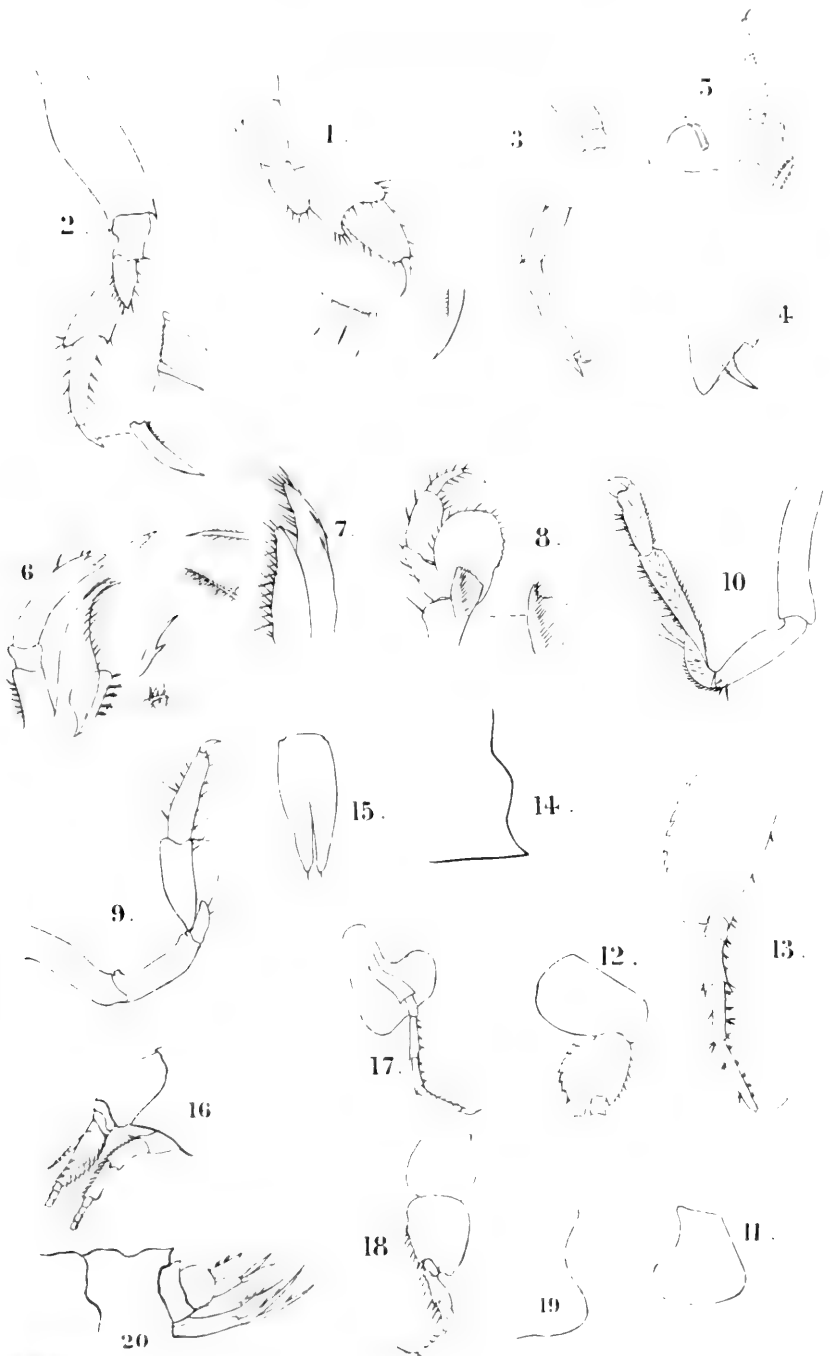














THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

[SEVENTH SERIES.]

No. 27. MARCH 1900.

XXXII.—*A New-Zealand Species of the Amphipodan Genus Cyproidia.* By CHARLES CHILTON, M.A., D.Sc., M.B., C.M., F.L.S., Research Fellow, University of Edinburgh.

[Plate V.]

A FEW specimens of the species described in this paper have been in my possession for a considerable time, and were obtained some years ago by surface-netting in Otago Harbour, New Zealand. I have hitherto refrained from publishing the species, owing to uncertainty as to its generic position; but as that difficulty appears likely to increase as time goes on, I have decided to describe the species now under the genus *Cyproidia*, Haswell.

This genus was instituted by Haswell in 1880 for two Australian species*, and the description was afterwards given with some slight additions and corrections in his Catalogue of the Australian Crustacea in 1882†. In 1885 a British species was described by Stebbing‡, who pointed out the close resemblance between the genus *Cyproidia* and another genus *Stegoplaa*, founded by Sars in 1882. Another British species

* Proc. Linn. Soc. N. S. W. vol. iv. pp. 320-321.

† 'Catalogue of the Stalk- and Sessile-eyed Crustacea of Australia,' p. 229.

‡ Ann. & Mag. Nat. Hist. ser. 5, vol. xv. 1885, p. 59, pl. ii.

was described by Thomas Scott in 1893, but was referred to the genus with some doubt, as it possessed several characters that seemed rather to indicate that it should be placed under *Stegoplax* *. Some confusion already seems to have crept into the discussion, for while Haswell's description in his Catalogue says that the superior antennæ are without a secondary flagellum, and this description is quoted in full by Stebbing, yet the latter describes his species *Cyproidia damnionensis* as having a minute one-jointed secondary flagellum on the superior antennæ, without indicating in any way, so far as I can find, that in this respect his species differs from the generic description given by Haswell. It was apparently this that led Scott to say that *Cyproidia* and *Stegoplax* differ in "the apparent presence (*Cyproidia*) or absence (*Stegoplax*) of a minute secondary appendage to the superior antennæ" †, though a few lines further on he recognizes that in possessing no secondary appendage to the superior antennæ his species, ? *Cyproidia brevisrostris*, "agrees better with Haswell's amended description than with that of the Rev. Mr. Stebbing, as well as exhibits a close affinity with *Stegoplax*." Whatever the author of *Cyproidia* may have intended, it appears that his genus is fated to be considered as having the possession of a minute secondary appendage to the upper antennæ for one of its characters, for Sars, in his recent work, in comparing the genus with his *Stegoplax*, speaks of *Cyproidia*, "as recently redescribed by Mr. Stebbing," as possessing a secondary appendage, though he also points out other differences, as, indeed, previous authors had also done ‡.

Della Valle places both *Cyproidia* and *Stegoplax* as synonyms of *Peltocoxa*, Catta §, as had been previously suggested by Stebbing ||; but with the discovery of new species it is hardly likely that these genera will be allowed to drop, and, on the other hand, Stebbing has quite recently established a new genus *Paracyproidea*, differing from *Cyproidia* in several small points, for the species *Cyproidia lineata*, Haswell ¶. At the same time he also established the new genus *Tetradion* for the species *Cyproidia? crassu* that I provisionally referred to *Cyproidia* in 1882 **, but though both genera belong to the Amphilocheidæ, *Tetradion* is very different from the true *Cyproidia*.

* Ann. & Mag. Nat. Hist. ser. 6, vol. xii. 1893, p. 244, pl. xiii.

† L. c. p. 245.

‡ 'Crustacea of Norway,' i. p. 232.

§ 'Fauna und Flora des Golfes Neapel,' Monograph 20, p. 647.

|| Report on the 'Challenger' Amphipoda, p. 441.

¶ Ann. & Mag. Nat. Hist. ser. 7, vol. iv. p. 207.

** 'Transactions New Zealand Institute,' xv. p. 80, pl. iii. fig. 1.

Cyroidia otakensis, sp. n. (Pl. V.)

Specific description.—Cephalon with a very small blunt rostral projection; first two segments of pereion short, third and fourth much longer, fourth longer than the third; last three segments of pereion and first three segments of pleon subequal in length; fourth segment of pleon fully as long as the third, but much narrower, it bears throughout its length a distinct dorsal crest, which widens posteriorly and projects beyond the end of the following segment, ending acutely; fifth segment very short, only about one fifth the length of the fourth, sixth segment longer than the fifth; telson reaching to the extremity of the peduncle of the terminal uropods. Gnathopoda subequal; carpus of the second longer than that of the first, and in both produced distally along the underside of the propodos; propodos of the second rather the stouter, palm not well defined in either. Basa of first and second pereiopoda narrow, not expanded; those of third, fourth, and fifth all expanded in a thin flat plate with rounded posterior margin. Rami of terminal uropoda unequal, upper margins fringed with fine setæ and a few stouter spinules at intervals.

Colour light brown.

Size. Length of body about 3 millim.

Hab. Otago Harbour, New Zealand. A few specimens obtained by surface-netting.

In addition to the above brief diagnosis, I give here the following additional details:—

The *general shape of the body* will be best seen from the figure; the *side-plates* of the first and second pereiopoda are enormously developed, and the antennæ, appendages, and pleon can nearly all be concealed and protected by them. The side-plate of the first pereiopod extends forwards past the first two short segments of the pereion and fits closely along to the lower margin of the cephalon; its junction with the side-plate of the second pereiopod is sinuous, the two are accurately and closely fitted, but are not actually cemented together, and can be readily separated by dissection. The side-plate of the second pereiopod is slightly deeper and considerably broader than that of the first; its margin is regularly convex below and behind, but is excavated at the upper posterior corner for the reception of the fairly well developed side-plate of the third pereiopod.

The *cephalon* is rather longer than the first segment of the pereion, the rostrum small and indistinct. The *eye* is large

and conspicuous, of many facets, round in outline, and red in colour.

The *upper antennæ* are stout and rather short; first joint of the peduncle longer than the second, and second considerably longer than the third, though they are all of nearly the same breadth; the margins are nearly or quite free from setæ: the flagellum contains three or four joints; the first joint is much the largest, about as long as the third segment of the peduncle, it is broad and bears on its margin about sixteen long non-tapering setæ, rather longer than the joint from which they spring; they are arranged somewhat irregularly in pairs, each pair springing from a small papilla; a similar arrangement is described by Scott in ? *Cyproidia brevirostris*, and from the figure given by Stebbing it is evident that it is also present in *C. damnoniensis*; it probably indicates that the first joint of the flagellum, though apparently single, is really formed by the coalescence of several separate joints, each with a pair of "olfactory setæ," for that is what the long setæ appear from their structure to be. The second joint of the flagellum is small and bears two long setæ, and is followed by a very slender but longer terminal joint with one or two setæ at its extremity; in the antenna on the other side of the specimen examined the flagellum was composed of four joints, there being two short joints before the slender terminal one. The secondary appendage is small and one-jointed and partially concealed by the broad first joint of the flagellum.

The *lower antennæ* are slightly longer than the upper and much more slender; the "gland-cone" arising from the second joint extends about halfway along the short third joint of the peduncle; fourth joint rather more than twice as long as the third, fifth rather shorter than the fourth, all with margins free from setæ; the flagellum is about half as long again as the fourth joint of the peduncle and is composed of four joints, each much shorter and narrower than the preceding, and bearing at the terminal extremity two or three fine setæ.

The *mouth-parts* I have not been able to examine in much detail, but they appear to closely resemble those of *C. damnoniensis*, Stebbing. The mandibles have a fairly well-developed molar; the apex of the inner plates in the maxillipeds is transversely truncate, with its outer angle rounded off.

The *first gnathopod* is rather slender; carpus shorter than propodos, bearing distally a projection which reaches about one third the length of the propodos and bears on its under surface about ten setæ; propodos only very slightly expanded, palm not well defined, but bearing six pairs of setæ

at regular intervals; dactylos long, more than half as long as the propodos, a few fine setæ on both margins, the terminal claw long and ending very acutely.

The *second gnathopod* very similar to the first, but rather stouter; the meros bears four or five setæ on its truncate distal margin; the carpus is slightly longer than the propodos and its distal process reaches halfway along the propodos, and, in addition to the setæ on its lower margin and extremity, has an irregular row of smaller setæ along the margin that is in contact with the propodos; palm of propodos not well defined, convex, bearing six stout plumose setæ, with shorter setæ at their bases; dactylos as in first gnathopod, but slightly shorter.

The side-plates of the *first and second pereopoda* have been already described; the basa are narrow and the remaining parts of these appendages call for no special notice.

In the *third pereopod* the side-plate is of moderate size, its margin smooth and convex; the basos is produced posteriorly into a thin flat plate, very delicate and transparent, its margin slightly concave posteriorly, the postero-distal corner rounded; the meros is produced distally and posteriorly into a process which reaches as far as the end of the carpus and ends acutely.

The *fourth and fifth pereopoda* are similar to the third, but the side-plates are smaller, while the expansions of the basa are broader and less delicate; the postero-distal angles are rounded as in the third pereopoda, not acutely pointed as in ? *Cyproidia brevirostris*, Scott.

In the *pleon* the first three segments are subequal in length, their pleural projections not greatly developed, the infero-posterior angles rounded and not produced backward. The appearance of the terminal portion of the pleon, with its long dorsally crested fourth joint, followed by the very short fifth joint, is very characteristic. The first two pairs of *uropods* are slender, subequal, with slender subequal rami. The peduncle of the third uropods is stout, its upper distal angle acute; rami unequal, the outer shorter one being as long as the peduncle. The *telson* does not appear to be laterally compressed, but is somewhat boat-shaped, concave above, and reaches as far as the end of the peduncle of the third uropods. The first uropods appear to reach a little beyond the extremity of the second, and these a little beyond that of the third; but in this, as in so many other characters, there is evidently considerable variation.

While this species closely resembles the other species referred to the genus in most respects, it can be at once

recognized by the characteristic formation of the terminal portion of the pleon; it differs from *C. dummoniensis*, Stebbing, in having a flat expansion to the basos of the third pereopod and in having the apex of the inner plates of the maxillipeds truncate; in the latter point and in some others it agrees with the new genus *Paracyproidea*, Stebbing, but it appears to differ from this genus in the form and size of the telson.

EXPLANATION OF PLATE V.

Fig. 1. Cyproidia otakensis. × 24.

Fig. 1 a. s. Superior antenna.

Fig. 1 a. i. Inferior antenna.

Fig. 1 gn. 1. First gnathopod.

Fig. 1 gn. 2. Second gnathopod.

Fig. 1 prp. 1-5. First to fifth pereopods.

Fig. 1 ur. 3 & T. Third uropod and telson, side view.

(All the details highly magnified.)

XXXIII.—*On new Species of Histeridæ and Notices of others.* By G. LEWIS, F.L.S.

[Concluded from p. 234.]

Hister lævimargo, sp. n.

Ovalis, parum convexus, niger, nitidus; fronte stria integra, supra oculos angulata; thorace stria interna basi vix abbreviata; elytris striis 1-4 integris, 5 et suturali apicalibus, suturali longiore; propygidio postice dense punctato, basi margineque laterali late lævibus; prosterno bistriato; mesosterno leviter emarginato, stria marginali integra; tibiis anticis 3-dentatis.

L. $4\frac{1}{2}$ mill.

Oval, rather convex, black and shining; the head, frontal stria well-marked, sinuous behind the mandibles, angulate above the eyes; the thorax, marginal stria very fine, conspicuous at the anterior angles only, ceasing behind the eyes, lateral stria almost complete, but a little shortened before the base, feebly bisinuous behind the neck; the elytra, striæ 1-4 complete, 5 apical, sutural dimidiate and apically turning slightly away from the suture, the humeral striæ are absent except a very fine oblique stria joined to the first dorsal stria at its base; the propygidium is densely punctured transversely behind, the punctures leave a broad smooth margin at the base and sides, the sides being clearly elevated; the

pygidium is similarly punctured, margined externally with a smooth somewhat elevated rim; the prosternum is bistrate, striae evanescent anteriorly before the suture, the anterior lobe is margined with a deep stria which, being oblique laterally, leaves a wide margin, the surface of the lobe and the keel is sparsely punctulate and microscopically strigose; the mesosternum is feebly sinuous and margined with a well-marked stria; the metasternum has a lateral stria only; the anterior tibiae are 3-dentate, but the apical tooth is bifid.

The smooth margin of the propygidium in this species agrees somewhat with that of *H. latimargo*, Sch. The species belongs, like *H. gibberosus*, to an American section of the genus with a striate prosternum.

Hab. Costa Rica. "Barba Esmeralda, May 1890" (*P. Biolley*).

Hister planimargo, sp. n.

Ovalis, convexus, niger, nitidus; fronte punctulata, stria antice recta; thorace stria marginali interrupta, interna integra; elytra striis 1-4 integris, 5 brevi, suturali dimidiata; propygidio postico transversim punctato, margine laterali anticoque laevi; pygidio punctato, margine extus laevi; prosterno bistrate, striis posticis conjunctis.

L. $4\frac{1}{3}$ mill.

Oval, convex, black and shining; the head, surface punctulate, frontal stria nearly straight anteriorly; the thorax, marginal stria interrupted behind the neck, lateral stria complete, parallel to the sides and somewhat strong laterally; the elytra with a fine oblique humeral stria only, dorsal striae 1-4 complete and rather deep, 5 apical, short and punctiform, sutural apical and dimidiate, turning away from the suture posteriorly; the propygidium is transversely densely punctate, with the base and sides rather broadly smooth; the pygidium also densely punctate, with an outside smooth margin; the prosternum, anterior lobe marginate, keel bistrate, striae joining behind, surface of lobe microscopically strigose; the mesosternum feebly sinuous in front, marginal stria complete; the anterior tibia with an apical bifid tooth and two simple teeth behind it.

In the American series this species may be placed next to the last and near *H. latimargo*, Sch.

Hab. Costa Rica (*Donckier*).

Hister cinctipygus, sp. n.

Breviter ovatus, convexus, niger, nitidus: fronte antice depressa, stria integra; thorace antice bisinuato, stria marginali ad oculos

desinente, laterali basi abbreviata, pone oculos interrupta; elytris striis dorsalibus 1-4 integris, 5 et suturali apicalibus: propygidio postico transversim punctato, margine laterali antioque laevi; pygidio punctato, margine postice laevi.

L. $3\frac{1}{2}$ mill.

Shortly oval, convex, black and shining; the head, stria strong and straight behind the mandibles, sinuous on either side, with a median depression behind the stria; the thorax bisinuous on the anterior edge, marginal stria fine laterally, but deeper from the anterior angle until it terminates behind the eye, internal stria shortened at the base, feebly sinuous at the sides, bent and interrupted near the anterior angle; the elytra, humeral striæ wanting, except the oblique basal, which is very fine, dorsal striæ 1-4 complete, 3-4 somewhat bent, 5 apical, nearly dimidiate, and parallel to the fourth, 5 shortened by one third of its length and posteriorly widens from the suture; the propygidium has a rather wide smooth margin at its base and sides, with a transverse thickly and rather coarsely punctured surface behind; the pygidium is similarly punctate, with a smooth posterior margin; the prosternum with large shallow punctures, anterior lobe clearly marginate, keel narrow, smooth, and triangular at the base; the mesosternum, anterior edge nearly straight, with a complete marginal rather deep stria and a short stria at either angle; the anterior tibia has a strong apical tooth, obscurely bifid, with 3 or 4 obtuse inconspicuous teeth behind it.

The thoracic striæ and the marginate propygidium of this species agree with those of *H. Gestroi*, Sch.; but *H. cinetipygus* is smaller and relatively broader, and has a very distinct frontal depression. In *H. latimargo*, Sch., *levimargo*, Lew., and *planimargo*, Lew., the propygidia are similarly margined, but in all the American species the prosternum is bistrate.

Hab. Siam.

Hister terræmotus, sp. n.

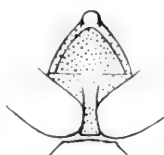
Breviter ovatus, convexus, niger, nitidus; fronte minute punctulata; thorace stria interna integra; elytris striis 1-4 integris, 5 et suturali abbreviatis; pygidio densissime et minutissime punctato; prosterno lobo antico conspicue prominulo; tibiis anticis 5-dentatis, dente apicali bifido.

L. $3\frac{1}{2}$ - $3\frac{3}{4}$ mill.

Shortly oval, convex, black and shining; the head very minutely punctulate, stria well-marked and nearly straight anteriorly; the thorax, marginal stria ceases behind the eye, inner lateral complete, deepest behind the anterior angle, not sinuous laterally; the elytra, except the fine oblique basal there is no humeral stria dorsal 1-4 complete and parallel to

each other, 5 apical and dimidiate, sutural ceases just beyond the middle and for two thirds of its length turns slightly away from the suture; the propygidium has scattered punctures, with the surface between them microscopically strigose and finely punctulate; the pygidium is very densely and similarly sculptured, but except at the base it is free of the larger punctures, the dense strigosity gives an appearance of opacity; the prosternum, the anterior lobe is strongly punctate, with a cariniform lateral stria, and the apex is obtusely produced like the mesosternum of a *Cetonia* (fig. 3); the mesosternum is widely arched anteriorly, with a complete marginal stria; the anterior tibiæ are 5-dentate, apical tooth bifid.

Fig. 3.

*Hister terramotus*, Lew.

Hister philippinensis, Mars., superficially is very similar to this species, but the sculpture of the pygidium and the curious prolongation of the prosternal lobe will at once distinguish it. *H. philippinensis* usually has the fourth dorsal stria complete, but Marseul's original specimen had but three, and the first abdominal segment has a bowed lateral stria; in *H. terramotus* it is oblique. It also resembles *H. myrmidon*, Mars.

Hab. "Java occident. Mons Gede, alt. 4000 feet, Aug. 1892," and "Sukabumi, 2000 feet" (*H. Fruhstorfer*). Ten examples.

Hister sessilis, Lew.

Hister sessilis, Lew. Ann. & Mag. Nat. Hist. ser. 7, vol. iv. p. 18 (1899).

Figure 4, introduced here, will show how differently the anterior lobe of this species is formed to that of the preceding species.

Fig. 4.

*Hister sessilis*, Lew.

Hister pinnulæ, sp. n.

Suborbicularis, convexus, niger, nitidus; fronte valide striata; thorace stria marginali integra, interna unica basi multo abbreviata, antice post angulos terminata; elytris striis 1-4 integris, 5 dimidiata, suturali medium superante; pygidio lævi; tibiis anticis intus et extus dilatatis.

L. $3\frac{1}{3}$ mill.

Nearly orbicular, convex, black and shining; the head, vertex slightly convex, stria complete and strong, straight behind the clypeus; the thorax, marginal stria fine and complete, feebly crenulate behind the neck, inner stria rather deep, much shortened at the base, arched, and terminating behind the anterior angle, surface (and that of the head) microscopically punctured; the elytra, outer humeral stria well-marked but very short, and posteriorly only just reaching the middle, dorsal striæ 1-4 complete, 1-3 parallel to each other, 4 bent, 5 straight, rather fine, apical and dimidiate, sutural apical and passing beyond the middle, and it is parallel to the suture; the propygidium is punctulate, but not very conspicuously; the pygidium is smooth; the prosternum, the anterior lobe has a sinuous immarginate apex, keel not acute, rather short and triangular at the base; the mesosternum is nearly straight anteriorly, marginal stria rather fine, close to the edge, and complete; the anterior tibiæ are dilated at the tarsal end on both edges, the dilatation on the inner edge is obtusely angulate, on the outer edge there are 4 or 5 small teeth.

The thoracic striæ in *H. pinnulæ* resemble those of *H. tortuatus*, Mars., except that in the first the inner stria is more shortened behind and less hamate in front.

Hab. S.E. Borneo (*Doherty*).

Hister vacillans, sp. n.

Suborbicularis, convexus, niger, nitidus; fronte minute punctulata, stria integra; thorace stria marginali interrupta, interna unica pone oculos utrinque deflexa, basi paululum abbreviata; elytris striis 1-4 integris, 5 et suturali abbreviatis; tibiis anticis extus dilatatis.

L. $3\frac{1}{3}$ mill.

Nearly orbicular, convex, black and shining; the head, surface finely punctulate, stria complete and very feebly bisinuous in front; the thorax is more clearly punctulate than the forehead, marginal stria fine and terminating behind the eye, internal strong laterally, feebly sinuous and shortened

before the base, anteriorly it is fine and crenulate and deflected behind the point where the marginal stria terminates, lateral interstice rather wide; the elytra, outer subhumeral stria short, deep, and well behind the humerus, dorsal striæ 1-4 complete, with crenulate edges, the interstices at the bases between the first and second and between the third and fourth are the widest, 5 is apical, dimidiate, sutural apical and equal to two thirds of the elytral length, and it turns a little away from the suture near the apex; the propygidium and the pygidium are somewhat closely punctured, the punctures on the first are rather the larger; the prosternum, anterior lobe sparingly punctate, with a lateral deep stria, not close to the edge nor meeting at the apex, keel not acute but triangular at its base; the mesosternum, anterior edge is feebly arched, stria and that of the metasternum complete; the anterior tibia is dilated on its outer edge, the dilatation being surrounded by small teeth, and there are a few irregular teeth behind them.

This species, like the last, belongs to an Indian group of the genus which has dilated fore tibiæ.

Hab. Tenasserim (*Doherty*).

Epiërus fæderatus, sp. n.

Ovalis, parum convexus, brunneus, nitidus, supra sparsim punctulatus; fronte concava; pronoto præscutellari impresso; elytris striis dorsalibus crenulatis, 1-4 integris, 5 dimidiata, suturali basi abbreviata; prosterno bistriato, basi late inciso, marginato; mesosterno in medio angulariter producto; tibiis anticis multi-spinulosis.

L. $1\frac{1}{2}$ mill.

Oval, somewhat convex, brown and shining; the head concave anteriorly, finely and sparsely punctured, with a very small fovea on the vertex, epistoma rather broad; the thorax is punctured like the head, except before the scutellum, in front of the scutellum there is a semicircular impression and round its limits the punctuation is larger, marginal stria fine and complete; the elytra, all the dorsal striæ are fine and crenulate, 1-4 complete, 5 apical and dimidiate, sutural also apical and a little longer, there is a faint trace of an inner subhumeral stria; the propygidium and pygidium are finely and sparsely punctured and the first is microscopically transversely strigose at the base; the prosternum is broad and bistriate, the striæ are fine and feebly turned outwards at either end, surface of the keel, sternal plates, and first segment of the abdomen with fine evenly scattered punctures; the mesosternum widely and angularly projects to fit the base

of the prosternum, there is an extremely fine marginal stria which does not quite reach the base, the transverse stria is very distinct, widely arched, and crenulate, and is joined to the metasternal lateral stria; the anterior tibiæ are minutely multispinulose.

In New Zealand there are two species of *Epiërus* known to me with projecting mesosterna, viz. *E. sylvanus*, Lew., and *E. purus*, Broun, but in both of these the anterior outline of the mesosternum is bisinuous.

Hab. Forest Keep, Tamworth, Australia (*A. M. Lea*, Note-book, 1272).

Tribalus amnicola, sp. n.

Ovalis, parum convexus, piceus, nitidus, supra vix dense sed perspicue punctulatus; fronte impressa; pronoto angulis anticis impressis, stria marginali integra; clytris, striis dorsalibus brevibus obsolete, postice partim rufis; prosterno striis utrinque divergentibus; mesosterno transverso, stria perspicue integra, punctulato; pedibus brunneis, tibiis anticis spinulosis.

L. vix 2 mill.

This species is very similar to *T. rubriculus*, Sch., but it is more perfectly oval, less convex, and the punctuation (especially on the head and thorax) is much more dense. The thoracic stria behind the neck is also much less conspicuous and less crenulate; the under surface is more distinctly punctulate and the mesosternal stria is less arched and more distinct anteriorly and the mesosternum is relatively narrower than that of *T. rubriculus*. Herr Schmidt describes the mesosternal stria of *T. rubriculus* as "antice obsoleta," but, although fine, it is complete throughout and evenly arched. I fortunately possess a typical example of *T. rubriculus* received from the author.

Hab. Salisbury, Mashonaland. "Under dried leaves in November 1898, and in flood-rubbish in April 1899" (*Guy A. K. Marshall*).

Sternocælis ovalis, sp. n.

Ovalis, convexus, piceo-brunneus, nitidus; capite punctato, punctis minime profundis, utrinque carinato; thorace lateribus punctato; clytris striis 1-3 dorsalibus leviter impressis; propygidio conspicue punctato; tibiis mediis et posticis valide triangulariter dilatatis.

L. vix 2 mill.

Oval, convex, darkish brown, shining; the head, surface with shallow punctures, rather closely set, carinate laterally, carinæ pass anteriorly along the clypeus, but do not apparently

join in front; the thorax has a fine lateral marginal stria, with a fovea at the base on either side well within the angle, and behind the anterior angles there is a rather wide area with rather large shallow punctures, but on the scutellar and discal regions the punctures are sparse and almost wanting; the elytra, striæ, outer humeral somewhat well-marked, basal and dimidiate, inner humeral almost complete, also the first dorsal stria, 2-3 less marked and shortened apically; the propygidium is very clearly, evenly, not coarsely, but rather densely punctured; the pygidium is less densely and less distinctly punctured; the prosternum, the keel is truncate anteriorly at the suture, surface flat and less punctured at the base than on the fore part, base lightly impressed on either side of the mesosternal projection, and it is margined laterally with a fine widely sinuous stria, the anterior lobe is on a lower plane than the keel and widens out anteriorly and is closely covered with large shallow punctures; the mesosternum is bisinuous anteriorly; the metasternum is bistriate on either side; the anterior tibiæ are dilated and rounded off on the outer edge, the median and posterior tibiæ are more dilated and angular in the middle of the outer edge.

This is the only species of the genus described which is oval in outline.

Hab. Yakouren, Algeria (*M. Pic.*).

Saprinus amethystinus, sp. n.

Oblongo-ovatus, convexus, niger, nitidus; fronte clypeoque punctatis; thorace obscure æneo, lateribus grosse punctatis; elytris violaceis, striis dorsalibus 1-3 abbreviatis, 4 arcuata brevissima, suturali antice abbreviata; prosterno carinato-striato, striis anticis conjunctis; mesosterno marginato, punctato; metasterno sublævi, antice in medio impresso; tibiis anticis 4-dentatis.

L. 4 mill.

Oblong-oval, convex, black and shining, with the thorax obscurely coppery and the elytra rich violet-blue. The forehead and clypeus are somewhat coarsely punctured, stria anteriorly is bisinuous and somewhat indistinct, but it is carinate over the eyes; the thorax, marginal stria complete, with a broad lateral margin of coarse punctures which are continued along the basal edge and less strongly behind the neck, disk impunctate; the elytra, striæ, external humeral complete, inner shortened apically and scarcely reaching the base, 1 dorsal touches the base and posteriorly it is a little shorter than the inner humeral, 2 is a little shorter than the first, 3 is as long as the inner humeral, 1-2 are markedly incurved

at the base, 4 basal, very short and arched, sutural well shortened before the base, the surface, except in the scutellar region, is punctured, punctures not close nor so large as those of the thorax; the propygidium is evenly and rather closely punctured; the pygidium is more clearly punctured and the punctures are larger, and there is a narrow longitudinal space in the middle of the base smooth; the prosternum, keel slightly depressed in the middle, striæ cariniform, joining anteriorly, and it widens out at the base; the mesosternum is truncate anteriorly and the marginal stria complete, surface punctate; the metasternum is smooth in the middle, with a few punctures near the edges, and on the anterior margin is a small round impression; the anterior tibiæ are 4-dentate.

The peculiar oblong form of this species is unlike any other that I know, but it must be placed near *S. letus*, Er.

Hab. Taylor Range, Queensland.

XXXIV.—*Notes from the Gatty Marine Laboratory, St. Andrews.*—No. XX. By Prof. M'INTOSH, M.D., LL.D., F.R.S., &c.

[Plates VII. & VIII.]

1. On the Reproduction and Development of *Pholoë minuta*, O. Fabr.
2. On the British Nephthydidæ.
3. On *Nephthys (Aglaophanus) inermis*, Ehlers, from the 'Porcupine.'
4. On the Nephthydidæ of the Gulf of St. Lawrence, Canada.

1. *On the Reproduction and Development of
Pholoë minuta*, O. Fabr.

AT St. Andrews ripe males are common at the end of June, so that the breeding-season would seem to be in July and perhaps also in August. On the west coast, at Lochmaddy, specimens in similar condition were found in August. No ripe females have been captured at St. Andrews, but examples from Greenland present well-developed ova in July.

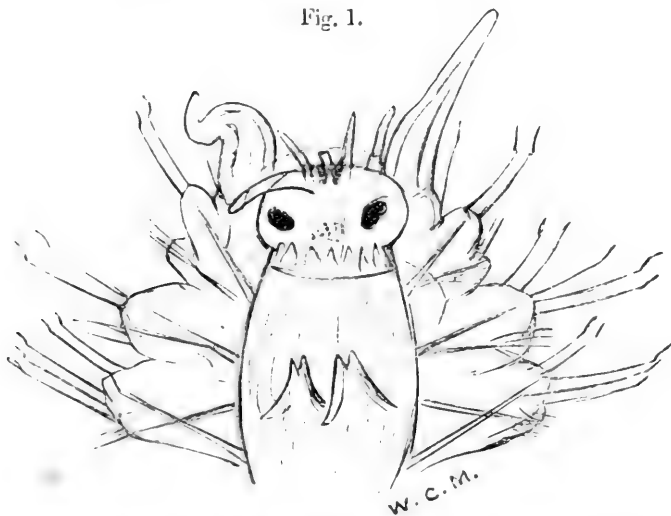
Trochophores apparently of this species occur at the bottom in the second week of September, presenting only four crenations posteriorly to indicate the segments. The next stage has a bluntly conical prostomial region which occupies about half the bulk of the animal. Two small black specks are situated posteriorly. At each side are the short tentacular cirri. Four bristled feet follow, each having stout bristles of the typical structure. Two spines occur on the dilated end of the shaft in each, the longest being inferior. In addition

there are two much more slender bristles with long, tapering, diaphanous, terminal pieces, apparently larval ventral bristles. The dorsal have the adult structure, being slender, tapering, hair-like, serrated bristles. The dorsal cirrus is much enlarged at the base, but with a slightly tapered tip. Viewed from below the ventral cirrus shows a similar dilatation (ceratophore) at the base and a two-jointed cirrus, a globular papilla occurring some distance inwards.

The body, which is marked by transverse lines, terminates posteriorly at this stage in a broad pygidium. The three pairs of scales of a globular outline are borne on pedicles, the outer edge of each having several large truncate papillæ which greatly exceed the proportions in the adult.

In the next stages, found on the same date, the snout is truncated and the caudal process has a dimple in the middle. Then the head becomes defined as an oblong mass, rounded in front, and flanked on each side by the tentacular cirri, which are now directed forward. There are still only four bristled feet. The cilia on the scales are larger, and two short broad caudal cirri have appeared under the pygidium.

Fig. 1.



Anterior end of young *Pholoë*, $\times 100$. 4th February, 1899.

The bottom tow-net again procured, on the 4th February, in 5 fathoms, a young *Pholoë* having thirteen bristled feet on each side. The head bears in front two closely approximated median eyes (fig. 1) and two are more widely situated towards

the posterior border. Both pairs have a rounded lens-like differentiation. The median tentacle is prominent, while two shorter tentacular cirri occur on each side. These are sparsely covered with minute papillæ. The palpi have enlarged basal regions and taper to a blunt point. The body is flattened and of nearly uniform diameter, though slightly tapered in front and more distinctly posteriorly, where it terminates in a rounded "boss" on each side of the vent (fig. 2), the globular

Fig. 2.

Posterior end of young *Pholoë*, $\times 100$.

cirri of the last pair of feet projecting a little in front. The proboscis is furnished with well-marked teeth. The number of scales is uncertain, though four pairs remained. Most had five cilia on the outer border, though one, probably the first, had seven. Lines radiating from the centre of the scale to the base of the cilia probably indicated nerve-strands. The feet show dorsal and ventral divisions each with a spine and the characteristic bristles.

The life-history of this form thus corresponds with that of its allies, the larval stage being pelagic, the young by-and-by settling on the bottom like their parents. A wide distribution is thus attained.

2. *On the British Nephthyidæ.*

In the 'Catalogue of the British Museum,' published in 1865, three species of *Nephthys* are mentioned, viz. *N. cæca*, Fabr., *N. longisetosa*, (Erst. (?), and *N. Hombergii*, Aud. & Ed. Dr. Johnston, however, had not seen an example of the latter, which had been mentioned by Dr. Williams, and the precise

relationships of *N. longisetosa* are doubtful—indeed, in all probability it may refer to the long-bristled form of *N. caeca*. The dredgings of the ‘Porcupine’ and ‘Knight Errant,’ of Dr. Gwyn Jeffreys in Shetland, those of Canon Norman in the same region and in Norway, and of the Royal Irish Academy under Prof. Haddon and Dr. Scharff, have considerably extended the species, so that there are at least double, and perhaps treble, the number now known as British.

The characters by which the species of *Nephtys* are distinguished from each other are less evident than in many other families of Polychaeta, and the observer is at first dissatisfied, especially in regard to the structure of the bristles, with the essential features diagnostic of each. A careful consideration of the form of the head, the structure of the feet, and the bristles, which are borne on the anterior face of each foot, with other features, however, shows that, so far as known, the distinctions are reliable, though it must be remembered that further information in regard to sexual variation is needed.

Accordingly the following nine species are found to be natives of Britain:—

The most abundant as well as the largest form is *Nephtys caeca*, Fabr., in which the wedge-shaped head is rounded in front, with two sensory papillae posteriorly. The body is moderately elongate and of considerable thickness. Posteriorly it terminates in an anus with a median tapering cirrus ventrally. The proboscis has twenty-two rows of papillae, five (or occasionally six) being in each row. The dorsal lamella of the foot is fan-shaped and prominent, its deepest part being external; dorsal cirrus short and tapering; branchial process of considerable length, coiled externally, and with a semicircular flap of the spinigerous lobe at its base anteriorly. The ventral division of the foot has a large, broadly lanceolate, and pointed lamella continuous with the fleshy lobes of the region. The ventral cirrus is of moderate size, slightly flattened and conical. In front of the dorsal lamella is a row of pale, elongate, serrate bristles which extend outwards fully three times the diameter of the lamella. The serrated edge, forming a simple saw-like arrangement in lateral view, is really composed of a close series of transverse spikes in each division. The bristle extends distally as an extremely attenuate process, and tapers to a fine point devoid of serrations. A narrow fleshy ridge, with the tip of the spine projecting externally, comes next the foregoing bristles, and then a series of the pale barred or cambered bristles in front. No free flap guarding these bristles in front is present in this

species. The foregoing, constituting the dorsal division, is separated by a considerable interval from the ventral division of the foot, the intermediate region being occupied by the branchial process. The inferior lamella is broadly lanceolate, pointed, and with the longer edge inferior. It is continuous with the fleshy lobe of the foot, the tip of which slopes from below upward and outward—the reverse of the arrangement in the upper lobe. The fleshy part terminates superiorly in a thickened adherent point. The long pale capillary bristles pass out, similarly to the dorsal, close to the lamella, and extend outwards about the same distance, and have the same structure. A narrow fleshy ridge, corresponding to the foot proper, separates the capillary from the row of barred bristles in front. The conical ventral cirrus is slightly flattened and of moderate size.

Common everywhere round the shores of Britain.

The next species, *Nephtys scolopendroides*, Delle Chiaje, is perhaps more generally known by other names, such as *N. Ilombergii*, Aud. & Éd., and *N. assimilis*, Cæsted. It extends from Shetland to the Channel Islands, along both shores, as well as to Ireland. The rectangular head is more elongated than in *N. caeca*, and the tentacles are more slender, the posterior pair, as usual, being larger than the anterior. The wide base of the inferior tentacular cirrus (Ehlers) merges into the anterior lips. The body as a rule is smaller than that of *N. caeca*. Proboscis with a slightly longer terminal papilla in the mid-dorsal line. The dorsal lamella of the foot is broad and low, projecting beyond the tip of the foot; dorsal cirrus short. Branchiæ large, often curved inwards, and with a process at the base, commencing on the fifth foot. A tongue-shaped inner flap guards the base of the bristles, and another (somewhat pointed) occurs at the tip of the foot. The lamella of the ventral division is large, directed upwards and outwards, and is broad and truncated at the tip. Ventral cirrus short and broadly lanceolate. The serrate bristles are shorter than in *N. caeca*, have long shafts and an expanded blade bent downwards at an angle and tapering somewhat quickly to a delicate point. The barred bristles (anterior) approach those of *N. caeca*, the tips perhaps being shorter.

The third form is *Nephtys ciliata*, O. F. Müller, a species chiefly Zetlandic, though it stretches both to the American and European shores of the North Atlantic. The head is longer than broad, with a wide anterior border and more slender tentacles than in *N. caeca*. In extrusion the proboscis

is generally papillose, with distal rows (twenty-two in number) of slender elongated papillæ, of which each row has from 5-7. A median cirrus in front of the rows in the mid-dorsal line. The body has from 90-132 segments or more. Foot with the dorsal lamella rounded, its greatest vertical diameter being median and its axis directed upwards. At the outer edge of the foot is a smaller rounded lamella. Dorsal cirrus slender and long. Branchial process of moderate length. Inferior lobe sinuous below the small terminal lamella, with a small papilla at the inner border of the latter superiorly. Ventral cirrus large and conical. Bristles brownish, comparatively short, the serrated forms having a distinct curvature of the dilated region beyond the shaft and a serrated edge. The barred forms are finely tapered.

The fourth species, *Nephtys hystrix*, sp. n., comes from Berehaven (Royal Irish Academy's Expedition), from various stations in the Mediterranean during the 'Porcupine' Expedition of 1870, and a closely allied, if not identical, form was obtained by Canon Norman off Bergen. The head is elongated from before backward, with rather pointed subulate tentacles anteriorly, the broader second pair following after an interval. Peristomial segment ventrally with two broad flaps and a symmetrical series of furrows. Body resembling that of *N. ciliata*. Proboscis comparatively short, with slender papillæ in twenty-two rows. The mid-dorsal pair converge on the long tentacle immediately in front, and the rows on each side of the mid-ventral line converge in a more marked manner; but there is no median filament. As a rule four papillæ occur in each row, but in some there are traces of a fifth, and in the ventral pair (on each side of the median line) six short papillæ. Foot with a long, little elevated, dorsal lamella, which does not extend so far outward or droop at the tip as in *N. scolopendroides*. It approaches in form the foot of *N. ciliata*, but differs in the shape of the dorsal lamella and in the fact that in front of the capillary bristles the spinigerous region forms a low cone with the spine at the apex, the barred bristles arising in the fissure between it and a large flap or lamella formed by the fillet guarding the bristles, whereas in *N. ciliata* the spinigerous region itself forms the free flap. The dorsal cirrus is somewhat thick, separated only by a shallow notch from the branchia, which is of moderate size, has a papilla at its outer base, and is curved outward. Bristles similar to those of *N. scolopendroides*, but thinner. Inferior division of the foot with a small lamella posteriorly, another nearly as prominent formed by the fillet for the barred bristles,

the conical spinigerous lobe lying between. In several views therefore the tip is trifold.

A fifth British example is *N. longisetosa*, (Ersted (1843), a very different species from the *N. longisetosa* (Erst.) of Dr. Johnston, which may have been the long-bristled form of *N. caeca*, though Malmgren found the examples in the British Museum to comprise *N. scolopendroides* and another species. In this the head is somewhat shield-shaped; the anterior tentacles marked by a translucent stripe in front, long and slender; second pair also long and lanceolate. Proboscis distinguished by fifteen rows of 11-15 papillæ*. Dorsal lamella of the foot elevated and prominent, with an accessory rounded process. Dorsal cirrus large and lanceolate, closely connected with the base of the branchia, only a shallow notch intervening, and the branchia is often curved inward. Ventral division with a tongue-shaped lamella above the dorsal edge at the tip, and only a narrow lamella beyond the foot. Both barred and serrated (capillary) bristles are yellow or brownish, with a metallic sheen, and largely developed, the latter presenting a gentle curve from base to apex, the minute spines being traceable from the short shaft to the tip.

Another species, somewhat allied to the foregoing, is *Nephtys Grubei* †, sp. n., which was dredged at station 8 on board the 'Knight Errant,' 17th August, 1880, in 540 fathoms in the Atlantic. The head is elongated from before backwards, with a straight anterior edge, which is somewhat narrower than in *N. longisetosa*. The tentacles at the outer angles are conical, tapering, and have a translucent area at the inner border. The second pair follow close on the first and have the form of an acuminate leaf, whereas in *N. longisetosa* they are more widely separated from the first, are proportionally longer and more pointed. At each angle of the head posteriorly is a papilla, probably sensory, the corresponding organ in *N. longisetosa* being inconspicuous. The proboscis is included, but the arrangement of the parts around the mouth is similar. The first foot differs from that in *N. longisetosa*, for it has a well-marked subulate dorsal process or cirrus, besides the lanceolate ventral one, whereas in *N. longisetosa* only a small papilla occurs dorsally and the ventral cirrus is much longer. In the typical foot the dorsal

* Malmgren gives 14.

† Named after the late Prof. Edouard Grube, of Breslau, a distinguished investigator of the Annelids.

lamella is narrowed at its attachment, broader and somewhat truncated distally, the reverse being the case in *N. longisetosa*. Instead of a distinct flap externally only a trace in the shape of a fillet occurs. The dorsal cirrus is less, while the branchia is longer, though it is likewise curved inward. The spinigerous lobe is produced further outwards as a pointed process and has a different angle. Moreover, the fillet guarding the barred bristles is convex upwards. In the inferior division the posterior lamella is considerably smaller, the spinigerous lobe is longer and more acute, whilst anteriorly the upper fillet is smaller. The ventral cirrus is smaller and less tapered than in *N. longisetosa*. Both barred and slender bristles are more slender than in the latter species, though in both the transverse bars of the camerated bristles extend downward till the full diameter of the shaft is reached.

The seventh form is *Nephtys Johnstoni*, Ehlers, which has a shield-shaped head, a broad and somewhat convex anterior border, a slender tapering tentacle at each angle, and an oblique translucent patch at its base internally. The second pair occur after a considerable interval. The proboscis has rather long rows of papillæ distally and a median cirrus dorsally and ventrally. Between the rows at the aperture is a simple papilla dorsally and ventrally. The anterior folds or lips in front of the mouth are large. The dorsal lamella has a similar curvature to that of *N. ciliata*, but it extends further outward, and only a trace of the rounded terminal lobe appears. The setigerous region stands up prominently and is smoothly rounded externally. No free flap to the anterior fillet guards the barred bristles. The dorsal cirrus is a variable filiform process. The branchia is not large and is coiled externally. The ventral lamella is large and ovato-lanceolate, and the ventral cirrus is lanceolate, larger than in *N. ciliata*, considerably less than in *N. longisetosa*. The capillary bristles are longer and less rigid than in the latter, and the serrations are very fine, the long distal region being smooth. The barred region in the anterior bristles is long and slightly fusiform.

Nephtys cirrosa, Ehlers (1868), is the eighth British species, characterized by a seven-sided head, longer than broad, with a pair of conical tentacles in front and a longer latero-ventral pair after a considerable interval. A small papilla (sensory) lies on each side of the head posteriorly. Proboscis with the normal rows (twenty-two) of rather long papillæ, each row having six or more papillæ. Shorter

papillæ are scattered over the general surface of the organ. A single slender median dorsal cirrus is present. Foot with a rather long low dorsal lamella, deepest in the middle. No other flap. Dorsal cirrus of average length, subulate and rather slender. Branchia of moderate size, slightly coiled outward. The ventral division has a posterior lamella of moderate size directed upwards and with a small flap superiorly over the base of the bristles. The ventral cirrus is prominent and somewhat conical. Bristles rather long and curved, pale golden; longer (capillary) forms with a marked curve of the blade and a finely serrated edge. Barred forms with a spindle-shaped camerated region.

The ninth and last British species is one near *Nephtys incisa*, Malmgren, which was procured on the shores of Connemara, Galway, by the late Mr. A. G. Moore. In this the head is somewhat shield-shaped, slightly wider in the middle, and marked by two pale lateral areas which map out the surface. Anterior and ventro-lateral tentacles small and conical. The proboscis has rows of minute papillæ and a short dorsal cirrus (Malmgren). The foot has a rounded dorsal lamella extending nearly to the tip of the organ, and somewhat like that of *N. longisetosa*, *Ærst.*, though differing both from that and *N. ciliata*. The small dorsal cirrus is leaf-like and pointed, separated by a shallow notch from the rather massive though short branchia, which has the tip bent outward and forward. The branchia diminishes and disappears posteriorly. Spinigerous lobe small, hidden between the rows of bristles. Fillet guarding the base of the barred bristles developed into a free flap posteriorly and inferiorly. Inferior division of the foot trifid, the anterior fillet projecting most superiorly. Neither flap is much developed, and the spinigerous lobe is conical. The bristles are dark brown, the anterior having the barred region beyond the widest part, and the capillary forms being curved and minutely serrated. The most marked features of the species are the dark brownish bristles, the slight development of the lamellæ, and the wide space between the divisions of the foot.

3. *On Nephtys (Aglaophanus) incrimis, Ehlers, from the 'Porcupine.'*

Though not falling within the British area, another species, dredged in the 'Porcupine' Expedition of 1870 off Cape Finisterre, in 81 fathoms, may be alluded to, viz. *Nephtys*

(*Aglaophanus*, Kbg.) *inermis*, Ehlers*. It was first obtained in the American expedition in the 'Blake,' under Count Pourtalès, in 1869, off Alligator Reef, at a depth of 53 fathoms; but the description was twenty years later in being published. The head is somewhat pentagonal, nearly straight or slightly convex in front, and devoid of the tentacles at each angle. The ventral tentacles are small and subulate, but occupy the usual position, though they do not project laterally. The buccal region considerably diverges, for there are no folds in front of it and only a median and two lateral grooves behind it. The body somewhat resembles that of a *Nereis*, from the great length of the branchial processes, which project like cirri. The proboscis (Pl. VII. fig. 6) is perfectly smooth, though Kinberg †, in his original description, gave it two fusiform maxillæ.

The typical foot in the anterior region (Pl. VII. fig. 7) shows comparatively short and widely separated divisions. The dorsal lamella is of moderate height and extends far outward. The dorsal cirrus is large, long, closely attached to the base of the branchia, which is long and coiled inwards and has a cylindrical papilla at its base externally. The bristles are dark and occur in a small and somewhat elliptical area, having the spine in the centre. The posterior tuft is composed of simple, rather stout and short, tapering bristles, with minute serrations on the edge of the blade (Pl. VIII. fig. 1), shorter lyrate forms (Pl. VIII. fig. 2) being mingled with them. The anterior tuft is also dark and has long and finely tapered bristles with indistinct transverse markings, which fade towards the tapering extremity (Pl. VIII. fig. 3).

The inferior division of the foot has a large spatulate lamella superiorly, while the cirrus projects nearly as far, as a somewhat conical process. The tip is thus bifid in lateral view. The bristles form a loop closed superiorly and open inferiorly—that is, the anterior tuft touches the posterior superiorly but is separate inferiorly. The rudimentary condition of the transverse markings in the anterior bristles, for they form closely arranged and somewhat indistinct granular bars, is interesting. A peculiarity of the ventral division of the foot is the presence of a fold of skin passing as a free flap backward and then slightly upward, so as to form a process between the feet. Viewed from the ventral surface each foot thus is ensheathed at the base.

* Ehlers, Mem. Mus. Comp. Zool. Harvard Coll. vol. xv. p. 125, Taf. xxxviii. figs. 1-6 (1887).

† "Annul. Nova," *Öfversigt K. Vet.-Akad. Förhandl.* 1865, p. 229.

Posteriorly the height of the dorsal lobe diminishes and it projects as an acute process. The length of the dorsal cirrus and branchia increases, and the lamella and cirrus in the inferior division are also considerably elongated, so that they form two slender processes. Just in front of the tail the branchia is reduced to a short process. Inferiorly the ventral cirrus is large, but the lamella above it has disappeared.

In contrasting the foregoing with the descriptions and figures of Ehlers, the elongated upper lamella in the European form differs. Moreover, Ehlers states that the anterior tufts of bristles do not show the transverse markings, whereas, though less distinct than in the typical form, such are present in the European. The mode of preservation, however, may be connected with this difference. Ehlers refers to the scale-like ventral fold at the base of the foot.

4. *On the Nephthydidæ of the Gulf of St. Lawrence, Canada.*

These formed part of a very interesting collection of annelids made by Mr. J. F. Whiteaves (now of the Canadian Geological Survey) in 1871, 1872, and 1873, the result of several dredging expeditions in the Gulf. A previous paper on the subject will be found in the 'Annals' for April 1876. An abundant form is *Nephtys ciliata*, O. F. M., a widely distributed species on European shores. One of the Canadian examples is large and another has a Crustacean parasite attached dorsally.

Nephtys canadensis, sp. n.

Dredged at Stat. A 1 and A 8, 1872, and no. 29, Bradelle Bank, 1873.

Head elongated from before backward and with a pair of short conical anterior tentacles. The second (ventral) pair are somewhat lanceolate and occur after an interval. The cirri of the first foot are also short and lanceolate.

Body of the typical form and attaining a considerable size, probably at least 6-7 inches. The furrows of the middle region behind the mouth slant from the median line outward and backward. The proboscis shows numerous small papillæ at its distal end in extrusion, the rest being smooth. No specimen, however, shows the organ completely extruded.

The foot (Pl. VII. fig. 1) presents two widely divergent regions, as in *N. incisa*. Anteriorly the dorsal division has a small rounded lamella at its base, the flattened dorsal cirrus

is minute (in some indistinguishable) and closely attached to the base of the short and broad branchial process, which shows only a slight concavity externally. In translucent preparations this lamellar branchia shows a crenate membranous border and large central trunks. The setigerous lobe is prominent and in side view forms a projecting lamella both above and below the spine. No fillet occurs at the base of the barred bristles. The bristles are of moderate length, with a curve backward. Both the barred and the elongated kinds are somewhat slender, the former being marked by close transverse bars and tapering to a fine point (Pl. VIII. fig. 4); the latter also slender and tapering to a delicate tip, the blade with distinct serrations (rows of spikes) on the expanded region above the shaft (Pl. VIII. figs. 5 & 6), the tip apparently smooth. The serrations, however, are easily removed.

The inferior division stands widely apart, without a lamella or occasionally only a trace. It has a blunt point and extends further outward than the dorsal. The spinigerous lobe is flattened and conical, with the spine at the apex. The fillet at the base of the barred bristles sends a process superiorly. The inferior cirrus is of moderate size and conical in shape.

Posteriorly the dorsal and ventral lobes of the feet become prolonged and acute. A trace of the dorsal lamella is still visible. The branchia, however, has shrunk to a minute process beneath the small cirrus. The inferior division has approached considerably nearer the upper and extends as a long pointed lobe half its length beyond the upper, and the ventral cirrus is carried outward nearly in a vertical line with the branchia.

The feet and bristles were studded with numerous examples of a whitish clavate ecto-parasite like *Loxosoma*, which, however, had a series of spine-like processes, either lateral or terminal.

Nephtys lawrencii, sp. n.

Dredged on Bradelle Bank, Gulf of St. Lawrence, Canada, 1873; at Stat. A 1, 1872; and off Port Hood, 1873.

The head is somewhat longer than broad, though in extrusion of the proboscis it becomes shield-shaped. A short and somewhat flattened conical tentacle comes from each angle of the rather narrow and straight anterior margin. The second or ventral tentacles, which are separated from the first by a short interval, are similar in shape but scarcely so large. Two slight elevations occur on each side of the median line posteriorly. In the ordinary position of the proboscis within the body the ventral cirrus of the first foot shows a somewhat

expanded base, and thus an approach to the *N. buccera* of Ehlers is made; but this, at any rate, is apparently variable and much more marked, for instance, in *N. caeca*.

Body of the normal shape, the folds of the triangular post-oral region slope from before backward and slightly outward on each side. The extruded proboscis is comparatively smooth, for the papillæ in the rows of the first region are small. A long and strong cirrus, however, occurs in the median line dorsally. The papillæ around the aperture distally are ten in number on each side and normal in shape.

The typical anterior foot (Pl. VII. fig. 2) has an elongated though not high lamella superiorly behind the bristles. Both inner and outer edges are somewhat abrupt. The shape thus differs from that of *Nephtys longisetosa*, CErst., to which it bears some resemblance. The spinigerous lobe is conical in antero-posterior view. The fillet at the base of the barred bristles rises into a lamella superiorly and again externally. The dorsal cirrus is thin and lanceolate, forming a comparatively large foliaceous expansion, sometimes with a thickened rib inferiorly. The branchia is separated from it only by a shallow notch, and is of considerable size. The tip is directed outwards. The barred bristles (Pl. VIII. fig. 7) are finely marked, and the simple bristles (Pl. VIII. fig. 8) are rather short, with a distinct curve where the shaft joins the blade, which is but little expanded. From the curvature almost to the tip the edge is minutely serrated. Similar bristles occur in the ventral division. All are dark, with a fine metallic sheen. The inferior division has a slight lamella from the fold superiorly, passing outward and downward behind the bristles nearly to the ventral border of the foot. The spinigerous lobe is acutely conical and the fillet guarding the bases of the barred bristles is distinct, folding over superiorly to join the posterior lamella and inferiorly ending in front of the ventral cirrus. It projects a little beyond the fleshy part of the foot. The flat and conical ventral cirrus is not much developed. The ventral edge of the foot from the tip inwards seems to be thin, forming a translucent narrow belt inferiorly.

Certain features approach those of *Nephtys scolopendroides*, but the form of the lamellæ and fillets and the cirri distinguish it.

Nephtys picta, Ehlers.

1868. *Nephtys buccera*, Ehlers, Die Borst. ii. p. 617, Taf. xxiii. fig. 8.

1868. *Nephtys picta*, Ehlers, Die Borst. ii. p. 632, Taf. xxiii. figs. 9, 35.

Dredged by Mr. Whiteaves in the Gulf of St. Lawrence, Canada, no. 61, 1871, and at A 1, 1872.

Only fragmentary specimens were obtained.

Head (Pl. VII. fig. 3) somewhat shield-shaped, widest in front, the anterior edge being convex. The anterior tentacles are subulate and somewhat long, with a translucent space at the inner edge of the base. The second pair are represented only by a small process at the posterior part of the head ventrally. Ventral cirrus of the first foot longer than the tentacle, tapering from a broad base to the tip.

The lips in front of the mouth (Pl. VII. fig. 4) ventrally are remarkably small, leaving the head in front entirely clear, as well as the ventral cirrus of the first foot, whereas in such as *Nephtys caeca* the oral fold on each side is confluent with and even passes slightly in front of this structure. The triangular area behind the mouth has the furrows with a gentle slope from within outward.

Proboscis.—The extruded organ (Pl. VII. fig. 8) shows rows of rather long papillæ distally, apparently about four in each row, and dorsally a single slender cirrus. The bifid papillæ surrounding the aperture have a long slender external limb. Their number seems to agree with that in allied forms.

The first foot bears a small tuft of forwardly-directed, simple, and apparently smooth bristles, with a distinct curvature, passing close to the margin of the head, and a more erect papilla with a series of transversely barred bristles of minute size. The ventral cirrus is conspicuous and subulate, tapering from a flattened expansion at the base.

The typical foot (Pl. VII. fig. 5) has a dorsal lamella which projects as a somewhat fan-shaped process outward as far as the tip, and having its greatest vertical diameter about the middle. It is slightly bent in the figure. The dorsal cirrus has a curiously enlarged and flattened base superiorly and is subulate. The branchia is comparatively short and with a slight curve outward. An external basal process is present, the incurvation between this and the dorsal cirrus being short.

The lamella of the inferior division is moderately developed, with an obliquity at its inferior margin. It is largest superiorly. The ventral cirrus is flattened and lanceolate, though, as usually seen, the narrow edge only is visible.

Two kinds of long posterior curved bristles occur on each foot, viz. those without evident serrations and those which have the convex edge of the long flattened blade minutely serrated, and at the convexity of the curve beyond the short shaft present about five or six larger hooks (Pl. VIII. figs. 9 & 10), which show a process or spike at the base in each case. Whether the smooth forms are younger or precede the barbed bristles is unknown, but those emerging from the surface and

the shorter forms are smooth. The barred bristles (Pl. VIII. fig. 11) offer no diagnostic feature.

The specimen seems to agree with the description given by Prof. Ehlers of the head and anterior end of *Nephtys buccera*, but the structure of the foot diverges, since he states that the dorsal lamella has its long diameter perpendicular to the foot (forming an oval membranous plate), whereas the long diameter here is horizontal. Moreover, the capillary bristles have the larger spikes at the flattened region beyond the shaft characteristic of *N. picta*, though they are not so pronounced as in Ehlers's figure. The dorsal lamella of the latter (foot) would appear to be scarcely so long as the division and uniformly rounded. The dorsal cirrus in the Canadian form has a flat enlargement at its base superiorly. Unfortunately Ehlers gives no figure of the foot, so that some doubt remains.

EXPLANATION OF THE PLATES.

PLATE VII.

- Fig.* 1. Typical foot of *Nephtys canadensis*, with peculiar parasitic bodies attached. Enlarged.
Fig. 2. Foot of *Nephtys lawrencii*. Enlarged.
Fig. 3. Head and anterior segment of *Nephtys picta*, Ehlers, from the dorsum. Enlarged.
Fig. 4. Ventral aspect of the same region. Enlarged.
Fig. 5. Foot of the same species. Enlarged.
Fig. 6. Partly extruded proboscis of *Nephtys (Aglaophanus) inermis*, Ehlers. Enlarged.
Fig. 7. Foot (about the 90th) of the foregoing. Enlarged.
Fig. 8. Proboscis of *Nephtys picta*. Enlarged.

PLATE VIII.

- Fig.* 1. Barred or camerated bristle of *Nephtys (Aglaophanus) inermis*, Ehlers. Magnified.
Fig. 2. Lyrate bristle of the same species. Magnified.
Fig. 3. Simple bristle of the same form. Magnified.
Fig. 4. Barred bristle of *Nephtys canadensis*, sp. n. Magnified.
Figs. 5, 6. Simple serrated bristles of the foregoing. Magnified.
Fig. 7. Barred bristle of *Nephtys lawrencii*, sp. n. Magnified.
Fig. 8. Simple finely serrated bristle of the same. Magnified.
Fig. 9. Serrated bristle of *Nephtys picta*, Ehlers.
Fig. 10. Inferior region of the blade of the foregoing, more highly magnified.
Fig. 11. Barred bristle of the same species. Magnified.

XXXV.—Descriptions of new Neotropical Mammals.

By OLDFIELD THOMAS.

Vampyrops dorsalis, sp. n.

Like *V. infuscus* in size and dentition, but with a marked dorsal line.

Size intermediate between the large *V. vittatus* and the much smaller *V. lineatus*, apparently about as in *V. infuscus*. General colour above dark smoky brown or blackish throughout; facial lines almost obsolete, a faint indication of the supraorbital ones perceptible. Dorsal line white, prominent, running from the nape to the rump. Under surface dull grey, paler than the back.

Skull shaped as in the allied species. Incisors $\frac{2}{2}$, molars $\frac{3}{3}$. Penultimate upper molars square or slightly concave behind, last molars minute.

Dimensions of the type (measured in skin) :—

Head and body 83 millim.; forearm 49; ear (dry) 16.

Skull: extreme length 27.5; basal length 22.7; greatest breadth 16; interorbital breadth 6.3; palate length from gnathion 15; breadth outside $m.^2$ 11.8; front of canine to back of $m.^2$ 10.2; front of lower canine to back of $m.^3$ 11.9.

Hab. Paramba, N. Ecuador. Alt. 1100 m.

Type. B.M. no. 99. 12. 5. 1. Collected 14th April, 1899, by R. Miketta.

In the synopsis of the species of *Vampyrops* that I gave in 1889* this bat would be placed with the Peruvian *V. infuscus*, Peters †, but differs from that species by the presence of a distinct dorsal white line, as in the much smaller *V. lineatus*.

Although I still think that in the present group the number of the molars is not a character of generic importance, the increase in the number of species known renders it not inadvisable that the genus *Vampyrops*, as with *Artibeus* and *Stenoderma*, should be arranged in subgeneric groups in accordance with the dental formulæ. This might be done as follows :—

- A. Molars $\frac{3}{3}$. Subgenus *Vampyrops* (s. s.). Type *V. lineatus*, Geoff. Other species: *vittatus*, Pet., *infuscus*, Pet., *zarhinus*, H. All., *dorsalis*, Thos.

* Ann. & Mag. Nat. Hist. (6) iv. p. 170 (1889).

† MB. Ak. Berl. 1880, p. 259.

- B. Molars $\frac{2}{3}$. Incisors $\frac{2}{3}$. Subgenus *Vampyrodes* *. Type *V. Caraccioli*, Thos.
 C. Molars $\frac{2}{3}$. Incisors $\frac{2}{1}$. Subgenus *Vampyriscus* *. Type *V. bidens*, Dobs.
 D. Molars $\frac{2}{3}$. Subgenus *Vampyressa* *. Type *V. pusillus*, Wagn.

Rhipidomys Goodfellowi, sp. n.

General external appearance almost precisely as in *R. Couesi*. Fur unusually short, close and straight, only about 6 millim. long on the back. Colour above of the same brownish-fawn tone found in the browner examples of *R. Couesi*, perhaps rather darker mesially. Sides clearer greyish fawn. Under surface very short-haired, dull greyish with a buffy tinge, the bases of the hairs slaty, the tips dull buffy; line of demarcation on sides quite indistinct. Hind limbs and outer sides of fore limbs like body; inner sides of fore limbs whitish, whiter than the belly. Ankles and upperside of hind feet brown, the hairs at bases of claws white. Tail with nearly an inch of its base covered with the grey hairs of the body, the remainder uniformly blackish, the terminal half more bushy than in the allied species, the scales being practically hidden. Mammæ 1—2=6.

Skull rather smaller and more delicate than that of *R. Couesi* (comparing old specimens of each species), with a lighter narrower muzzle; nasals extending rather further back. Interorbital region smooth, flat, sharp-edged, evenly broadening backwards. Palatal foramina rather smaller. End of palate level with hinder edge of $m.^3$.

Dimensions of the type (measured in skin):—

Head and body 186 millim.; tail 191; hind foot (wet) 29; ear (wet) 14.

Skull: extreme length 39; basilar length 31.6; greatest breadth 20; nasals 14.6×4.6 ; interorbital breadth 6.1; palate length from hensenion 17; diastema 11; palatal foramina 8.1×3.3 ; length of upper molar series 6.

Hab. Upper Rio Napo, at mouth of Rio Coca.

Type. Female. Collected in June 1899, and presented to the British Museum, by Walter Goodfellow, Esq., in whose honour it is named.

This Upper-Amazonian species is most nearly allied to the Trinidadian *R. Couesi*, All., and the Peruvian *R. leucodactylus*, Tsch., but may be distinguished from either by its much shorter fur, duller-coloured under surface, bushier tail, and

* Nomina nova.

more delicate skull. The other members of the genus are all considerably smaller.

Rhipidomys venezuelæ cumananus, subsp. n.

Similar to the typical form in colour and other characters but rather larger and more heavily built; the feet broader and stouter. General colour above dull greyish fulvous, as in the majority of specimens of *R. v. typicus*, but the latter is very variable in the exact tone of colour, some specimens from Merida being quite greyish and others deep fulvous. Belly of type dull whitish, the hairs white to their roots; in the second specimen they are slightly grey basally. Tail rather more heavily furred and pencilled than in the typical form, blackish brown throughout.

Skull with its brain-case larger than in the typical form, but its muzzle is of much the same proportions, very different to the long heavy muzzle of *R. Couesi*, the Trinidad species. Interorbital region broad and flat.

Dimensions of the type (measured in the flesh):—

Head and body 150 millim.; tail 176; hind foot 29; ear 21.

Skull: basilar length 29.5; greatest breadth 20; nasals 12.5×4.3 ; interorbital breadth 5.3; breadth of brain-case 15; palate length 15.2; diastema 9.7; palatal foramina 8×3.6 ; length of upper molar series 6.0.

Hab. Cumana. Type from Ipure, altitude 700 m.; a second example from Quebrada Secca.

Type. Female. Original number 314. Collected 22nd March, 1899, by E. André.

Rhipidomys dryas, sp. n.

Size small. Fur fairly straight and crisp, not woolly; hairs of back about 7 millim. in length. General colour above bright fulvous, about as in *Oryzomys flavicans*, Thos., finely lined with black. Head rather greyer. Ears of medium size, thinly haired, pale brown. Checks, sides of neck, and flanks more fawn-coloured, a distinct fulvous line edging the belly-colour. Lips, whole of under surface, and inner sides of limbs pure sharply defined white. Outer sides of arms and legs and upper surface of hands and feet fulvous, a faint metapodial darkening present. Fifth hind toe reaching to the middle of the second phalanx of the fourth. Tail rather longer than the head and body, its basal half-inch furry like the body, the remainder thinly haired, slightly pencilled, uniformly brown throughout.

Skull of the shape typical of the genus, but distinguished from that of most of the species by its small size. Nasals narrow, just surpassing the premaxillæ posteriorly. Interorbital space flat, its edges with well-developed divergent ridges which can be traced backward across the parietals to the outer corners of the interparietal. Brain-case broad and rounded. Palatal foramina short, barely reaching backward to the level of the front of *m*.¹. Molars very small, smaller in proportion than in other species.

Dimensions of the type (an adult female, measured in the flesh by collector):—

Head and body 100 millim.; tail 120; hind foot 22; ear 14.

Skull: extreme length 27; basilar length 20·3; greatest breadth 15; nasals 9·3 × 3·1; interorbital breadth 5·2; breadth of brain-case 12·2; palate length from henselion 11; diastema 7; palatal foramina 4·6 × 2·2; length of upper molar series 3·8.

Hab. Paramba, N. Ecuador. Alt. 1100 m.

Type. B.M. no. 99. 12. 5. 4. Original number 12. Collected 11th May, 1899, by R. Miketta. Two specimens examined.

This striking little species, one of the smallest of the genus, has a certain resemblance to *R. microtis*, Thos., from the neighbourhood of Bogota, but is readily distinguished by its brighter colour, pure white belly, and much smaller palatal foramina and molars.

Its nearest ally is probably Tomes's "*Hesperomys bicolor*"*, collected by Fraser in the Ecuadorean Oriente at Gualaquiza; but that animal is said to have a "darkish cinnamon-brown" general colour, and its under surface is yellowish white. The tail is also shorter than the head and body.

Oryzomys sylvaticus, sp. n.

General appearance very much that of a large specimen of the European *Mus sylvaticus*. Fur straight, close and rather crisp, about 8–9 millim. long on the back. General colour above dull fulvous, much darkened with black on the middle line of the back, clearer on the sides. Head decidedly greyer than body. Under surface soiled whitish, the bases of the hairs slaty, the tips dull white; line of demarcation on sides rather sharply defined. Ears large, finely haired, dull brown. Outer sides of limbs greyish, inner sides like belly; hands and feet dull white above, wrists and ankles browner; feet

* P. Z. S. 1860, p. 217.

long and slender, fifth hind toe reaching to the middle of the basal phalanx of the fourth. Tail slender, naked, finely scaled, brown above, scarcely paler below.

Skull very similar in its general shape and delicate build to that of *O. gracilis*, but much larger. Nasals and premaxillæ about level posteriorly. Supraorbital edges evenly divergent, finely beaded, the beading extending backward nearly half across the parietals. Palatal foramina small and narrow. Teeth of normal proportions.

Dimensions of the type (measured in the flesh by collector):—

Head and body 112 millim.; tail 118; hind foot 29; ear 21.

Skull: extreme length 30.5; basilar length 22.8; greatest breadth 15; nasals, length 12; interorbital breadth 4.9; palate length from hensenion 13; diastema 7.8; palatal foramina 4.5; length of upper molar series 4.5.

Hab. Santa Rosa, Southern Ecuador. Altitude 10 m.

Type. B.M. no. O. 1. 1. 21. Original number 410. Collected 30th June, 1899, by Perry O. Simons.

This species is exactly intermediate in size between the large *O. laticeps* and the small *O. gracilis*, and may therefore be readily distinguished by size from either of them, to which alone it has any resemblance in general characters. Probably it is most nearly allied to *O. gracilis*.

Oryzomys balneator, sp. n.

General appearance that of a dark-coloured member of the *O. longicaudatus* group, but really more allied to *O. baeps*.

Size small, rather less than in *O. gracilis*. Fur fairly straight, not so woolly as in *O. baeps*. Colour above dark greyish brown, heavily lined with black, the general effect not far from the "bistre" of Ridgway. Rump with a suffusion of reddish fawn. Face like back. Cheeks and flanks dull fawn; outer side of hips deeper fawn. Under surface dark soiled greyish, the hairs slaty grey basally, dull whitish terminally; the line of demarcation little defined. Ears small, finely haired, black. Limbs coloured on outer sides like back, on inner sides like belly; upper surface of hands and feet greyish brown; hairs at base of claws white; feet long and slender; fifth hind toe reaching to the middle of the basal phalanx of the fourth. Tail slender, almost naked except towards the end, dark brown above, rather lighter below; extreme tip slightly pencilled, commonly (in four out of five examples) white.

Skull showing a general resemblance to that of *O. beops* in its thin texture, rounded and unridged brain-case, small face, and narrow interorbital region. Nasals narrow, evenly tapering backward; supraorbital edges square but not ridged. Palatal foramina short and narrow. Molars small and delicate.

Dimensions of the type (measured in the flesh by collector):—

Head and body 92 millim.; tail 117; hind foot (s. u.) 26; ear 16.

Skull: greatest length 26; basilar length 19·4; greatest breadth 14; nasals 9·2 × 3; interorbital breadth 4·3; brain-case 13 × 12; palate length from henselion 10·5; diastema 7; palatal foramina 4 × 2; upper molar series 3·6.

Hab. Mirador, 20 miles E. of Baños, Oriente of Ecuador. Altitude 1500 m.

Type. Male. B.M. no. 99. 9. 9. 34. Original number 237. Collected 8th February, 1899, by Mr. Perry O. Simons. Five specimens.

Despite its general resemblance to members of other groups, this species is probably most nearly related to *O. beops* and its allies, but is readily distinguishable by its smaller size, longer feet, much smaller teeth, and less woolly fur.

Zygodontomys brevicauda tobagi, subsp. n.

Closely allied in size and all other essential characters to *Z. b. typicus*, but of a more dirty brownish hue, the face and fore-quarters especially browner, and without the rufous tone which characterizes the Trinidad form. On the rump alone does the colour attain to nearly the reddish tone which is spread equally over the whole of the head and back in *typicus*. Under surface as in *typicus*, dull soiled buffy, without line of demarcation.

Dimensions of the type (measured in the flesh):—

Head and body 146 millim.; tail 100; hind foot (s. u.) 30; ear 18.

Skull: greatest length 35; greatest breadth 19; length of upper molar series 4·6.

Hab. Island of Tobago, W. Indies. Type from Richmond.

Type. Male. B.M. no. 97. 6. 7. 47. Collected 1st March, 1897, by Dr. Percy Rendall. Three specimens examined.

This is evidently a darkened insular race of the Trinidad *Z. brevicauda*, of which the British Museum possesses six skins, obtained by Messrs. Caracciolo, Chapman, and Rendall.

XXXVI.—Descriptions of Two new Sciuropteri discovered by Mr. Charles Hose in Borneo. By OLDFIELD THOMAS.

Sciuropterus Thomsoni, sp. n.

Similar in size and essential characters to *S. Horsfieldi*, but with the general colour of the head and upper surface dark smoky brown, finely grizzled with dull buffy white, this latter colour replacing the bright fulvous or rufous found in the allied species. Underside whitish or pale fulvous. Ears, hands, feet, and tail as in *S. Horsfieldi*, or, at least, as in "*S. Davisoni*"*, for the type of *S. Horsfieldi* is so faded that the colours cannot be determined with certainty. Mammæ 6.

Skull and dentition as in the allied species. No upper $p.^s$ present.

Dimensions of the type (measured in the flesh by Mr. Hose):—

Head and body 231 millim.; tail 199; hind foot 37, with claws 40·5; ear 22.

Skull: greatest length 46·5; basilar length 37; greatest breadth 29·6; nasals $13 \times 7\cdot2$; length of upper molar series 9·2.

Hab. Baram District, Eastern Sarawak. Type from the Bakong River.

Type. Female. B.M. no. 99. 12. 9. 34. Collected August, 1897, and presented by Charles Hose, Esq. Three specimens examined.

By the request of Mr. Hose I have named this very handsome flying-squirrel, which is distinguished from its only near ally by its very different body-colour, after Mr. Thomson, the energetic Managing Director of the Borneo Company.

Sciuropterus Hosei, sp. n.

Size small, about as in *S. setosus*. Fur as usual very soft and fine. General colour above dark, the tips of the dorsal hairs washed with fawn or rufous fawn; flanks and top of parachute from wrists to ankles black, the lighter tips to the hairs disappearing laterally. No special tufts of bristles on cheeks or round ears. Centre of face like back; a darker line running through eye to base of ear; below this the cheeks are pale rufous white; behind posterior base of ear a prominent white patch. Ears very long and narrow, nearly twice the length of those of *S. setosus*. Under surface dull white, with a slight rufous tinge, but how much of this is

* Described and figured P. Z. S. 1886, p. 74, pl. vi.

due to the action of spirit it is impossible to say; hairs of chin, chest, and middle line of belly whitish to their roots, those of sides of belly and under surface of parachute slaty black. Mammæ 4. Upper surface of hands brown, some lighter hairs present on the wrist; feet also brown, but the ends of the digits white. Tail markedly distichous, its middle line brown above nearly to the end, its long lateral hairs brownish fawn proximally, gradually darkening to black till within half an inch of the tip, when the whole end of the tail abruptly changes to white.

Skull short, broad, with a curious short conical muzzle, in this way somewhat similar to Dr. Jentink's figure of the skull of *S. setosus*, but the shortness of the muzzle even more marked. Brain-case broad and rounded. Bullæ of normal size. Incisors strong, deep antero-posteriorly, rather more thrown forward than usual. Cheek-teeth rather small; pre-molars not disproportionately different in size, the three anterior teeth increasing quite equally from the small *p.*³ to *m.*¹. Molars smooth and rounded, their crests low and scarcely wrinkled.

Dimensions of the type (an adult female, measured in spirit):—

Head and body 87 millim.; tail 98; hind foot 20, with claws 21·5; ear 17 5 × 9.

Skull: greatest length 28; basilar length 21·4; greatest breadth 18·8; nasals 8·2 × 4; interorbital breadth 7; palate length from hensenion 11·5; diastema (to front of *p.*⁴) 6·3; length of upper tooth series (from front of *p.*⁴) 3·8.

Hab. Baram District, Eastern Sarawak. Type from the Toyut River; a second specimen from Lobok Nibong.

Type. Female. Skinned from spirit. B.M. no. 99.12.9.85. Collected and presented by Charles Hose, Esq.

This striking little species, unique in the possession of a white-tipped tail, was first found by Mr. Hose many years ago, but it could not then be described owing to a doubt as to whether it might not be the Sumatran *S. platyurus*, Jentink, a species with the ordinary dark tail. Now, however, not only has Mr. Hose sent two and seen two more Baram specimens, all alike with white-tipped tails, but the Museum owes to the kindness of the late Mr. Theo. C. Barclay a topotype of *S. platyurus*, and this shows that the two are really quite distinct.

The second specimen sent by Mr. Hose, also an adult female, is rather smaller than the type, but shares all its essential characters. The type was *enceinte*, containing two embryos, one in each uterus.

XXXVII.—Notes on a Collection of African Blattidæ, chiefly from the Transvaal, formed by Mr. W. L. Distant. By W. F. KIRBY, F.L.S., F.E.S., &c.

DURING his residence in the Transvaal Mr. Distant paid particular attention to the Blattidæ, and obtained a series of very interesting species. There are a considerable number of remarkable forms in Southern and Eastern Africa, and an examination of this collection has enabled me to record several genera previously known only from Madagascar as occurring also on the African continent, to clear up several doubtful points of synonymy, and to place together the sexes of various species. A large proportion of African species belong to genera in which the females are very different from the males, and mostly apterous; and we require a much larger series of specimens of both sexes than have yet been brought together to enable them to be worked out in anything like a satisfactory manner.

The species of Blattidæ enumerated below, and mostly represented in Mr. Distant's collection, are as follows:—

ORTHOPTERA-BLATTIDÆ.

Ectobiidæ.

- Ectobia*, Westw.
ericetorum, Wesm.
Aphlebia, Brunn.
transvaaliensis, sp. n.
bicolor, sp. n.

Phyllodromiidæ.

- Phyllodromia*, Serv.
bivittata, Serv.
delta, sp. n.
ruficeps, sp. n.
Ischnoptera, Burm.
strigosa, Schaum.

Epilampridæ.

- Epilampra*, Burm.
pardalina, Walk.

Blattidæ.

- Apotroglia*, gen. nov.
angolensis, sp. n.
Dorylca, Stål.
rhombofolia, Stoll.

- Periplaneta*, Burm.
americana, Linn.
Eurycotis, Stål.
athiopica, Sauss.
Deropeltis, Burm.
erythrocephala, Fabr.
atra, Brunn.
melanophila, Walk.
brevicollis, Serv.
similis, Sauss.
capensis, Sauss.
Distanti, sp. n.

Panchloridæ.

- Rhyparobia*, Krauss.
maderæ, Fabr.
Gyna, Brunn.
caffrorum, Stål.
Nauphæta, Burm.
aspersata, sp. n.

Perisphæriidæ.

- Eustegasta*, Gerst.
pacila, Schaum.
obsoleta, sp. n.

Gynopeltis, Gerst.
discoidalis, Brunn.
cryptospila, Walk.

Elliptoblatta, Sauss.
uniformis, sp. n.

Pronaonota, Sauss.
cribrosa, Sauss.

Pilema, Sauss.
thoracica, Walk.
Saussurei, sp. n.

Stenopilema, Sauss.
cylindrica, Walk. (?).
pullicornis, sp. n.

Cyrtotria, Stål.
scabra, Walk.

Derocalymma, Burm.
elateroides, Walk.
versicolor, Burm.
porcellio, Gerst.

Derocalymma
linearis, Walk. (?).
punctata, Sauss.
bipapilla, sp. n.
intermedia, sp. n.
granulata, Sauss.
pallipes, sp. n.
clavigera, sp. n.
Hostilia, Stål.
proterva, Stål.

Heterogamiidæ.

Heterogamia, Burm.
ursina, Burm.

Chorisonneuridæ.

Oxyhaloa, Brunn.
deusta, Thunb.

Ectobiidæ.

Ectobia ericetorum.

Blatta ericetorum, Wesm. Bull. Acad. Brux. v. p. 587 (1838).

Ectobia ericetorum, Brunn. Syst. Blatt. p. 58 (1865); Prodr. Eur. Orth. p. 34 (1882).

1, Pretoria (*Distant*).

A common British and European species. Probably an introduced species in the Transvaal.

Aphlebia transvaaliensis, sp. n.

Long. corp. 10 millim.

Male.—Varied with black and testaceous. Head black; front, between the antennæ, with a testaceous spot, below which are three connected markings increasing in breadth downwards, the first transverse, the second rhomboidal, the third a smaller rhomboid, with a lateral projection on each side turning upward at a right angle; antennæ black, testaceous at the base. Pronotum black, bordered with testaceous, and with an irregularly transverse mark on its lower half. Wings about four-fifths as long as the abdomen, costa edged by a ferruginous line; baso-costal area testaceous, connected at the extremity with a testaceous band running across the tegmen as far as the internal area; internal area testaceous at the base. Abdomen black, with large testaceous marginal markings. Cerci black above, testaceous below, as is most of the under surface except the tip of the abdomen, some lateral marks on the pectus and abdomen, and some dots at

the base of the spines on the outer edge of the hind tibiæ, which are black or blackish.

1, Pretoria (*Distant*).

Closely allied to *Temnopteryx variegata*, Schulthess, from Delagoa Bay, of which it may be a variety.

This genus is well represented in North Africa, as in the Mediterranean region generally, and one species has been described from Madagascar. I add the description of an allied species in the Natural History Museum from Port Elizabeth.

Aphlebia bicolor, sp. n.

Long. corp. 8-10 millim.

Female.—Varied with black and testaceous. Head black, with a transverse testaceous stripe on the vertex, and the space round the base of the antennæ and sometimes the mouth-parts more or less testaceous; antennæ black, testaceous towards the base. Pronotum nearly as in *A. transvaaliensis*, but the central pale mark is longitudinal. Meso- and metanotum testaceous, with a black band behind; tegmina as long as the mesonotum, testaceous, with a longitudinal blackish central stripe; abdomen black, with about five rows of testaceous spots or dashes on each side of the median line, the middle ones more linear and the marginal ones larger and more irregular in shape than the others; the last two abdominal segments are bordered behind with testaceous, and from this streak testaceous lines run obliquely upwards and outwards; terminal plate black, spotted with testaceous. Pectus testaceous, with blackish markings towards the margins; legs testaceous, femora lined on both edges with black, and tibiæ dotted with black. Cerci testaceous, with a black spot in the middle above, and several transverse blackish markings below.

Described from three specimens.

It is perhaps an immature insect, and has some resemblance to the larva of *Ectobia ericetorum* (*vide supra*).

Phyllodromiidæ.

Phyllodromia bivittata.

Blatta bivittata, Serv. Orth. p. 108 (1839).

Phyllodromia bivittata, Bruun. Syst. Blatt. p. 92 (1865).

1, Pretoria (*Distant*); 1, Fort Johnston, Nyasaland (*Rendall*).

Found in South Africa, and in various parts of Tropical America. Evidently liable to be distributed by shipping, like its close ally *P. germanica*, L.

Phyllodromia delta, sp. n.

Long. corp. cum tegm. 20 millim.

Head testaceous, vertex brown, tip of mandibles reddish brown. Pronotum with a dark brown centre, broadest behind, and with sinuated margins, beyond which the pronotum is hyaline. On the lower part of this dark space stands an equilateral yellowish triangle, with the apex pointed downwards. Scutellum very pale testaceous. Tegmina with a great part of the costal area hyaline, the rest rufo-testaceous, paler at the extreme base, and with a pale oblique band at two-thirds of the length, and paler towards the extremity. Underside and legs testaceous, the legs dotted with brown or reddish brown above, above and below the knees, and on the upper surface of the tibiæ.

1, Barberton (*Rendall*).

Described from a single specimen in too poor condition to allow of a complete description. It resembles *P. supellectilium*, Serv., but is much larger, and the pale triangle on the dark centre of the thorax will serve to distinguish it.

Phyllodromia ruficeps, sp. n.

Long. corp. cum elytris 13–15 millim.

Male.—Black, vertex and face dark red, trochanters and a narrow border to the abdomen beneath testaceous, legs and spines inclining to reddish. Pronotum subhyaline, the middle filled up with a large black mark, not extending to the front margin, and broadest behind, where it is narrowly bordered with pale; tegmina dark blackish brown, inclining to reddish towards the sides and extremity of the dark portion, and with the costal area broadly subhyaline for four fifths of its length.

2, Fort Johnston; 1, Zomba (*Rendall*).

Differs from *P. vinula*, Stål (*amæna*, Walker), by its larger size and red head.

Ischnoptera strigosa.

Blatta strigosa, Schaum, Peters's Reise nach Mossamb. p. 108 (1862).

Ischnoptera strigosa, Brunn. Syst. Blatt. p. 138 (1865).

Ischnoptera natalensis, Walk. Cat. Blatt. p. 127. n. 30 (1868).

4, Pretoria; 1, Pemba Island; 1, Pienaars River (*Distant*); 1, Barberton (*Rendall*).

Mozambique (*Schaum*); Natal, Zomba (Nat. Hist. Mus.).

Epilampridæ.

Epilampra pardalina.

Epilampra pardalina, Walk. Cat. Blatt. p. 68. n. 6 (1868).

2, Barberton (*Rendall*) ; Lake N'Gami (Nat. Hist. Mus.).

A rather small but very conspicuous and easily recognizable species, which does not seem to have been described by any author but Walker.

Blattidæ.

Genus APOTROGIA, nov.

Very broadly oval; smooth and polished. Head completely concealed under the pronotum; eyes placed widely apart; pronotum depressed at the sides and in front; mesonotum and metanotum with the sides broadly deflexed backwards; abdomen depressed, acutely angled on the lateral extremities, and forming a projecting tooth on the last, and one less prominent on the penultimate segment; cerci broad, not longer than the subgenital plate, which is nearly twice as broad as long, slightly rounded off at the lateral angles, and curved inwards in the middle. Front femora with several short spines on the outer carina, but only the terminal spine on the inner carina, the rest unarmed. Tibiæ broad, with a single row of spines on the inner edge above, and a double row on the outer edge above; tarsi moderately stout, metatarsus rather longer than the three middle joints together, which collectively are slightly longer than the terminal joint. Embolium well marked.

This genus is based on six specimens (including both sexes), which may be immature; but I have no winged specimens which can be referred to them. They are not unlike immature specimens of the American genus *Blaberus*, Serv., which belongs to another family. But if winged specimens of the present genus are met with, they can easily be identified as belonging to it. At present I am inclined to place *Apotrogia* near the Australian genus *Polyzosteria*, Burm.

Apotrogia angolensis, sp. n.

Long. corp. 24-28 millim.; lat. corp. 17-21 millim.

Head testaceous, face ferruginous or blackish below the vertex, except a narrow testaceous border within the antennæ; antennæ ferruginous, more or less blackish above scape, paler

beneath. Pronotum transversely striated, somewhat rugose behind, tawny, with a large trapezoid ferruginous or blackish blotch resting on the base; this blotch is shaped nearly as in *Blaberus*, but reversed, being broadest behind, where it is sometimes marked with three tawny dots in a transverse line; in front this patch throws off two broad parallel brown bands, separated by a tawny line broadest behind, nearly to the front edge. There are also brown bands thrown out obliquely forward to the margins from the front angles of the main blotch, and the pronotum behind is edged with brown along its lateral and hinder margin; the hinder margin, however, is narrowly bordered by a yellow line, and the dark edging ceases before reaching the dark blotch. The mesonotum and metanotum are ferruginous, sometimes edged behind by a narrow yellow line, and more or less varied with reddish; the middle of the mesonotum is tawny, with a black spot on the front edge in the middle. Abdomen ferruginous, with seven more or less complete rows of tawny spots and most of the sixth segment tawny; towards the margins the dark markings are blackish. Cerci ferruginous, tipped with tawny. Legs above mostly ferruginous, below mostly tawny. Abdomen beneath tawny, with about five rows of darker markings more or less visible in some of the specimens.

6, Angola (*Monteiro*).

Two in Mr. Distant's collection and four in the Natural History Museum.

Easily recognizable by the peculiar pattern of the pronotum. The sexes differ little.

Dorylæa rhombifolia.

Blatta rhombifolia, Stoll, Blatt. p. 5, pl. iii. d, fig. 13.

Periplaneta rhombifolia, Sauss. Mém. Soc. Genève, xx. p. 260 (1869).

Periplaneta histrio, Sauss. Rev. Zool. 1864, p. 318; Mém. Mex. Blatt. p. 73 (1864); Walk. Cat. Blatt. p. 130. n. 20 (1868).

Periplaneta decorata, Brunn. Syst. Blatt. p. 224 (1865).

Periplaneta heterospila, Walk. Cat. Blatt., Suppl. p. 35 (1871).

5, Fort Johnston, Nyasaland (*Rendall*); 1, Pemba Island (*Distant*).

First described from China. Common in the warmer parts of Asia, Africa, and America.

Periplaneta americana.

Blatta americana, Linn. Syst. Nat. (ed. x.) i. p. 424. n. 4 (1758).

Periplaneta americana, Brunn. Syst. Blatt. p. 232 (1865).

1, Barberton; 3, Pemba Island (*Distant*); 1, Fort Johnston, Nyasaland (*Rendall*).

A cosmopolitan species, carried everywhere by shipping and commerce.

Eurycotis aethiopica.

Periplaneta aethiopica, Sauss. Rev. Zool. 1864, p. 317; Mém. Soc. Genève, xx. p. 260 (1869).

Periplaneta tetra, Walk. Cat. Blatt. p. 138. n. 42 (1868).

11, Pretoria and Masil Nek (*Distant*). Gaboon (*Saussure*), Cape Town, Port Elizabeth, British East Africa (Nat. Hist. Mus.).

If the West-African form proves to be distinct, Walker's name will be available for the southern and eastern form. I have no West-African specimens to compare.

Deropeltis erythrocephala.

Blatta erythrocephala, Fabr. Spec. Ins. i. p. 342. n. 7 (1761).

Deropeltis erythrocephala, Brunn. Syst. Blatt. p. 242 (1865).

1, Cape Town (*Becker*). Port Elizabeth, Durban (Nat. Hist. Mus.).

An immature specimen from Zomba (*Rendall*) and another from Blantyre (*Elson*) in Mr. *Distant's* collection appear to belong to this species.

Deropeltis atra.

Deropeltis atra, Brunn. Syst. Blatt. p. 244 (1865); De Borm. Ann. Mus. Genov. xvi. p. 207 (1881).

2, Fort Johnston, Nyasaland (*Rendall*); Shoa (*de Bormans*). Zomba, Ruwenzori, Port Elizabeth (Nat. Hist. Mus.).

A widely distributed species in East Africa.

The antennæ are more or less tipped with reddish in both sexes, which is not mentioned by Brunner in his description.

Deropeltis melanophila.

Ischnoptera melanophila, Walk. Cat. Blatt., Suppl. p. 146 (1869).

1, Pemba Island (*Distant*). Zanzibar, Mombasa, British East Africa (Nat. Hist. Mus.).

Perhaps a large form of *D. atra*, Burm.

Deropeltis brevicollis.

Kukerlac brevicollis, Serv. Ins. Orth. p. 70 (1839).

Deropeltis (?) *brevicollis*, Brunn. Syst. Blatt. p. 246 (1865).

Deropeltis juncea, var., Sauss. Mém. Soc. Genève, xxiii. p. 117 (1874).

4, Pretoria (*Distant*); 2, Barberton (*Rendall*). Cape (*Serville*); Lagos, Zomba (Nat. Hist. Mus.).

The type of *D. juncea*, Sauss. (Rev. Zool. 1864, p. 314), appears to represent a dark form of this species.

Deropeltis similis.

Ischnoptera similis, Sauss. Rev. Zool. xvi. p. 314 (1864).

Nauphata foveolata, Walker, Cat. Blatt. p. 42. n. 16 (1868).

3, Pretoria; 1, Port Elizabeth (*Distant*); 1, Barberton; 1, Zomba (*Rendall*). East London (Nat. Hist. Mus.).

The legs and pronotum vary somewhat in colour in different specimens. The specimens from Barberton and one of those from Pretoria represent a form of the insect which stands in the same relation to typical *D. similis* that *D. brevicollis* occupies towards *D. juncea*. *D. foveolata* is a dark form with the pronotum alone uniform black.

Deropeltis capensis.

Polyzosteria capensis, Sauss. Rev. Zool. 1864, p. 307.

Deropeltis flavomarginata, Brunn. Syst. Nat. p. 247 (1865).

Periplaneta collaris, Walk. Cat. Blatt. p. 142. n. 51 (1868).

Periplaneta decorata, Walk. l. c. n. 52 (1868).

1, Teafontein, Cape Colony; Cape (*Brunner*); Natal, Port Elizabeth (Nat. Hist. Mus.).

A conspicuous species with a yellow border to the pronotum.

Deropeltis Distanti, sp. n.

Long. corp. 17 millim.

Female.—Black, shining, especially the head; lower mouth-parts yellow; a small yellow dot above the base of each antenna; antennæ dark chestnut-brown, shading into rufo-testaceous beyond the middle; pronotum finely cribrate-punctate, the rest of the upper surface nearly smooth; pronotum with rather broad lateral orange borders, not extending to the hind border; mesonotum with the lateral carina reddish; metanotum with a rufo-testaceous spot at the base, on each lateral margin, and a similar spot on the sides of the second abdominal segment (the first segment being covered at the sides by the metanotum); cerci dark rufo-testaceous, set with long fine hairs; legs rufo-testaceous and middle of abdomen beneath reddish.

1, Pretoria (*Distant*).

Allied to *D. meridionalis*, Sauss., but larger and differently coloured.

Until the sexes of *Deropeltis* are better known, it is almost impossible to unite them in our collections with anything approaching certainty.

Panchloridæ.

Rhyparobia maderæ.

Blatta maderæ, Fabr. Spec. Ins. i. p. 341. n. 2 (1781).

Panchlora maderæ, Brunn. Syst. Blatt. p. 282 (1865).

1, Angola (*Monteiro*); 1, E. Africa (*Distant*).

A cosmopolitan species.

Gyna caffrorum.

Panchlora caffrorum, Stål, Öfv. Vet.-Akad. Förh. xiii. p. 167 (1856);

Brunn. Syst. Blatt. p. 268 (1865).

Epitampira conspicua, Walk. Cat. Blatt. p. 67. n. 2 (1869).

Panchlora scripta, Walk. l. c. p. 183.

|| *Gyna ferrida*, De Borm. (nec Sauss.), Ann. Soc. Ent. Belg. xxv. p. 21, pl. i. B (1881).

1, Warm Baths, Waterberg (*Distant*); 1, Rustenberg (*Ayres*); 2, Barberton (*Rendall*). Natal (*Stål*); N'Gami, Delagoa Bay (Nat. Hist. Mus.).

In unset specimens the red blotches are hardly visible, and such specimens agree very well with Stål's description.

[In Waterberg I found this species on the leaves of trees. —W. L. D.]

Nauphæta aspersata, sp. n.

Long. corp. cum tegm. 20 millim.

Testaceous; head reddish above, with a brown band between the eyes, divided by yellowish spaces into three square spots; then follows a broader yellowish band between the antennæ, below which the face is about equally divided into a blackish upper space and a yellowish lower space. Pronotum brownish in the middle and testaceous on the sides, irregularly dotted with black; towards the middle these dots tend to form longitudinal lines here and there, but there is no trace of the conspicuous black lateral stripes of *P. cinerea*, Oliv., to which this species is most nearly allied. On the outside of the eyes a black band runs backward and is continued beneath the wings and above the upper part of the coxæ. Wings, legs, and under surface mostly brown; costal area and legs more or less dotted with brown. Upperside of tibiæ brownish.

1, Pretoria (*Distant*).

A single specimen, which has lost the abdomen. It is labelled *N. circumvagans*, Burm., which species, however, belongs to the genus *Phatalia*. *N. aspersata* might, however, be the same as *N. grisea*, Burm., the type of *Nauphæta*,

according to Stål; but *N. grisea* was described from the East Indies, and the legs are not said to be mottled.

Perisphæriidæ.

This family seems to be pre-eminently an African group, but it is at present very imperfectly known. The females of many species are apterous, and there are many genera of which only males or females respectively are at present known, and comparatively few species belonging to genera which are apterous, at least in the females, are satisfactorily known in both sexes.

Eustegasta pæcila.

Panchlora pæcila, Schaum, Ber. Akad. Berlin, 1853, p. 777; Peters's Reise nach Mossambique, Zool. v. p. 109, pl. vii. fig. 2 (1862); Brunn. Syst. Blatt. p. 281 (1865).

A very pretty species and extremely variable. A description of Mr. Distant's specimens is given below. The variations are combined in so many different ways that I cannot venture to regard them as representing more than one species.

Schaum's figure is greatly enlarged and badly coloured, which rendered it no easy matter to identify the species.

Long. corp. cum tegm. 14–15 millim.

Head rufo-testaceous, generally with a black transverse band in front just below the antennæ, or this forms the upper part of a longitudinal band filling the whole centre of the face, or the band may be broken in two or reduced to a narrow perpendicular stripe, or the occiput may be black, or the whole head may be black except a reddish transverse band above the antennæ, or red with no black markings. Antennæ black, with a broad reddish band before the extremity. Pronotum black, shining, broadly bordered on the sides with rufo-testaceous and more narrowly before and behind; the hind border is sometimes interrupted in the middle. Abdomen rufo-testaceous, sometimes with a broad longitudinal black central band. Tegmina dark metallic green, more or less varied with chestnut-red; the costa is usually edged with this colour nearly to the extremity and marked with a triangular spot beyond the middle. Below the costal area is a chestnut-red line, expanding into a broad blotch at about two thirds of the wing; sometimes the whole costal area is of this colour except a short basal streak, and coalesces with this blotch; and in some specimens the inner margin of the basal area is of the same colour; and there may be a similarly

coloured spot towards the inner margin opposite the triangular spot on the costa. Wings smoky hyaline, with rufo-testaceous nervures towards the costa and brown ones elsewhere; the transverse nervures are whitish: or the wings are frequently pale subhyaline, with brown borders. Legs black, with black or red spines; coxæ often bordered by a pale line. In some varieties the legs are red, or the whole under surface of the body is black, or the under surface of the abdomen is transversely banded with black, or the red markings of the tegmina are reduced to a streak at the base of the costa, a streak or spot below the subcostal area opposite the end of the basal area, and a spot on the lower part of the costal area at three-fifths of its length. Nothing seems constant but the colour of the antennæ and pronotum, and even the reddish hind border of the pronotum is interrupted behind in some specimens. But all these variations grade into each other too much to allow of their being regarded as distinct species.

4, Zomba; 3, Fort Johnston, Nyasaland (*Rendall*); Mozambique (*Schaum*).

Eustegasta obsoleta.

Size and appearance of the last species, of which it may possibly be an extreme variety.

Head dull red above, black below; antennæ black, with a broad pale band before the extremity. Pronotum black, the lateral borders with or without a faint chestnut shade. Tegmina dark metallic green, tinged with chestnut on the outer half and with a dull reddish expanding line from the base below the costal area for two-fifths of the length of the wing. Wings smoky hyaline. Abdomen black. Under surface black; coxæ bordered with a pale line; tibiæ and tarsi reddish.

1, Fort Johnston, Nyasaland (*Rendall*); 1, Zomba (Nat. Hist. Mus.).

Gynopeltis discoidalis.

Perispharia discoidalis, Brunn. Syst. Blatt. p. 310 (1865); Sauss. Mém. Soc. Genève, xx. p. 276 (1869).

5, Zomba; 3, Fort Johnston, Nyasaland (*Rendall*).

Cape (*Brunner*); Somali, Mombasa, Zanzibar, Udara, British East Africa (Nat. Hist. Mus.).

Gynopeltis cryptospila.

Polyphaga cryptospila, Walk. Cat. Blatt. p. 15. n. 6 (1868).

Gynopeltis picta (♀ only?), Gerst. Arch. f. Nat. xxxv. p. 208 (1869);
Von der Decken's Reisen, iii. (2) p. 9, pl. i. figs. 1 (?), 2 (1873).

3, Zomba; 2, Fort Johnston, Nyasaland (*Rendall*); Endara, Mozambique (*Gerstaecker*).

Fwambo (Nat. Hist. Mus.).

This species curiously resembles the female of *Polyphaga aegyptiaca*, but is not pubescent and the subgenital plate is not indented. De Saussure doubts if the male associated with it by Gerstaecker really belongs to the same genus.

Elliptoblatta uniformis, sp. n.

Long. corp. 18–22 millim.; lat. pron. 13 millim.

Female.—Black, smooth, shining, very finely, closely, and uniformly punctured; eyes separated by a short space, lower mouth-parts testaceous; antennæ ferruginous towards the base; legs more or less ferruginous; terminal plate transverse, rounded; cerci yellow; angles of pronotum not produced behind.

3, Blantyre (*Elson*).

The first continental representative of this Madagascar genus.

Pronaonota cribrosa.

Pronaonota cribrosa, Sauss. Rev. Suisse Zool. iii. p. 21, pl. i. fig. 1 (1895); Sauss. & Zehntn. Grandid. Hist. Madag., Orth. i. p. 128, pl. v. fig. 62 (1896).

Long. corp. 30 millim., cum tegm. 38 millim.

Male.—Head black above; labrum red; lower mouth-parts and antennal pits testaceous; antennæ testaceous at the base and reddish brown beyond. Pronotum less arched than in the female, thickly punctured, yellowish testaceous, inclining to reddish in the middle, and with some detached black marks on each side of the subcarinated median line, representing the lyrate pattern so common among the Blattidæ. Abdomen very long, testaceous; cerci long, thick, slightly incurved. Tegmina longer than the abdomen, testaceous, paler along the costa. Wings longer than the tegmina and paler, with brown longitudinal and whitish transverse nervures.

The female has the base of the abdominal segments reddish above, but otherwise agrees with Saussure's description.

2, Pretoria (*Distant*).

This is one of the most interesting species in Mr. Distant's collection. The male of the genus was previously unknown. It is not unlike a large *Termes*, and is so similar to the description and figure of *Derocalymma clypeata*, Sauss. (Mém. Soc. Genève, xxiii. p. 142, pl. x. fig. 52), said to be from Java (?), that I should not be surprised if it eventually proves to be the same species.

Pilema thoracica.

Perisphæria thoracica, Walk. Cat. Blatt. p. 174. n. 20 (1868).

Pilema hebetata, Sauss. Rev. Suisse Zool. iii. p. 24, pl. i. figs. 2, 2 a, b (1895).

(?) *Blatta fusca*, ♀, Oliv. Enc. Méth., Ins. iv. p. 315. n. 9 (1789).

1, Pretoria (*Distant*).

This species agrees with Olivier's description of the insect he considered to be the female of *Blatta fusca*, Thunb., so far as it goes; but he did not mention the peculiar form of the thorax, and I believe that the true *B. fusca*, Thunb. (a male insect), has not yet been satisfactorily identified.

Pilema Saussurei, sp. n.

Long. corp. 15 millim.; long. et lat. pron. 6 millim.

Female.—Head and thorax dark red; vertex with four black lines between the eyes; the carinæ of the overlapping sides of the pronotum meeting at an acute angle in front and projecting in a point behind; sides of pronotum broadly and shallowly guttered on the sides; a well-marked carina on the median line in front. Pronotum and first segment of abdomen moderately closely and finely punctured; pronotum mottled with black in the middle; the three thoracic segments with an interrupted black stripe towards the hind border; abdominal segments bordered with black behind. Antennæ black, reddish towards the base. Legs and abdomen beneath testaceous yellow, shining.

1, Pretoria (*Distant*).

The head is marked like that of *Pronaonota fornicata*, Sauss., but the generic characters prevent me from regarding it as an immature form of that species.

Stenopilema cylindrica (?).

Perisphæria cylindrica, Walk. Cat. Blatt. p. 176. n. 23 (1868).

1, Barberton (*Rendall*).

An immature specimen, probably belonging to this species, but coloured like *Pilema Saussurei* (suprà). It belongs to the group of *S. capucina*, Gerst.

Stenopilema pallicornis, sp. n.

Long. corp. 13-14 millim., lat. 6 millim.

Female.—Black, thickly and finely punctured, more finely on the hinder segments of the abdomen. Head black; antennæ, antennal cavities, sides and lower part of face, legs, a narrow line extending round the whole thorax and abdomen, cerci, and more or less of the face and subterminal plate below rufo-testaceous or reddish; rim of pronotum upcurved, hinder angles produced backwards into a tooth; meso- and metanotum with the hinder angles slightly recurved. Eyes rather wide apart.

2, Pretoria (*Distant*).

One of these specimens is labelled *S. capucina*, Gerst.; but *capucina* is a much larger species, with the head redder and the antennæ darker, besides other slight differences which may be noticed in the description. There appear to be many closely allied species of this genus.

Cyrtotria scabra.

Perisphæria scabra, Walk. Cat. Blatt. p. 172. n. 17 (1868).

1, Pretoria (*Distant*).

Walker's type is said to come from South Africa, near the Tropic of Capricorn.

Derocalymma (?) *elateroides*.

Perisphæria elateroides, Walk. Cat. Blatt. p. 176. n. 24 (1868).

1, Barberton (*Rendall*); Natal (*Gueinzus*) (Nat. Hist. Mus.).

The hood of this species is interrupted in the middle, the carinæ being complete; but I prefer to place doubtful forms in *Derocalymma* till they are better known. The short stout form of the insect resembles that of *Pronaonota*.

Derocalymma versicolor.

Derocalymma versicolor, Burm. Handb. Ent. ii. p. 487. n. 9 (1838);
Brunn. Syst. Blatt. p. 317 (1865).

1, Blantyre (*Elson*); 1, Delagoa Bay (*Junod*).

Two female specimens, which I refer to this species with some doubt.

Derocalymma porcellio.

Derocalymma porcellio, Gerst. Arch. f. Nat. xxxv. p. 207 (1869); Von der Decken's Reisen, ii. (2) p. 7, pl. i. figs. 3, 3 a (1873).

1, Zomba; 2, Fort Johnston, Nyasaland (*Rendall*); Lake Jipe, Uru (*Gerstaecker*).

I am not sure that Gerstaecker has correctly identified the female of this species. I should not be surprised to find that it was a broad oval insect allied to *D. intermedia*.

Derocalymma linearis (?).

Perisphæria linearis, Walk. Cat. Blatt. p. 176. n. 25 (1868).

1, Pretoria (*Distant*).

An immature specimen, apparently belonging to this species.

Derocalymma punctata.

Derocalymma punctata, Sauss. Rev. Suisse Zool. iii. p. 29 (1895); Sauss. & Zehntn. Grandid. Madag., Orth. p. 131 (1896).

2, Pretoria (*Distant*).

The only locality given by Saussure is South Africa.

Derocalymma bipapilla, sp. n.

Long. corp. 20-22 millim.; lat. pron. 13 millim.

Female.—Black; head small, punctured; eyes moderately approximating; pronotum broad, the lateral lamellæ longitudinally convex both above and below; a broad gutter on the inner side of the rim above, extending to the front margin, where the approximating ends are separated by a short longitudinal carina. The pronotum is thickly punctured, and about the middle of the gutter is a large raised tubercle on each side. The back of the pronotum is raised into a crescent directed forwards; the front of this is less thickly punctured, but the enclosed segment of a circle behind very thickly. Here, and on the remaining segments of the thorax and abdomen, we find interrupted traces of a central carina. The sides of the meso- and metanotum are flattened and recurved, and the segments of the abdomen are subdentate on the lateral edges. The abdomen is thickly cribrate-punctate, and there is a row of large granules on each side of the metanotum and of all the segments of the abdomen except the last, before the extremity. Cerci black; terminal plate obtusely angulated.

6, Blantyre (*E/son*).

This species differs from *D. punctata*, Sauss., in its larger size, black cerci and tarsi, and in having only one tubercle on each side in the gutter instead of two. It differs from *D. granulata*, Sauss., in being broader in proportion, less strongly granulated, and in the broader rims and sulci of the pronotum.

Derocalymma intermedia, sp. n.

Long. corp. 18 millim. ; lat. pron. 10 millim.

Female.—Blackish brown, thickly covered with a greyish pile, especially above. Sides of the pronotum flattened, back slightly convex ; a central carina in front, but the sulci obsolete ; a raised tubercle on each side. The whole upper surface finely punctured and granulated. Cerci black ; legs black or slightly inclining to reddish.

2, Barberton (*Rendall*).

Resembles *P. granulata*, Sauss., in general structure, but is much broader in proportion.

Derocalymma granulata.

Derocalymma granulata, Sauss. Rev. Suisse Zool. iii. p. 29 (1895) ;
Sauss. & Zehntn. Grandid. Madag., Orth. p. 131, pl. v. fig. 65 (1896).

1, Blantyre (*Elson*).

This specimen is considerably smaller than the dimensions given by Saussure. It measures 17 millim. in length and 9 in breadth.

Derocalymma pallipes, sp. n.

Long. corp. cum tegm. 20 millim. ; long. et lat. pron. 5 millim.

Male.—Head black ; antennal pits, palpi, and lower mouthparts testaceous ; antennæ reddish brown, paler towards the base. Pronotum black, slightly reddish on the narrow, flattened, hardly recurved carina ; very rugose and cut off almost straight behind. Lateral carinæ complete, uniting in an angle before the arch over the head. Legs rufo-testaceous, coxæ more or less black at the base ; abdomen blackish, varied with reddish towards the base of the segments and on the sides ; terminal plate and cerci reddish ; tegmina rufo-testaceous, blackish at the base below the costal area.

1, Grahamstown (*Schonland*).

Appears to resemble *D. analis*, Sauss.

Derocalymma clavigera, sp. n.

Long. corp. 15 millim.; long. pron. 9 millim. (jun.), 10 millim.; lat. pron. 6 millim.

Female.—Clay-coloured. Eyes rather wide apart. Sides of the pronotum slightly raised, not sulcated; a median carina in front. Pronotum, except at the sides, with numerous longitudinal rugosities and granules; two transverse rows of large granules, the first interrupted in the middle before the extremity. Meso- and metanotum with three rather irregular rows of large granules, the largest at the extremity. The extremity of each of the abdominal segments bears, except on the edges, a row of very large granules, not very close together, as if studded with nails. This is preceded on each segment by one or two rows of smaller and closer ones. Even the rounded terminal plate bears two short rows of large tubercles. Under surface dark brown, with greyish tomentum, but without tubercles. The smaller specimen is more reddish, especially beneath.

2, Barberton (*Rendall*).

Allied to *D. Bottegoiana*, Sauss., but much smaller and with much larger tubercles.

Hostilis proterva.

Blatta proterva, Stål, Öfv. Vet.-Akad. Förh. xiii. p. 166 (1853).

Phyllodromia proterva, Brunn. Syst. Blatt. p. 111 (1865).

1, Delagoa Bay (*Junod*). Natal (*Brunner*).

Heterogamiidæ.*Heterogamia ursina*.

Heterogamia ursina, Burm. Handb. Ent. ii. p. 489 (1839); Sauss. Rev. Suisse Zool. i. p. 313 (1893).

Heterogamia africana, Brunn. (♂, nec ♀; nec Linn.), Syst. Blatt. p. 357 (1865); Krauss, Verh. zool.-bot. Ges. Wien, xl. p. 251 (1890).

Heterogamia conspersa, Brunn. (♀, nec ♂), l. c. p. 358 (1865).

Heterogamia syriaca, Krauss, l. c. p. 241 (1890).

Heterogamia maris-mortui, Jans., Hart, Faun. & Flor. Sinai, p. 182 (1891).

1, Fort Johnston; 1, Zomba, Nyasaland (*Rendall*). Egypt, Syria (*Burmeister*); Mombasa (Nat. Hist. Mus.).

The above synonymy is taken from Saussure.

Chorisoneuridæ.*Oxyhaloa deusta*.

Blatta deusta, Thunb. Hem. Max. Cap. p. 8 (1822).

Proscratea deusta, Stål, Öfv. Vet.-Akad. Förh. xiii. p. 167 (1856).

Proscratea fulviceps, Burm. Handb. Ent. ii. p. 509 (1839).

Oryhaloa fulviceps, Brunn. Syst. Blatt. p. 255 (1865).

Nauphæta ruficeps, Walk. Cat. Blatt. p. 39. n. 11 (1868).

Ischnoptera ruficeps, Walk. l. c. p. 123. n. 64 (1868).

Nauphæta signifrons, Walk. l. c. p. 40. n. 12.

2, Pretoria, Nov. 1894 (*Distant*); 7, Barberton (*Rendall*); 1, Blantyre (*Elson*). Cape (*Thunberg*); Pirie Bush, Delagoa Bay, Machakos, Durban, Natal (Nat. Hist. Mus.).

Varies in colour from ferruginous to nearly black, but may always be known by the red head, with a large square blotch in front.

XXXVIII.—*Some new or little-known Thelyphonidæ and Solifugæ.* By R. I. POOCK.

Family Thelyphonidæ.

Genus HYPOCTONUS, Thorell.

Hypoctonus granosus, sp. n. (Fig. 4.)

Colour. Upperside of trunk blackish, lower side castaneous; chelæ black; legs of first pair reddish brown; femora and patellæ of second, third, and fourth legs blackish, remaining segments reddish brown.

Trunk sculptured and granular above as in *H. formosus*; abdominal sterna sparsely punctured and weakly striate; first sternal plate (genital operculum) with the middle of its posterior border convexly produced and defined by a transverse depression; the anterior part of the plate marked on each side with a deep transversely oval pit, behind these in the middle line there is also a median longitudinal depression, deeper in front than behind.

Chelæ resembling those of *H. formosus* in form and spine-armature, but differing in having the upper as well as the underside of the trochanter, femur, tibia, and hand studded with coarse round granules.

Legs of third and fourth pairs with tibial spur, apical tarsal segment of first longer than the seventh and eighth.

Ommatoids fairly large, separated by a space which is about equal to a diameter and a half.

Total length 33 millim.

Loc. Yunnan.

A single female example.

Recognizable from all the known species by the coarse granulation of the upperside of the chelæ.

Genus LABOCHIRUS, Poc.

In the last number of the 'Journal of the Bombay Nat. Hist. Society,' vol. xii. p. 745 (1899), two species of this genus are described by myself; but by an unfortunate error of the printer they appear under the same name, *cervinus*. For the second species, namely the one from Kanara, I here propose the new name *tauricornis*.

Genus THELYPHONUS, Latr.

Thelyphonus Wayi, sp. n. (Figs. 3-3 b.)

Colour nearly black; legs reddish brown.

Upperside of *trunk* rugose, densely punctured; carapace sparsely granular posteriorly and on the lateral slope of its postocular portion; terga also granular.

Sterna smooth and polished, minutely punctulate, and beset with a few scattered punctures, the first with its posterior border produced and acutely emarginate in the middle.

Chelæ with coxæ nearly smooth; trochanters weakly granular above, armed below with 2 teeth, above with 5, the anterior and the angular large; femur weakly granular below; rest of the segments smooth, sparsely punctured; femur armed internally with 2 small denticles above and 1 below; tibia also with 2 small denticles on its inner side; apophysis with 1 distal tooth on its posterior side, its anterior side and inner side of hand denticulate.

First *leg* with second, third, and fourth segments of tarsus longer than wide, about twice as long as wide; fifth and sixth a little shorter, but distinctly longer than wide; seventh about as long as the sixth, longer than the eighth; ninth about twice as long as the eighth, but not so long as the seventh and eighth; the sixth, seventh, and eighth modified, the sixth with a small nodular prominence at its distal end below; the seventh with nodular prominence much larger and tipped with a small spinule, the outer side of the segment strongly convex; eighth with nodular prominence similar to that of seventh, but smaller; ninth segment unmodified.

Legs of second, third, and fourth segments with tibial spur.

Ommatoids large, round, about a diameter and a half apart.

Total length 34 millim.

Loc. Battambang in Siam.

A single female specimen, collected and kindly presented to the British Museum by Mr. Herbert W. L. Way.

At once recognizable from all the species that have been

hitherto established by the combination of the following characters:—(1) The third segment of the tarsus of the first leg is twice as long as wide and subequal to the second; (2) the second, third, and fourth legs are furnished with a tibial spur; (3) there are five spines on the upperside of the trochanter of the chela. Judged by these features, *T. Wayi* ranges itself alongside of *T. manillanus* under section 25 of the table given by Kraepelin (Das Tierr., Scorp. &c. p. 216), but certainly differs from that species in having the sixth, seventh, and eighth tarsal segments of the first leg modified, the ommatoids large, and the genital operculum angularly emarginate in the middle of its posterior border.

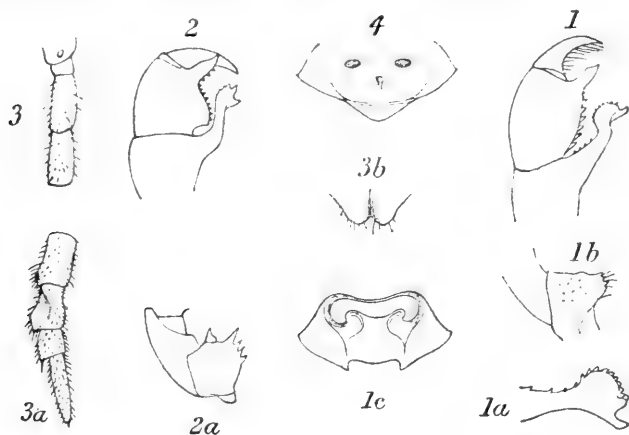


Fig. 1.—*Typopeltis Dalyi*, sp. n., ♂. Extremity of chela.

Fig. 1 a.—Ditto. Tibial apophysis.

Fig. 1 b.—Ditto. Trochanter of chela, from above.

Fig. 1 c.—Ditto, ♀. First abdominal sternum.

Fig. 2.—*Typopeltis Stimpsonii*, Wood, ♂. Extremity of chela.

Fig. 2 a.—Ditto. Trochanter of chela from above.

Fig. 3.—*Thelyphonus Wayi*, sp. n., ♀. Base of tarsus of first leg.

Fig. 3 a.—Ditto. Apex of tarsus of first leg.

(These figures not drawn to quite the same scale.)

Fig. 3 b.—Ditto. Apex of first abdominal sternum.

Fig. 4.—*Hypoctonus granosus*, sp. n., ♀. First abdominal sternum.

Genus TYPOPELTIS, Poc.

Typopeltis Stimpsonii (Wood). (Figs. 2, 2 a.)

A specimen of what is very likely the hitherto unknown male of this species has been recently kindly presented to the British Museum by Prof. d'Arcy Thompson, C.B. The specimen was collected in Yokohama.

In the subjoined table of the species of the genus, based upon the male sex, some of the distinguishing features of this species are set forth, to show its affinity to those that have been already described.

Typopeltis Dalyi, sp. n. (Figs. 1-1 c.)

♂.—*Colour*. Deep reddish black, chelæ darker; legs, especially towards the extremities, clearer red; coxæ and genital operculum castaneous, shining; upperside of trunk densely punctulate and uniformly but not very closely granular.

Chelæ with coxæ punctured and densely punctulate, granular laterally; trochanter granular, armed with two small teeth below on the lower half of its anterior edge, the upper of the two nearly obsolete; its upperside almost unarmed in front, only furnished with one or two obsolete teeth, the angle with two or three small teeth, the inner edge un-toothed; femur granular, armed with a single inferior tooth; tibia granular and punctate, the apophysis long, its distal end bent downwards almost at right angles, with a large apical expansion; the convex upper rim of this expansion armed with a series of 9-10 teeth, its inferior angle running out into a sub-cylindrical prominence; base of apophysis on inner side weakly denticulate; inner edge of hand lightly convex, armed with a row of sharp denticles; upperside of hand with a few granules, the rest punctured; tip of movable finger sharp and closing against the truncate area of the tibial apophysis close to the sub-cylindrical prominence.

Legs 2-4 with tibial spine.

Genital operculum nearly smooth, swollen, obsoletely grooved and rugose in the middle, depressed posteriorly in the middle line.

♀.—Resembles the male in colour.

Chela with trochanter armed below with two subequal separated teeth; armed above normally with five teeth, three inner smaller, one anterior and one angular much larger; femur with an upper and a lower spine; apophysis thick, abruptly narrowed at the apex, its anterior edge convex, closely dentate, posterior border straight, armed with one long distal and two smaller teeth.

Tarsi of first leg different on the two sides; second, third, and fourth segments longish, subequal; fifth and sixth a little shorter, subequal, seventh and eighth still shorter, subequal; fifth to eighth black and thickened below; ninth sometimes with an inferior apical notch, sometimes without it,

sometimes also there is a notch or depression at the distal end of the lower side of the fifth.

Genital operculum with its posterior border transversely emarginate in its middle third, marked on each side with a pair of posteriorly converging groove-like depressions; middle of anterior portion lightly depressed on each side, the depression emphasizing a low tuberculiform eminence.

Total length 45 millim.

Loc. Lacan, via Raheng in Siam.

Two adult males and two females sent with an example of *Thelyphonus Schimkewitschii* by Mr. Mahon Daly, to whom I have great pleasure in dedicating this fine new species.

Allied to *T. niger* (Farn.) from China, but at once recognizable by the very weak spine-armature of the trochanter of the chela and the greater number of spines on the clubbed tip of the tibial apophysis in the male.

The female of *T. niger* is unknown; that of *T. Dalyi* differs from that of *T. Stimpsonii*, Wood, in having the teeth on the trochanter of the chela smaller, the apophysis much thicker, and the genital operculum without a median impression.

Kraepelin's table of the males of this genus may be now supplemented as follows:—

- | | | |
|------------------|--|--------------------------|
| a. | Tibial apophysis straight, attenuate, apex not expanded; inner edge of hand and immovable finger straight | <i>amurensis.</i> |
| b. | Tibial apophysis bent, apex clubbed; inner edge of hand and immovable finger sinuous. | |
| a ¹ . | Anterior border of upperside of trochanter at most armed with a small denticle, inner edge of hand without an internal basal prominence. | |
| a ² . | Tibial apophysis armed apically with a series of about 10 small and 1 large inferior teeth; inner angle of trochanter armed with 3 small denticles | <i>Dalyi.</i> |
| b ² . | Tibial apophysis only armed with 3 apical teeth; trochanter armed on its inner angle with 1 large and 2 smaller teeth | <i>niger.</i> |
| b ¹ . | Anterior border of upperside of trochanter armed with a large tooth, longer than the angular tooth; inner edge of hand with strong basal prominence. | |
| a ³ . | Anterior vertical edge of trochanter armed with a series of 3 small subsimilar teeth below the large superior tooth | <i>crucifer, Poc.</i> |
| b ³ . | Anterior vertical crest of trochanter armed with only 2 teeth below the superior large tooth, the upper of the two large, quadrate, and bifid | <i>Stimpsonii, Wood.</i> |

Genus MASTIGOPROCTUS, Poc.

Mastigoproctus liochirus, sp. n.

Colour. Upperside of trunk black; chelæ and legs deep brown, much redder towards the distal extremities; lower side of abdomen reddish brown, black marginally and on the eighth sternite.

Upperside of *trunk* sculptured with dense punctuation and sparsely granular; fore part of carapace smooth.

Sterna smooth and shining, sparsely punctured; the first with the posterior border widely rounded, black in the middle, with a shallow impression on each side of the median black area, and a shallow impression near the middle of the plate.

Chelæ with coxæ sparsely punctured; trochanter armed with 2 teeth below and 6 teeth above, the one on the angle the longest, the outer of the two teeth on the anterior border much smaller than the inner; femur and tibia granular below; upperside of all the segments very smooth and shining, only sparsely punctured; femur only minutely toothed on inner side above; tibia with a single tooth on inner side near base of apophysis; apophysis with one tooth on posterior side at distal end; hand shaped much like that of female *M. giganteus*, but thicker; immovable finger thicker than in that species. Movable fang of mandible without basal angle or process on the outer side.

Maxillary process of coxa armed above with a single row of about 7 spiniform teeth.

Tarsus of first leg with second and third segments subequal; second and third legs without tibial spur, fourth with tibial spur.

Ommatoids long and elliptical, less than their long diameter apart.

Total length 37 millim.

Loc. Guatemala (*Sarg coll.*). A single subadult male example.

At once recognizable from the rest of the species of the genus *Mastigoproctus*, as diagnosed by Kraepelin, by the presence of tibial spurs only on the fourth leg, the smoothness of the chelæ, &c.

Order SOLIFUGÆ.

Genus SOLPUGA, Licht.

Solpuga sagittaria, sp. n. (Figs. 5, 5 a.)

♂.—*Colour* of head, mandibles, and limbs a pale ochre-yellow; the femora and patellæ of the posterior two pairs

tinted with pale reddish brown; abdomen greyish black on tergal plates, paler at the sides.

Head-plate considerably more in width than half the length of the patella of the palp (8:12.5), a little less than tibia of fourth leg (8:10.5); palp longer than third leg, its tarsus and tibia almost equal to its tibia.

Upper fang of *mandible* strongly toothed, rather strongly curved at the apex; the teeth arising some distance behind the tip, the first and second teeth large and subequal, the third minute, fourth only a little larger, the fifth large. Basal membranous part of flagellum not strongly elevated, its border with almost an even semicircular curvature; flagellum bent abruptly backwards from a point on a level with the second tooth, shortish, not reaching the middle of the upperside of the mandible, its distal third with a strong outward curvature, the terminal portion straight and armed at its base with two strong serrate teeth, an external and an inferior; the apex pointed and barbed somewhat like an arrow-head. Lower jaw of mandible armed with three teeth, two large and one small, the latter attached to the base of the first large tooth.

♀.—Resembling the female of *S. Darlingii* in dentition of mandibles and most structural features, but with the legs distinctly shorter. For example, in *S. Darlingii* the width of the head is shorter than the patella and only equal to the length of the tibia of the palp (head 11 millim., tibia 12.5), whereas in *S. sagittaria* the head exceeds the patella and is almost equal to the tibia and tarsus of the palp (head 11 millim., patella 10.5, tibia 9). So, too, in the case of the fourth legs, in *S. Darlingii* the head is less than the length of the patella and tibia (11:11.5), whereas in *S. sagittaria* the head exceeds these segments (11:9.5). The head, mandibles, and legs, too, are of a ruddier hue in *S. sagittaria*, and not clouded with greyish black, as is the case in *S. Darlingii*, where, apart from the blackish tint, the jaws and legs are a paler yellow.

Measurements in millimetres.—♂. Total length 41; width of head 8; length of mandible to tip of upper fang 10.5; length of palp 39; patella of palp 12.5; tibia and tarsus 12.5; fourth leg 57.5, its patella and tibia 11.2.

♀. Total length 54; width of head 11; length of mandible 15; length of palp 37, of fourth leg 50* (for the separate segments see above).

Loc. Mashonaland: Mazoë (*J. ff. Darling*).

* The measurements of the limbs are taken along the external side and include the trochanters, but not the coxæ, which constitute the sternal area of the cephalothorax.

The female of this species may be readily distinguished from that of *S. Darlingii*, the larger of the two known species from the Umfuli River, by the characters mentioned in the diagnosis; the male differs sharply from that of *Darlingii* in the structure of the flagellum, this organ being shorter, straighter, unarmed, and with a lower basal membranous portion.

Of this species Mr. Darling writes:—"I often heard them stridulate, and one of the large specimens made a noise like a policeman's rattle when put into a match-box. They hang on like bull-dogs, and often when caught with my handkerchief I found quite a difficulty in making them let go their hold, they grip with such tenacity."

Genus RHAGODES, Poc.

Rhagodes anthracinus, sp. n.

♀.—*Colour.* Carapace black, with antero-lateral edge pale; mandibles black, redder towards base of fingers; abdomen black above and below; coxal area of cephalothorax blackish; palpi with femur black; patella yellow; protarsus and tarsus black; first and second legs mostly yellow, infusate at base, tarsus of first reddish brown; third leg mostly yellow, with a broad black ring round femur and patella, the ring on the latter incomplete above; fourth leg with femur infusate below.

Total length 17 millim.

Loc. Somaliland (*Miss Gillett*).

Resembling *R. melanus* in the uniform blackness of the head, mandibles, and abdomen, but differing in the colour of the legs. Recognizable from *R. Phillipsii* and *R. ornatus* by the uniform blackness of body and mandibles and blackness of femur of palp.

Genus BLOSSIA, Simon.

Blossia setifera, sp. n. (Figs. 6, 6 a.)

Colour a tolerably uniform dark greyish or reddish brown above, the underside and the bases of the appendages pale; tarsi of legs also pale; femur of fourth leg reddish in its basal half.

Sides of *head*, thoracic and abdominal *terga*, and *mandibles* beset with long cylindrical setiform spines and studded with short, erect, thinner bristles. *Ocular tubercle* with two long setæ in front and two rows of shorter bristles behind between the eyes. *Mandibles* with first and second teeth of upper jaw large, subequal, third tooth quite small, fourth larger than third but smaller than second: lower jaw armed with four

teeth, two principal and two minor, as shown in fig. 6 a; the two minor teeth situated between the others, widely separated and very small—the anterior on the base of the first major tooth, which is large, nearly horizontal along the summit, and apically subbid; the posterior close to the base in front of the posterior major tooth, which is conical: *flagellum* rising on a level with the second tooth of the upper jaw, directed backwards, long, horny, with a membranous inferior edge; the distal end long, attenuate, and apically hooked.

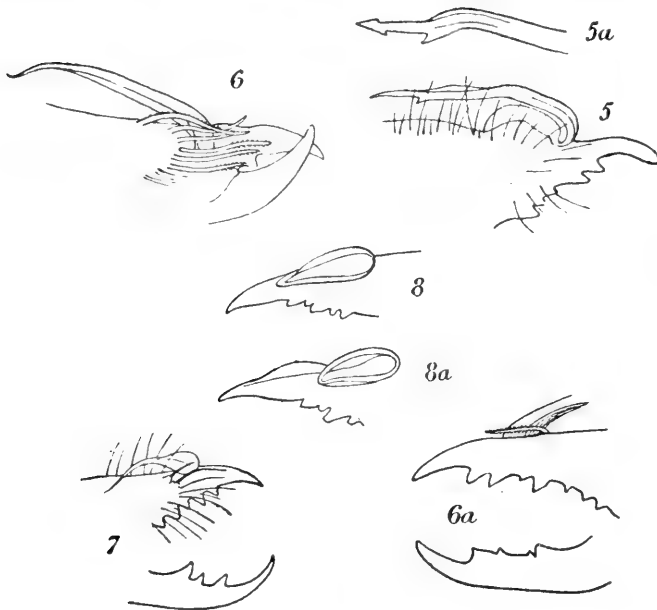


Fig. 5.—*Solpuga sagittaria*, sp. n., ♂. Upper jaw.

Fig. 5 a.—Ditto. Apex of flagellum.

Fig. 6.—*Blossia setifera*, sp. n., ♂. Upper jaw and flagellum, from inner side.

Fig. 6 a.—Ditto. Upper and lower jaw, from outer side.

Fig. 7.—*Ceroma pallidum*, sp. n., ♂. Jaws, from inner side.

Fig. 8.—*Pseudocleobis alticola*, sp. n. Upper jaw and flagellum.

Fig. 8 a.—*Pseudocleobis andinus*, Poc. Upper jaw and flagellum.

Palpi without spines, except for a row of three short spines on the outer side of the under surface of the patella and tibia; all the segments covered thickly with erect hairs and bearing some long bristles; the patella more than twice as long as the width of the head.

Tibiae: second and third *legs* with 3 spines on the posterior side.

Total length 10 millim.

Loc. Mashonaland: Salisbury (*G. A. K. Marshall*).

Only one species of the genus *Blossia* is up to the present time known, namely *B. spinosa* of Simon (*Ann. Soc. Ent. Fr.* 1880, p. 400), from Lower Egypt and Algeria. The genus, however, has been recorded from S. Africa by Kraepelin, who mentions but refrains from naming, except as doubtfully *spinosa*, some females procured at Moritzburg (? Pietermaritzburg). More probably these females belong to the species here described, which at least differs from *B. spinosa* in the dentition of the jaws of the mandible. In *B. spinosa* the fourth tooth of the upper jaw is a little larger than the first and second, and in the lower jaw there is only one intermediate minor tooth.

Genus GLUVIOPSIS, Kraep.

Gluviopsis atratus, sp. n.

♀.—*Colour* mostly a tolerably uniform deep blackish brown, relieved by the pale-coloured bristles and hairs; lower surface and base of appendages flavous; legs of first and second pairs mostly pale, tarsus and apex of tibia of third and fourth legs pale.

Width of *head* about equal to length of patella and to tibia and tarsus of palp, shorter than patella and longer than tibia of fourth leg; mandibles beset above with slender erect cylindrical bristles; upper jaw strong, convex above, slender and depressed apically, the first and second teeth large.

Palpus about three times as long as width of head; patella armed below with 4-5 pairs of short slender spines; tibia with 6 pairs of stouter shorter spines; tarsus also furnished below with bristles and spines on inner side. *Tarsi* of second and third legs hairy beneath, armed apically with 4 pairs of spines and with 1 anterior basal spine; tarsus of fourth armed with 6 pairs of spines.

♂.—Much more coarsely and thickly spined than female. Terminal fang of jaws long and slender, the upper nearly straight, bent slightly downwards. *Palpi* long; patella and also tibia and tarsus about once and a half times the width of the head; patella of fourth leg nearly twice as long and tibia about one fifth longer than width of head. Modified *bristles* of second abdominal sternum long, slender, incrassate, then apically acuminate, three in number on each side.

Measurements in millimetres.—

	Total length.	Width of head.	Length of palpus.	Length of first leg.	Patella of palp.	Tibia and tarsus of palp.
♂ ..	14	3.5	11.5	17.5	3.6	3.6
♀ ..	13	3	13	20	4.8	4.8

Loc. Western India, Poona and Khandeish (*Bombay Nat. Hist. Soc.*).

The male of this species may be at once recognized from that of *G. rufescens*, Pocock (*Ann. & Mag. Nat. Hist.* (6) xx. p. 271 (1897), sub *Blossia*), from S. Arabia, by the longer terminal fang of the upper jaw, the small size of the first two teeth, the shorter palpi and legs, and the different form of the modified hairs on the second abdominal sternum. In *G. rufescens* the palpi are about seven times as long as the width of the head (21:3), and the fourth leg more than eight times as long (26:3), and the modified bristles on the abdomen are short and strongly clavate.

The species described by me as *Paracleobis Balfouri* and *Paracleobis nigripalpis* fall into the genus *Gluviopsis*, as Kraepelin has already suggested.

Genus PSEUDOCLEOBIS, nov.

Differing from *Cleobis*, Sim., as recently restricted and defined by Kraepelin (*Jahrb. Hamb. Wiss. Anst.* xvi. pp. 223-227, 1899) in the following particulars:—

The tibia and protarsus of the palp are furnished below with short paired spines in both sexes. In the male the third tooth of the upper jaw is larger than the first and much larger than the second, which is minute and lodged in between the other two. In the female the third tooth is also larger than the first and second, but its basal width is less than that of these two teeth taken together.

Also allied to *Mummucia*, but having the fourth tarsus distinctly trisegmented.

Type *P. andinus*, Pocock*.

Pseudocleobis alticola, sp. n. (Figs. 8, 8a.)

♂.—Closely resembling *P. andinus* in colour, but rather more deeply infuscate. Differing from that species in having no crest on the superior side of the upper jaw of the mandible and in the shortness of the palpi. In *P. andinus* the patella of the palp and of fourth leg are a little more than twice as long as the width of the head; in *P. alticola* these segments are barely twice the width of the head.

♀.—Tarsi of second and third legs with 4 pairs of spines and 1 basal anterior spine; of fourth with 6 pairs of spines, 2 pairs on the basal, 1 pair on the median segment, and three at the apex of the third segment; tibia of these legs with 3 posterior and 2 anterior spines, without superior spines as in *P. andinus*.

* In Fitzgerald's 'The Highest Andes,' p. 359 (1899).

Measurements in millimetres.—♂. Total length 10; width of head 2·6; length of palpus 14·5, its patella 5; fourth leg 18, its patella 4·5. (In *P. andinus* ♂ the head is 2·8; the palpus 19, its patella 7; fourth leg 25 from base, its patella 7.)

Loc. Bolivian Andes, Mount Sorata (♂ type) (*Sir Martin Conway*).

Genus CEROMA, Karsch.

Ceroma pallidum, sp. n. (Fig. 7.)

♂.—*Colour* a tolerably uniform ochre-yellow; ocular tubercle black; abdominal terga greyish or subolivaceous, with a large clear yellow patch at the posterior end of the abdomen, involving the ninth, tenth, and part of the eighth somites.

Width of *head* about two thirds the length of the patella of the palp, less than two thirds length of tibia and tarsus of palp, only a little more than half the length of the patella of the fourth leg.

Mandibles but little modified: first and second teeth of upper jaw large, subequal, and sharp; third small, fourth larger than third but not so large as second: lower jaw armed with three normal sharp and conical teeth, the median the smallest: flagellum very short, the apex filiform, but not extending back beyond the middle of the upperside of the mandible, the basal expanded portion protected on the inner side by one strong spine, and beneath it two bristles, stout at the base and filiform at the apex.

Legs and palpi long; palpus about four and a half times and fourth leg about seven times as long as width of head.

Measurements in millimetres.—Total length 10; width of head 2·5; length of palpus 11·5, of fourth leg 18.

Loc. Garies, Little Namaqualand (*Dr. Broom*).

At once recognizable from *C. Johnstoni*, Pocock (*Ann. & Mag. Nat. Hist.* (6) xx. p. 253, figs. 1, 1 a), from Nyasaland, and from *C. ornatum*, Karsch (= *C. variatum*, Pocock, *Proc. Zool. Soc.* 1898, p. 523, pl. xlii. fig. 16, ♂), from Masailand, by the shortness of the flagellum, the nearly uniform pale colouring, greater length of appendages, &c.*

* In *Jahrb. Hamb. Wiss. Anst.* xvi. p. 247 (1899), Kraepelin cites amongst the recognized species of *Ceroma* two forms named *Ceroma Sclateri* and *Ceroma capense*, both purporting to be described by Dr. Purcell, of the South African Museum, Cape Town. I cannot discover that the descriptions of these species have yet been published. It is a thousand pities that *nomina nuda* should make their appearance in literature in this way.

N.B.—Since writing this note I have learnt that pt. iii. of the 'Annals of the South African Museum,' containing the descriptions of these and many other new species of Solifugæ, not to mention other Arthropods, has been issued, bearing the date December 1899, although it does not appear to have been published before February 1900.

XXXIX.—*Descriptions of new Reptiles from Perak, Malay Peninsula.* By G. A. BOULENGER, F.R.S.

THE reptiles here described form part of a collection submitted to me for identification by Mr. L. Wray, Curator of the Perak Museum, to which they belong.

Lygosoma larutense.

Section *Lygosoma*. Body much elongate; limbs minute, didactyle. Snout short, obtuse. Lower eyelid scaly. Nostril pierced in the anterior part of the nasal; no supranasal; frontonasal twice as broad as long, forming sutures with the rostral and with the frontal; præfrontals small; frontal slightly longer than broad, broader than the supraocular region, in contact with the first and second supraoculars; four supraoculars; seven supraciliaries; frontoparietals distinct; interparietal a little longer than the frontoparietals; parietals forming a suture behind the interparietal; fourth upper labial entering the orbit, second and third smaller than first and fourth. Ear completely hidden. 26 smooth scales round the middle of the body, equal. A pair of enlarged præanals. Hind limb twice as long as fore limb; fingers tubercle-like, clawed, equal; second toe twice as long as first. Tail thick. Uniform brownish in spirit (faded?).

	millim.
Total length	242
Head	13
Width of head	9
Body	101
Fore limb	7
Hind limb	13
Tail	128

A single specimen from Maxwell's Hill, Larut, 3000 feet elevation.

Closely allied to *L. sumatrense*, Gthr. Scales round the body more numerous and hind limb less rudimentary.

Hydrophis rhombifer.

Head very small; body long, extremely slender anteriorly.

Snout projecting beyond the lower jaw; rostral considerably broader than deep; frontal very small, longer than broad, as long as its distance from the rostral; one præ- and one postocular; a single anterior temporal; seven upper labials, third and fourth entering the eye, second largest and in contact with the præfrontal; two pairs of small chin-shields, in contact with each other. 31 scales round the neck, 55 round the body; scales smooth, rhomboidal and imbricate anteriorly, elsewhere hexagonal, subimbricate, each with one or several small tubercles. Ventrals very small but distinct throughout, 422. Head and neck black, the latter with two series of round yellowish spots; body yellowish white, with a series of blackish rhomboidal spots on the back, these spots confluent on the vertebral line; end of tail black.

Total length 620 millim.; tail 47.

Very closely allied to *H. fasciatus*, Schn., from which it is distinguished by the broader rostral, the greater number of scales round the body, and the coloration; the pattern of the latter can, however, be derived without difficulty from that of *H. fasciatus*.

Distira Wrayi.

Head moderate; body elongate, its greatest depth twice and one third the diameter of the neck. Rostral considerably broader than deep; nasals a little shorter than the frontal, twice as long as the suture between the præfrontals; frontal nearly twice as long as broad, slightly shorter than its distance from the rostral, two thirds the length of the parietals; one præ- and one postocular; a single very large anterior temporal, nearly reaching the oral border; seven upper labials, second largest and in contact with the præfrontal, third and fourth entering the eye; two pairs of chin-shields, in contact with each other. The head-shields studded with small granules. Scales feebly imbricate, very strongly keeled, many of the keels broken up into two tubercles; 27 scales round the neck, 37 round the body. Ventrals 296, small but distinct throughout, bicarinate, the keels mostly broken up into tubercles. Tail ending in a spine-like compressed scale. Blackish, with 67 narrow light annuli, which are olive on the back, yellow on the sides and on the belly.

Total length 940 millim.

A single male specimen from the Perak coast.

This well-marked species appears to be most nearly related to *D. tuberculata*, Anderson, which is known to me only from the description.

Amblycephalus vertebralis.

Rostral slightly broader than deep; internasals a little

shorter than the præfrontals; latter entering the eye; frontal slightly longer than broad, much longer than its distance from the end of the snout, a little shorter than the parietals; loreal short, entering the eye; no præocular; two postoculars; temporals 2+2; seven upper labials, third and fourth entering the eye, seventh very long; first lower labial narrow, forming a suture with its fellow behind the symphysial; second lower labial in contact with an azygous chin-shield; three pairs of large chin-shields, followed by a very large azygous one, all broader than long. Body strongly compressed, keeled above. Scales smooth, in 15 rows, vertebrales strongly enlarged. Ventrals 194; anal entire; subcaudals 63 (♀). Reddish brown above, with small dark brown spots and ill-defined dark cross-bands; an interrupted yellow vertebral line, formed by a small spot on each median scale; labials and chin-shields yellowish, edged with dark brown; belly yellowish, with some brown spots on the sides.

Total length 460 millim.

A single specimen from Maxwell's Hill, Larut, 3000 feet elevation.

Most nearly allied to *A. monticola*, Cantor, which differs in the presence of a præocular below the loreal and the different arrangement of the shields on the chin.

XL.—*Description of a new Genus and Species of Longicorn Coleoptera from Central Formosa.* By C. J. GAHAN, M.A.

DICELOSTERNUS, gen. nov.

Head vertical in front, deeply concave between the antennal tubercles; the latter deeply emarginate, with an acute process on the inner side of the emargination and on the outer side a cariniform ridge which extends downwards between the side and front of the head. Antennæ of the female reaching to about the apex of the elytra; first joint stout, with a foveate impression near the base; third joint longer than first or fourth, slightly thickened at the apex, the joints from the fourth to tenth each widened gradually from base to apex, narrowed to an acute edge on the anterior side, and more or less acutely angulate at the apex. Prothorax armed with a conical tubercle just behind the middle on each side; the disk strongly elevated, the elevation being highest just behind the middle, sloped gradually to the base in front, and more abruptly sloped behind. Scutellum elongate, sharply acuminate

behind, and canaliculate in the middle near the base. Elytra slightly depressed and canaliculate along each side of the scutellum, rounded at the apex. Legs increasing in length from the first to the third pair; femora stalked at the base, thickened into a fusiform club between the middle and the apex. Intercostal part of prosternum furnished with a downwardly-directed conical tubercle; mesosternum with a large subcylindrical process, which projects downwards for some distance below the level of the coxæ.

This genus must be placed in Lacordaire's "groupe" *Stenaspidæ*. In many of its characters it seems to come nearest to *Euryphagus*, Thoms., but in the structure of the head it is quite different, being in this respect very like the genus *Philagathes*, Thoms.

Diclosternus corallinus, sp. n.

Rufus; prothorace opaco, disco valde elevato et punctato-rugoso, versus marginem anticum et ad latera plus minusve transversim rugoso, lateribus pone tuberculos sat abrupte constrictis, et ab tuberculis usque ad marginem anticum gradatim convergentibus; scutello elongato, postice acuminato, supra ad basin canaliculato; elytris rufo-pollitis, fere impunctatis, fascia transversa nigro-velutina pone medium: pedibus rufo-nitidis, coxis genibusque nigris, antennis articulis 3^o ad 7^{um} apice, et sequentibus fere totis, nigris.

Long. 21-27, lat. 8-10 mm.

Hab. Central Formosa (*Holst*).

Almost entirely of a bright reddish colour, the prothorax being rugosely sculptured and opaque, and the rest of the body, including the legs and elytra, more or less highly polished. A little behind the middle of the elytra there is a transverse band, narrowed near the suture, made up of short black hairs springing from small and very closely placed punctures, these punctures being easily seen under a lens near the edges of the band; the rest of the elytral surface is almost wholly impunctate. The coxæ, trochanters, and the tips of the femora and tarsal joints are black, and there is a fringe of short black hairs on the upperside of the hind femora in the middle third of their length. The third and succeeding joints of the antennæ are blackish at the apex and, to a greater or less extent, along the anterior border, the last three or four joints being almost entirely dark brown.

XLI.—*Descriptions of new Coleoptera from Hainan Island, China.* By CHAS. O. WATERHOUSE, F.E.S.

THE British Museum has received a small series of Coleoptera collected in Hainan Island by the late Mr. J. Whitehead, whose death we so greatly deplore.

The following species appear to be undescribed:—

Parnidæ.

Parygrus Whiteheadi, sp. n.

Elongatus, bene convexus, nitidus, nigro-fuscus, pube brevi fusco vestitus; thorace convexo, crebre subtiliter punctato, antice sat angustato, lateribus subrectis; elytris evidenter striato-punctatis, interstitiis leviter convexis, crebre subtilissime punctulatis; tibiis tarsisque rufo-piceis.

Long. 7 mm.

This species most nearly resembles *P. Hardwicki*, McL., from Java. It is at once distinguished from *P. talpoides*, Waterh., by the much more marked striæ of the elytra and by its narrower form. It differs from *P. Hardwicki* in being a trifle broader; the thorax, instead of being evenly gently arcuate at the sides, has them almost rectilinear in the middle, then very gently arcuate before the posterior angles, which are not so much impressed above as they are in *P. Hardwicki*. The lines of punctures on the elytra are rather stronger than in *P. Hardwicki*, the punctures are rather close together, but are rather irregular in size. The interstices are slightly but distinctly convex; the punctuation is very fine and rather close, but not by any means crowded. The tibiæ and tarsi are pitchy red; the claws long and slender, gently curved.

Hab. Hainan Island (*J. Whitehead*).

Cetoniidæ.

*Ingrisma** *Whiteheadi*, sp. n.

Depressus, læte viridis, lævis; thoracis disco, scutello medio, tibiis tarsisque nigris; femoribus et coxis posterioribus rufis.

Long. 25 mm.

♂.—Head green, rather closely punctured, with the front

* Fairmaire, Ann. Soc. Ent. Belge, xxxvii. 1893, p. 293. The genus is given in a note only, and was consequently overlooked in the 'Zoological Record.'

part almost smooth; the vertex, the lateral ridges (which are strongly marked and converge considerably anteriorly), and the extreme front margin black. Thorax black, narrowly bordered with green, the middle with scarcely any punctuation, the sides finely and rather closely punctured but shining. Scutellum green, with two black spots, or almost entirely black. Elytra very much flattened, rather finely punctured, the punctures having a tendency to form lines, the sides almost smooth, with a few transverse rugæ on the outside of the apical callosity. Pygidium not very closely punctured. Anterior femora red above, with a slight projection on the anterior margin near the apex. Tibiæ subparallel, with a slight dilatation near the base posteriorly, and with numerous tubercles on the posterior surface. Middle femora red above. Posterior femora with a red spot. Posterior coxæ and apex of abdomen red.

♀.—Lateral ridges on the head nearly parallel; front of the clypeus broadly black and coarsely rugose. Thorax with the middle distinctly and moderately thickly punctured. Pygidium with the punctures more asperate. Anterior femora with the subapical projection less prominent; tibiæ broad, with a broad triangular tooth on the outer edge, not tuberculate posteriorly.

Teniodera Whiteheadi, sp. n.

Statura *T. ornata*; nigra, opaca, supra planiuscula; thorace sat rugoso, flavo trivittato, vitta mediana abbreviata; scutello vitta flava ornato; elytris rubris, flavo-maculatis, sutura usque post medium sat late nigra; pygidio rugoso, nitido, macula basali triangulari flava. ♀.

Long. 18 mm.

This species is very close to *T. ornata*, Saund. It differs in having the sides of the thorax more parallel posteriorly, so that the hind angles are less rounded; the median yellow vitta extends to the middle, the lateral vittæ occupy the greater part of the sides. The elytra are red except the broad sutural patch, which extends to the second pair of yellow spots. There is a yellow spot at the base inside the humeral callosity. There are two quadrate spots near the suture (one on each elytron), not united as in *T. ornata*, and there are two similar spots considerably behind the middle; there is a spot at the side behind the shoulder and another rather beyond the middle. The pygidium is very rugose, shining, and has a broad triangular yellow patch at the base. The whole of the metasternum is yellow except the middle.

The abdomen has four stripes at the side as in *T. ornata*, but they are broader and rich yellow. Tibiæ and tarsi obscure pitchy red.

Hab. Hainan Island (*J. Whitehead*).

Taniodera (Euselates?) Galei, sp. n.

Statura et color fere *Taniodera quadrivittata*; scutello nigro, vitta flava ornato; pygidio maculis flavis tribus; processu sternali sat magno. ♀.

Long. 20 mm.

Head black, with the front margin pitchy red; with two yellow stripes; the clypeus more deeply incised than in *T. quadrivittata*. Thorax black, with four yellow stripes, the middle ones almost parallel; broader than in *T. quadrivittata* and with the posterior angles less acute. Scutellum elongate, black, with a yellow stripe, which expands at the base. Elytra red, with the scutellar region, the apex, and a stripe extending from the shoulder to beyond the middle, and then dilated towards the suture, black. There are two yellow spots at the suture before the middle, two behind the middle, and one at the apex of each elytron, one on the margin below the shoulder, and one rather behind the middle. The pygidium has an oval spot in the middle and a smaller one on each side. The sides of the sterna are ornamented with yellow spots. The abdomen has a yellow fascia on each side of the basal segment, slightly interrupted in the middle; the second segment has a transverse spot at the side and a longitudinal spot nearer the middle; the third segment has two fasciæ at the side, interrupted in its middle; the fourth segment has a similar fascia, but it is not interrupted. The middle of the abdomen is sparsely punctured, smooth at the base. Tibiæ and tarsi red.

M. Thomson (*Le Nat.* i. 1880, p. 277) has split up the genus *Taniodera* into several genera, with some of which I am unacquainted. *Euselates* is said to have the mesosternal process "magna, cariniformis, apice obtusa." This character would apply to the species I am describing, and it may therefore be provisionally placed in that genus, if it be adopted.

Hab. Hong Kong (*C. Y. Gale*); Hainan Island (*J. Whitehead*).

XLII.—*Description of a new Species of Plectopylis from Tonkin.* By G. K. GUDE, F.Z.S.

Plectopylis lepida, sp. n.

Shell dextral, deeply and widely umbilicated, pale corneous, striated and decussated with microscopic spiral lines above the periphery, smoother below. Spire depressed, apex raised, suture shallow. Whorls 8, slightly convex, increasing slowly and regularly; the last widening rather suddenly, twice as wide as the penultimate, descending shortly in front. Aperture oblique, lunate. Peristome a little thickened and reflexed; the margins united by a very slight ridge on the parietal callus. Parietal wall with a slight denticle near the ridge. Parietal armature consists of a strong curved plate, obliquely descending towards the aperture, and giving off anteriorly two long ridges, the upper low and rather thin, the lower stronger; on the posterior side the plate gives off at its upper extremity a very short support. Palatal armature composed of six folds: the first (upper) thin, horizontal, parallel with the suture; the second also horizontal, longer than the first, descending slightly posteriorly, where it is a little bifurcated; the third, fourth, and fifth vertical, semi-circular, curved (the convex side towards the aperture), and united by a low ridge; the sixth horizontal, rather long and thin, parallel with the lower suture.

Major diam. 13, minor 11.5, alt. 6.5 mm.

Hab. Tonkin, Tinh-Tuc. Type in my collection.

This new species is the smallest of the Tonkinese forms, and differs considerably in the armature from its allies. The vertical palatal folds overlap the parietal plate, leaving scarcely any room for the animal to emerge. The species is unique among its allies in having two horizontal palatal folds above the three vertical folds. In this respect, however, it shows a certain affinity with *P. achatina* and its allies; and this affinity is further evidenced by the fact that the three vertical folds are united by a low ridge; the sinuses between these folds would only have to be filled in to constitute the single vertical plate characteristic of the group of *P. achatina*. *P. lepida* should be placed next to *P. Villedaryi*.

The single specimen was received from a French dealer.

XLIII.—On the Spiral Growth of Appendages in Course of Regeneration in Arthropoda. By EDMOND BORDAGE*.

I.—IN a previous communication to the Academy I noted the spiral manner of growth of limbs in process of regeneration among the Mantidæ. I recalled the fact that this special mode of growth is common to the Phasmidæ and to the Blattidæ †. I should add that this peculiarity ought probably to be met with in the four classes of Arthropoda and in the case of different appendages ‡. So far as insects are concerned, the fact is now proved as regards the limbs. Furthermore, I have been able to convince myself that after amputation the antennæ of the larvæ of Phasmidæ (*Monandroptera* and *Raphiderus*) grow in a spiral until the first moult which follows the mutilation.

Among the Crustacea spiral growth has been determined in *Cancer pagurus*, *Carcinus mænas*, and *Pagurus Bernhardus* by H. Goodsir ('Anatomical and Pathological Observations,' Edinburgh, 1845).

Among the Arachnida the Araneidea show it clearly.

In Myriopoda it has not yet been noted. It seems probable, however, from what few researches have been made upon regeneration of limbs among these Arthropoda. It should most probably be seen at least in Myriopods with well-developed limbs, such as the Scutigerae (*Scutigera*). The latter present a remarkable peculiarity. Before they have attained their full development there can be made out rolled up under the skin, owing to its transparency in the terminal segment of the body, a number of limbs—limbs which do not become free and rectilinear until the following moult. After each moult the body of *Scutigera* gains an additional segment.

II.—I ought, however, to mention that spiral growth is not met with in all Arthropoda. In the lobster, for instance, the thoracic limbs when in process of regeneration grow in a rectilinear manner. This fact is the more remarkable inasmuch

* Translated from 'Comptes Rendus,' cxxix. (1899) pp. 455-457, by Wilfred Mark Webb, F.L.S. From a separate impression communicated by the Author.

† I have just discovered that Mr. H. Brindley had noted this manner of growth in the Blattidæ (Brindley, 'On certain Characters of Reproduced Appendages in Arthropoda,' p. 9, 1898).

‡ Researches, experimental as well as bibliographical, have, however, shown me that this mode of growth is not met with in all the Arthropods, as one would have been at first inclined to suppose.

as the mutilated antennæ of the same crustacean grow in a spiral until the first moult after the injury.

The difference between the two modes of growth is not so great as at first might be imagined. Let us see in what it consists. In Arthropods showing spiral growth, as in those which present the rectilinear method, the surface along which the separation is made between two successive joints of a limb becomes covered by a thin non-chitinous cuticle. In one case as in the other the work of regeneration begins not over the whole surface of the cut, but near the central part, and growth is generally much more rapid in length than in diameter, with the result that the rudiment of the limb in course of development has at first a diameter greatly inferior to that of the stump remaining in place.

If growth proceeds rapidly, as is most usual, and if no turgidity of the limb-rudiment shows itself, the latter, by reason of its flaccidity, is incapable of pressing with any force against the thin cuticle covering over the cut surface. It is only able to distend it slightly in order to obtain necessary room for itself. Under these circumstances it is obliged to coil upon itself while remaining covered by the cuticle, which forms a kind of protecting sheath.

If, however, on the contrary, turgidity shows itself from the beginning of growth, the rudiment of the limb in process of formation, instead of being obliged to coil itself, is able to push before it the thin cuticle endowed with very considerable elasticity. In this case nothing hinders rectilinear growth. The cuticle in question can even mould itself in a more or less perfect way upon the growing limb, and remains until the time of the next moult. It is then cast off with the old chitinous covering of the body, with which it is intimately connected.

To epitomize the question, the development of the limb will follow the spiral or the rectilinear form, according as there is flaccidity or turgidity of the rudiment of the limb being replaced at the beginning of its formation.

III.—So far as insects are concerned [Mantidæ, Blattidæ*, and Orthoptera saltatoria], regeneration of a part of the limb after *artificial severance* most often takes place by means of the spiral manner of growth. I have nevertheless found some exceptions which can be explained easily enough also and considered as a particular case of the more usual process. Thus, among the Phasmidæ, whilst a limb amputated by self-mutilation regenerates itself according to the method involving spiral growth, the regeneration of part of a limb

* Cf. H. H. Brindley, 'On certain Characters of Reproduced Appendages in Arthropoda,' p. 9 (1898).

removed by an artificial cut, on the other hand, follows the method of rectilinear growth [see Bordage, "Régénération des membres chez les Phasmides après des sections artificielles" (Ann. Soc. Entom. de France, p. 87, 1898)].

In the paper referred to, after having indicated that the growth of self-mutilated limbs in course of replacement takes place with relatively remarkable speed, I added that, on the contrary, in the case of parts of limbs artificially removed by cutting it proceeds with the greatest slowness. The part, however, in course of regeneration after artificial severance having of necessity immediately after the next moult the same diameter as the termination of the stump of greater or less length remaining in place, it follows that growth in diameter must be quite as rapid as in the Mantidæ and Blattidæ. It is even sometimes as rapid as the growth in length* and that exactly at the commencement of the regenerative process, but at this period alone. Afterwards it slackens considerably and follows the speed of growth in diameter of the whole limb with which it is to be blended.

In this way the work of regeneration of a part of a limb which has started, as is the rule, near the central portion of the cut has already spread to the whole surface of the latter before the rudiment of the limb has attained an appreciable length. This rudiment possesses then the diameter of the part of which it is a prolongation, and its insignificant length does not compel it to coil upon itself under the protecting cuticle, as would certainly happen if its growth in length were rapid and if its diameter remained at the same time much smaller than that of the stump which it must complete. It can then stretch the thin cuticle before it during its whole extension and grow rectilinearly.

I have been able to determine that the same thing happens sometimes in Orthoptera saltatoria following artificial division carried out on the two front pairs of limbs either on the lower part of the tibia or on the first joints of the tarsus in the jumping-legs. Here, however, this result is not constant, as in the Phasmidæ. It only follows in the case where, from some cause or other, regeneration takes place with great slowness. Otherwise the growth is spiral.

We have, then, a second cause leading to the rectilinear growth of a member in course of regeneration. It is proper to add that in this case turgidity seems also to play a certain part.

* Thus I have determined that in a larva of *Monandroptera inuncans*, after the moult, which occurred in the first place some time after the artificial severance of a limb 2 millim. in diameter at the point where section had been performed, the terminal projection formed by the part in course of regeneration had itself scarcely reached 2 millim. in length.

BIBLIOGRAPHICAL NOTICE.

Zoological Results based on Material from New Britain, New Guinea, Loyalty Islands, and elsewhere, collected during the Years 1895, 1896, and 1897, by Arthur Willey, D.Sc. Lond., Hon. M.A. Cantab., late Balfour Student of the University of Cambridge. Part III. Cambridge, 1899.

THE third part of Dr. Willey's 'Zoological Results' contains only three articles, but each of these is in its own way a valuable contribution to zoological literature.

The first paper is by Dr. Hans Gadow and is entitled "Orthogenetic Variation in the Shells of Chelonia." Dr. Gadow bases his remarks on an examination of the shells of 20 newly-hatched specimens of the Loggerhead (*Thalasseochelys caretta*), collected by Dr. Willey from one nest in New Britain, and of numerous individuals of various ages in different museums. Altogether his material comprised 76 specimens. The arrangement of the epidermal scutes in these specimens showed considerable variation, especially in the younger individuals, and Dr. Gadow, looking upon these variations as atavistic, draws from them important conclusions as to the evolution of the carapace in the Chelonia. The gist of these conclusions is contained in the following extract:—

"At an early ancestral stage, not necessarily that of the primordial Chelonian, the plates and scutes of the back were arranged as follows:—All the metameres carried originally a series of transversely arranged dermal plates and scutes, which in the region of the trunk, according to the greater bulk of the body, increased in size, converging towards the root of the neck and upon the tail. About 14 metameres were distinguished by the greater size of the dermal plates, each transverse series consisting of a median or neural and three pairs of lateral elements, in all eight. The median pair fused into an unpaired neural. The next lateral pair became the costal, the outermost or most lateral the marginal set. The intermediate row between these two still survives in some recent genera as the so-called supramarginals; it became gradually suppressed owing to the increasing size of the costals.

"The last costals, say those of the 15th to 20th metameres, became likewise suppressed in conformity with the shaping of the trunk; the three last neurals were turned into pygals and the last pair of marginals closed round the posterior end A similar reduction seems to have taken place at the root of the neck

"A later phylogenetic stage would be characterised by the suppression of the supramarginals, and by the reduction from eight to seven to six and ultimately to even less transverse series of epidermal scutes, while the constituting elements of the dermal armour after having been welded into the formation of the carapace remain comparatively constant."

A remarkable feature of this process of reduction of the epidermal scutes is that it takes place (in the life-history of the Loggerhead) not by loss of scutes at either end, but by the elimination of elements

from the midst of the series, viz. in the region of the original 2nd, 5th, and 7th transverse rows.

The second and longest communication is by Dr. Willey himself, on "Enteropneusta from the South Pacific, with Notes on the West-Indian species." After a few introductory remarks Dr. Willey proceeds to a synopsis of the families and genera of Enteropneusta, recognizing in the group three families: the Ptychoderidæ, Spengelidæ, and Balanoglossidæ. Next comes the systematic description of several South-Pacific species, including three not previously described, and some notes on the West-Indian forms, with descriptions of two new species. Finally, under the heading of "Morphology of the Enteropneusta," there is a lengthy discussion of the various features of the group which betray a relationship with the Chordata. In the specific descriptions, which are very full and careful, and include remarks on the colour and œcology of the animals, very great attention is paid to internal features.

The pages devoted to theoretical questions are beyond doubt a most important contribution to the discussion on the vexed question of the ancestry of the Chordata. The matter is divided into nine heads, dealing respectively with the gill-slits, the proboscis pores, the origin of the vertebrate kidney, the nervous system, the fate of the genital pleuræ of Enteropneusts, the neurenteric canal of vertebrates, the notochord, the branchial bars, and the endostyle. Throughout the discussion the dominating idea is that of the change of structure of an existing organ with its change in function. An origin *de novo* is not postulated for any structure, but a number of characteristic chordate features are derived from pre-existing enteropneustan organs, on the supposition of a change of function.

It is not possible here to do more than touch shortly on each of the heads we have mentioned above, but some indication of Dr. Willey's views on these points will probably be welcome to many. In treating of the gill-slits it is sought to show that they were at first unlimited in number and coextensive with the gonads, the oxygenation of which, and not respiration, was their primary function. In the second section, on the proboscis pores, it is claimed that the pore-canal of the proboscis of Enteropneusta is homologous with the neuro-hypophysial canal of the ascidian larva (the "primordium" of the adult subneural gland), the proboscis pore being here represented by the pore leading from the neurohypophysial canal into the cerebral vesicle. In *Amphioxus* the proboscis pore-canal has become Kölliker's olfactory pit, into which the neural canal opens by the neuropore. The view that the preoral pit of the larva represents the left division of the head-cavity is upheld, and the latter is compared with the left proboscis cœlome of the Enteropneusta. The opening of the preoral pit to the exterior represents the communication between the cœlome and the pore-canal. The nephric tubules of *Amphioxus* (and so of the Chordates) are derived from a series of "regional pore-canals" continuous with that comprising the proboscis, collar, and truncal pores (proto-, meso-, and opisthomeria pores). It will be seen that

Dr. Willey's speculations bring to a climax the extremely interesting series of researches on the primary divisions of the chordate coelome and their communications with the exterior which we owe to various members of the Cambridge school.

Treating of the central nervous system, the following conclusion is reached:—"The medullary tube of the collar of Enteropneusta is the homologue of the cerebral vesicle only of *Amphioxus* and the ascidian tadpole, and probably represents no more than the primary fore-brain (thalamencephalon) of Craniota; the roots of Ptychoderidæ are genetically related to the epiphysal complex of Craniota; in the crucial nuchal region of the Enteropneusta are therefore to be found not the actual but the nearest possible approximation to the actual primordia of the hypophysis cerebri and of the epiphysis cerebri of Craniota." The genital pleuræ of Enteropneusta and their fate are discussed at some length, but not fully, and the conclusion that "the genital folds of Enteropneusta, the atrial folds of *Amphioxus*, and the medullary folds of Vertebrata belong to the system of pleural folds of the body-wall, and are differentiated from a common primordium," is hinted at rather than demonstrated. The medullary tube of Enteropneusts is in some cases formed by the closing in of medullary folds, and the continuation of this process backward would bring the posterior neuropore into association with the blastopore (primitive anus) and form the neurenteric canal. With regard to the notochord of Enteropneusts there are some very interesting observations. This structure, which is a complex one, is considered to have been originally a portion of the postoral gut, the anterior part representing the functional œsophagus of the Actinotrocha. The ventral cæcum represents that of the Actinotrocha of *Phoronis Sabateri*; the lateral pouches are the vestiges of a pair of postoral but pretruncal gill-slits, and are represented in Actinotrocha by the "pleurochords" and in *Cephalodiscus* by actual gill-slits. The notochord of *Cephalodiscus* is related to the vermiform process of the notochord of Enteropneusta. The tongue bars of the gill-slits are organs of respiration, developed on the assumption of the latter function by the slits. In *Amphioxus* they have already become ontogenetically secondary structures, and in the Craniota they are transformed into the thymus. The parabranial ridges of the Enteropneusta are homologous with the endostyle of Cephalochorda and Tunicata. It will be easily understood from the above remarks that Dr. Willey regards the Enteropneusta as not merely allied to the Chordata but "much nearer the direct line of Chordate descent than has generally been supposed."

The last of the three articles in the volume is by Mr. A. E. Shipley, on the Echiurids collected by Dr. Willey. Mr. Shipley's paper contains a short report on the five species of Echiurids in the collection, none of which are new, and a valuable revision of the group, including a key to the genus *Thalassema* and some remarks on the distribution of the genera.

L. A. B.

MISCELLANEOUS.

The Hexagonal Structure formed in Cooling Beeswax in relation to the Cells of Bees.

To the Editors of the 'Annals and Magazine of Natural History.'

GENTLEMEN,—With regard to the explanation of the hexagonal arrangement of the cells of the honeycomb offered in the November number of 'Natural Science' (pp. 347-350) and in the Ann. & Mag. Nat. Hist. ser. 7, vol. v., Jan. 1900, pp. 121-126, by Messrs. Dawson and Woodhead, I would like to point out that crystalline structure in the wax has no direct influence in producing the hexagonal markings seen on the surface of cooling or cooled wax.

This fact is illustrated in Messrs. Dawson and Woodhead's own experiments, for they remark that "the addition to beeswax of resinous substances gave a more pronounced and bolder outline to the hexagons," though they add that they do not consider this to be necessary for the production of the hexagons.

In point of fact the more nearly homogeneous a substance is, the better are the results obtained. In the case of beeswax the minute acicular crystals do not interfere with the phenomena seen on the cooling surface; but colloidal substances, such as Canada balsam, give the best results.

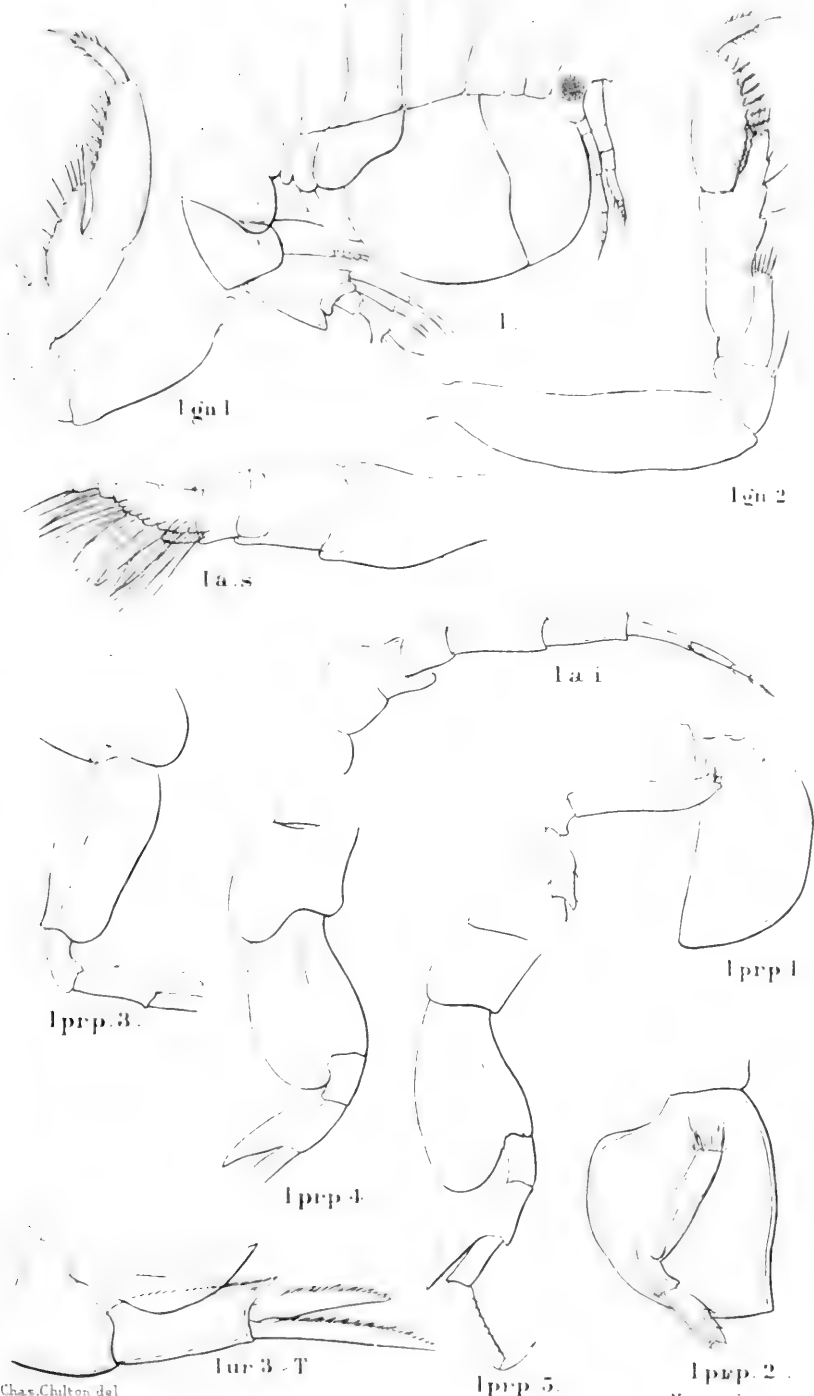
According to the writer's experience, the hexagonal arrangement of the surface is due entirely to the contraction of the uppermost layer, consequent upon the unequal cooling of that surface. If one take, for example, either beeswax, paraffin-wax, Canada balsam, or any other wax or resin, crystalline or non-crystalline, melt it thoroughly, and examine the surface as it slowly cools, he will see a hexagonal tracery, by reflection, marked out over the surface. If a jet of cold air be projected upon this surface the hexagons instantly contract, and on removing the cooling agent they expand again.

As the outcome of this simple phenomenon, due directly to strain and contraction, we have the interesting structures in igneous rocks known as the columnar, perlitic, and spheroidal.

With regard to the melting of the wax by the bees, this is not easy to understand, since the melting-point of beeswax is 145° F., and, according to our best authorities on this subject, the ordinary temperature of the hive is 65° F., although at times during agitation of the bees this may be increased, but not to the amount required to liquefy the wax.

F. CHAPMAN.

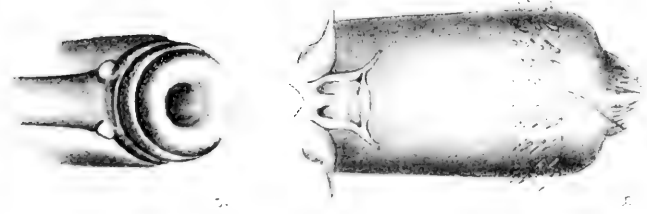
Geological Laboratory,
Royal College of Science, London,
December 5, 1899.

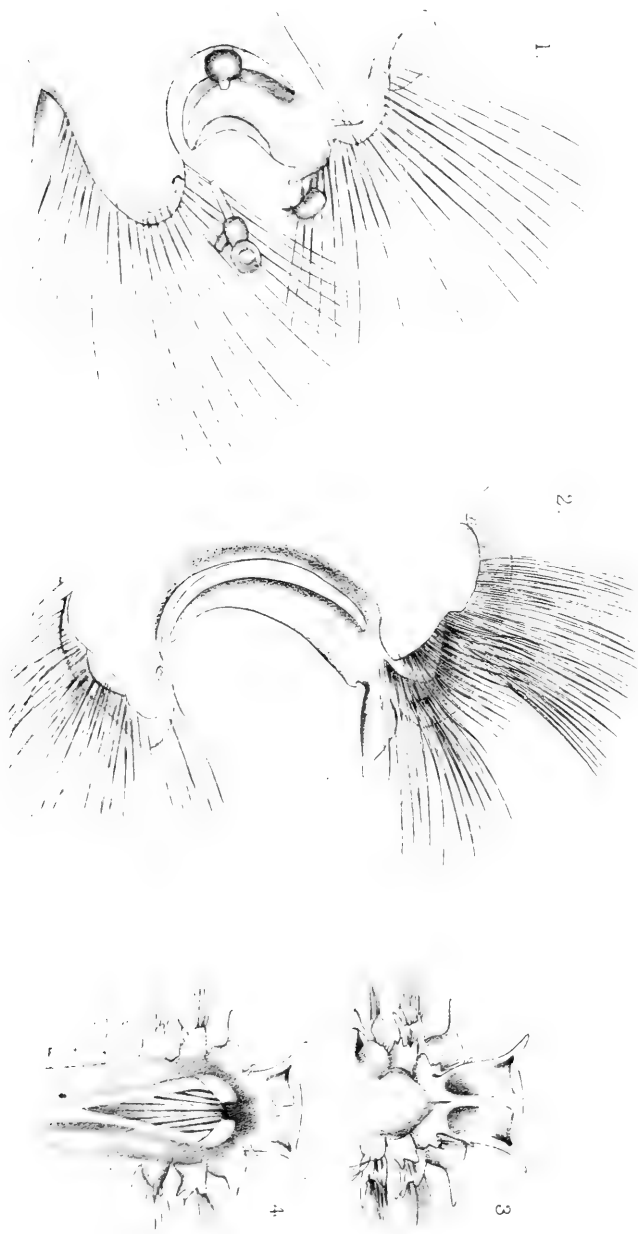


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THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

[SEVENTH SERIES.]

No. 28. APRIL 1900.

XLIV.—*Evidence of an Extinct Eel* (*Urenchelys anglicus*,
sp. n.) *from the English Chalk.* By A. SMITH WOOD-
WARD, F.L.S.

[Plate IX. figs. 1, 1 a.]

THIRTEEN years ago the late Mr. James W. Davis described some imperfect fishes from the Upper Cretaceous of Mount Lebanon which he supposed to represent two extinct species of eels named respectively *Anguilla sahel-almæ* and *A. hakelensis*, in allusion to the localities where the specimens were found*. In 1897 Mr. Raymond Storms pointed out † that the first of these species could not be an Apodal fish of any kind, while the second was so imperfectly described and figured that Davis's generic determination at least was not justified. Quite lately an examination of the original specimens in the British Museum has determined their true relationships. It appears that the so-called *Anguilla sahel-almæ* is really an extinct member of the Notacanthidæ,

* J. W. Davis, "The Fossil Fishes of the Chalk of Mount Lebanon in Syria," *Trans. Roy. Dublin Soc.* [2] vol. iii. (1887), pp. 625, 626, pl. xx. figs. 2, 3.

† R. Storms, "Première Note sur les Poissons Wemmeliens (Éocène supérieur) de la Belgique," *Bull. Soc. Belge Géol.* vol. x. (1897), *Mém.* p. 239.

representing a hitherto unknown genus *Pronotacanthus**, while *Anguilla hakelensis* is an undoubted eel with blunt teeth and a differentiated small caudal fin, which will shortly be described under the generic name of *Urenchelys*†. Evidence of a second species of the latter from Sahel Alma will also be made known.

There is thus no doubt that the Apodal fishes date back to the Cretaceous period. The object of the present paper is to show that they occur even in the English Chalk. A well-preserved skull of a typical eel from the Lower Chalk of Clayton, Sussex, is to be recognized in the Willett Collection in the Brighton Museum. Thanks to the kindness of Edward Crane, Esq., F.G.S., I have had the privilege of studying this fossil and comparing it with the crushed remains from the Lebanon. It is shown of the natural size from both sides in Pl. IX. figs. 1, 1 a.

The cranium in this specimen is very narrow and elongated, and its bones are remarkably stout. The roof in the parietal and frontal regions rises into a sharp median longitudinal ridge, and the occipital border also seems to be raised. The supraoccipital is not preserved, but the anterior portion doubtless of the parietal bones (*pa.*) is produced forwards as a tapering point between the hinder ends of the frontals (*fr.*), of which considerable portions are destroyed. The squamosals are not seen, but there is a sharp postorbital prominence evidently formed by the cartilage-postfrontal or sphenotic (*sp.*). The precise shape and limits of the ethmoidal rostral region (*m.*) are uncertain, the specimen being crushed and imperfect. The mandibular suspensorium is well displayed on each side, the upper articulation of the expanded hyomandibular (*hm.*) extending as far forwards as the sphenotic. The articular end of the quadrate (*qu.*) for the support of the mandible is directly beneath the sphenotic. So far as they can be distinguished, the metapterygoid and entopterygoid appear to be delicate; but a bone which is probably the ectopterygoid (*ec.*) is stouter and may have borne teeth. A still larger and stouter external bone in the upper jaw is doubtless the

* Differing from recent genera in exhibiting dorsal fin-supports without either fin-rays or spines attached to them (Catal. Foss. Fishes B. M. pt. iv.).

† Teeth small, bluntly conical, in numerous series. Slender branchiostegal rays not curving round opercular apparatus. Vertebrae about 100, the hindermost bearing a pair of hypurals. Pectoral fins present; dorsal fin arising immediately behind occiput and extending to the small caudal fin, which is separate. Scales rudimentary. (Catal. Foss. Fishes B. M. pt. iv.)

maxilla (*mx.*); and this element on the left side of the fossil is displaced so as to expose the oral face, which is expanded, slightly concave, and marked with the bases of attachment of clustered small teeth. The premaxillæ (*pmx.*) seem to be fused into a continuous mass with the mesethmoid and vomer. The bone thus formed is expanded and obtusely rounded in front, while its oral face is covered with a dense cluster of small bluntly conical or hemispherical teeth. The mandible (*md.*) is deepest in the coronoid region and tapers towards the symphysis with a characteristic curvature. The oral face of the dentary bone is somewhat expanded and covered with a cluster of obtuse teeth resembling those of the rostrum but smaller. Attached to the hinder border of the mandibular suspensorium on the right side is the well-preserved preoperculum (*p.op.*). This is a rather stout bone, with thickened straight anterior margin and a small semicircular posterior expansion. The operculum (*op.*) is a very small bone, constricted just below its thickened suspensory articulation and slightly expanded distally. There are traces of vertebræ, but these are too imperfect for description.

The osteological characters of the head and opercular apparatus from Clayton now described seem to prove conclusively that the specimen belongs to a typical generalized eel. The only difficulty arises in connexion with its generic and specific determination. Its close resemblance, however, to the head of *Urenchelys*, as known from the Upper Cretaceous of Sahel Alma in the Lebanon, suggests that it may best be referred to this genus, while it differs from each of the known species not only in its much larger size, but also in the depth of the head compared with its length. The species from Sahel Alma has a relatively longer, that from Hakel a relatively shorter, head. The species from the English Chalk may therefore receive the provisional name of *Urenchelys anglicus*.

EXPLANATION OF PLATE IX. FIGS. 1, 1 a.

Fig. 1. *Urenchelys anglicus*, sp. n.; head with opercular apparatus, right and left (1 a) lateral aspects, nat. size.—Lower Chalk; Clayton, Sussex. [Willett Collection, Brighton Museum.]

ec., ectopterygoid; fr., frontal; hm., hyomandibular; m., mesethmoid; md., mandible; mx., maxilla; op., operculum; p.op., preoperculum; pa., parietal; pmx., premaxilla; qu., quadrate; sp., sphenotic (postfrontal).

XLV.—*On a new Specimen of the Clupeoid Fish Aulolepis typus from the English Chalk.* By A. SMITH WOODWARD, F.L.S.

[Plate IX. figs. 2, 2a.]

WHEN describing the Cretaceous Clupeoid fish *Aulolepis typus*, Ag., five years ago*, I referred to this species one specimen in the British Museum (no. P. 1854) which had already been labelled as belonging to it by Agassiz. This fossil showed a considerable portion of the skull, and proved to be identical with two other specimens in the British Museum displaying the head in a still better state of preservation. The latter (nos. 49903, P. 5681) were thus determined as also belonging to *Aulolepis typus*, and the characters of the cranial roof and branchiostegal apparatus were both described and figured. It now appears from a still more satisfactorily preserved specimen, undoubtedly of this species, in the Woodwardian Museum, Cambridge, that the three fossils just enumerated were wrongly ascribed to the fish in question. The skull therefore needs an amended description, and the new facts necessitate a reconsideration of the precise systematic position of the genus *Aulolepis*.

The Woodwardian fossil was obtained from the Lower Chalk of Southeram, near Lewes, and, thanks to the kindness of Prof. McKenny Hughes and Mr. Henry Woods, I have had the privilege of studying it in connexion with the British Museum collection.

The cranium is well exposed from above (fig. 2a), and some of the principal sutures are distinct. The supraoccipital bone (*s.occ.*) is relatively small, with a median vertical crest on its hinder face. Its upper portion enters the cranial roof, but does not completely separate the parietals (*pa.*), which are much extended antero-posteriorly and meet in the middle line for more than half of their length. The squamosal-pterotic region (*sq.*) also seems to be relatively large, but is not in the same plane as the parietals, sinking into a fossa which deeply impresses the hinder portion of the cranial roof on either side. The frontals (*fr.*) are very large, widest in the interorbital region and rapidly tapering in front, where the small mesethmoid (*m.*) projects beneath them. None of these bones are ornamented. Of the cheek-plates only part

* Proc. Zool. Soc. 1894 (1895), p. 660, pl. xliii. figs. 2-6.

of an antorbital is preserved (fig. 2, *a.o.*), but this is interesting as exhibiting downwardly-radiating branches from the slime-canal which traverses it. There are remains of the two large supramaxillæ (*s.m.x.*) overlapping the maxilla (*m.x.*), of which the convex oral border is beset with minute teeth. The rather stout premaxillæ must clearly have met in the middle line, and that of the right side exhibits a considerably extended oral face with the bases of attachment for a cluster of minute teeth. The mandible (*md.*) is fragmentary, but its articulation is shown beneath the hinder border of the orbit. The deep and narrow preoperculum (*p.op.*) has a straight vertical anterior margin which is somewhat thickened. The lower limb of this bone is small, and from its angle there are a few radiating ridges. The operculum (*op.*) is delicate and deeper than broad, and a few of the characteristic cycloidal scales extend both over this bone and over the cheek. Of the trunk only the lower portion is preserved, but this is complete to the base of the caudal fin (*c.*). There are remains of the comparatively small pectoral fins (*pect.*) well on the flank, while the bases of the very stout pelvic fins (*plv.*) are seen on the somewhat flattened ventral aspect slightly further back. Each of the latter comprises at least eight or nine robust rays, of which only the undivided proximal ends are preserved. The anal fin (*a.*) is small, arising about midway between the pelvic and caudal fins. The cycloidal scales are rather thick, and merely exhibit the concentric lines of growth without any posterior crenulations or serrations.

Comparing the specimen now described with those in the British Museum which were referred to *Aulolepis typus* in 1895, it is evident that only those numbered 47932 and P. 4247 were rightly determined. Nos. 49903, P. 1854, and P. 5681 probably belong to a small species of *Osmeroides*, which will be discussed in part iv. of the British Museum 'Catalogue of Fossil Fishes.' It now appears that the skull of *Aulolepis* is intermediate in characters between that of the typical Elopidae and that of the typical Clupeidae. The supraoccipital bone enters the cranial roof, though not completely separating the parietals, while the lateral muscles of the trunk must have extended well forwards over the sides of the skull above the laterally projecting otic region. There is no evidence of a gular plate; indeed it was probably absent, for the branchiostegal rays are distinctly few in number. The jaws are typically Clupeoid. The trunk is comparatively short, much laterally compressed, and covered with rather large cycloid scales, while the fins are exactly as

described on the former occasion, the pelvic pair being relatively large and advanced far forwards.

Aulolepis may therefore be placed in the family Clupeidæ, and in the primitive section which is characterized by the absence of ventral ridge-scales. Careful comparisons seem to show that its nearest ally is the Cretaceous genus *Otenothrissa**, from which it differs in the non-pectination of the scales and in the relatively smaller size of the pelvic and dorsal fins.

EXPLANATION OF PLATE IX. FIGS. 2, 2a.

Fig. 2. *Aulolepis typus*, Ag.; imperfect fish, left lateral aspect, nat. size. Lower Chalk; Southeram, near Lewes. [Woodwardian Museum, Cambridge.] 2a. Upper view of skull of same specimen, nat. size.

a., anal fin; *a.o.*, antorbital; *c.*, base of caudal fin; *fr.*, frontals; *m.*, mesethmoid; *md.*, mandible; *mx.*, maxilla; *op.*, operculum; *p.op.*, preoperculum; *pa.*, parietal; *pect.*, pectoral fin; *plv.*, pelvic fin; *s.mx.*, supramaxillæ; *s.occ.*, supraoccipital; *sq.*, squamosal.

XLVI.—*British Amphipoda: Families Pontoporeidæ to Ampelisidæ.* By Canon NORMAN, M.A., D.C.L., LL.D., F.R.S., &c.†

THIS revision of species of British Amphipoda is intended primarily to give an account of specimens which have passed through my hands and have been identified by myself. Species may have been procured from districts which have been worked by others and recorded; but if they are also in my collection I give my own authority for them. Multiplication of exact habitats of less rare species would too greatly extend the space occupied by distribution, while my own record will have the advantage of confirming that previously made. A carcinologist desiring to be acquainted with the fauna of a particular district will naturally consult the papers which have been published on the restricted area. These observations more especially refer to the Clyde district, in which I first dredged in 1854, and which I have visited many times since, a district which has been so admirably worked as

* A. S. Woodward, Ann. & Mag. Nat. Hist. [7] vol. iii. (1899) p. 490.
† See for preceding paper 'Annals,' Feb. 1900, p. 196.

regards the Amphipoda by my late friend Dr. David Robertson, and more recently by Mr. Thomas Scott.

In order, however, to indicate the good work which my brother carcinologists have done, I subjoin the following lists of species which they have added to our fauna since the publication of Bate and Westwood's work. I hope that these lists are approximately, if not absolutely, complete.

The late DAVID ROBERTSON.

The following Amphipoda were first recorded in Dr. Robertson's excellent papers "On the Amphipoda and Isopoda of the Firth of Clyde and West of Scotland" (Trans. Nat. Hist. Soc. Glasgow, vol. ii. pp. 9-99, and vol. iii. pp. 199-223):—

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|--|---|
| <p>1888. <i>Ampelisca assimilis</i>, Boeck.
 <i>Amphilocheus tenuimanus</i>,
 Boeck.
 <i>Podalirius typicus</i>, Kröyer.
 <i>Metopa affinis</i>, Boeck.
 <i>Ampelisca spinipes</i>, Boeck.
 <i>Triphosa Höringii</i>, Boeck.
 <i>Paramphithoe assimilis</i>, G. O.
 Sars.
 <i>Dulichia tuberculata</i>, Boeck.</p> | <p>1892. <i>Monoculodes borealis</i>, Boeck.
 <i>Amphithopsis nodifera</i>, G. O.
 Sars.
 <i>Melphidippa spinosa</i>, Boeck.
 <i>Amphilochooides odontonyx</i>,
 Boeck.
 <i>Gitanopsis hispinosa</i>, Boeck.
 <i>Metopa rubrovittata</i>, G. O.
 Sars.
 — <i>borealis</i>, G. O. Sars.
 — <i>nasuta</i>, Boeck.
 <i>Bruzelia typica</i>, Boeck.
 <i>Iphimedia minuta</i>, G. O. Sars.
 <i>Podoceros minutus</i>, G. O.
 Sars.</p> |
| <p>1892. <i>Socarnes Vahli</i>, Kröyer.
 — <i>erythrophthalmus</i>, sp. n.
 <i>Orchemenella pinguis</i>, Boeck.
 <i>Triphosa nana</i>, Kröyer.
 — <i>pusilla</i>, G. O. Sars.
 <i>Haploonyx similis</i>, G. O. Sars.</p> | |

Rev. T. R. R. STEBBING and D. ROBERTSON.

"Four New British Amphipoda" (Trans. Zool. Soc. vol. xiii. 1891, p. 31).

- | | |
|---|--|
| <p><i>Sophrrosyne Robertsoni</i>, sp. n.
 <i>Syrrhoeo fimbriata</i>, sp. n.</p> | <p><i>Podoceros palmata</i>, sp. n.
 <i>Podoceros cumbrensis</i>, sp. n.</p> |
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Rev. T. R. R. STEBBING.

Papers published in the Ann. & Mag. Nat. Hist. of the several dates.

- | | |
|---|--|
| <p>1874. <i>Amphithoe cuniculus</i>, sp. n.
 1876. <i>Probolium Spence-Batei</i>,
 sp. n.</p> | <p>1878. <i>Caprella fretensis</i>, sp. n.
 <i>Amphilocheus Sabrinæ</i>, sp. n.
 1891. <i>Talorchestia brito</i>, sp. n.</p> |
|---|--|

A. O. WALKER.

Trans. Liverpool Biol. Soc. of the dates mentioned, except where otherwise indicated in the notes.

- | | |
|---|---|
| <p>1888. <i>Photis tenuicornis</i>, <i>G. O. Sars</i>.
 1889. <i>Lysianax ceratinus</i>, sp. n.
 <i>Orchomene Goëssii</i>, <i>Boeck</i>.
 <i>Podocerus isopus</i>, sp. n.
 1893. — <i>Herdmani</i>, sp. n.
 1895. <i>Nannonyx spinimanus</i>, sp. n.
 <i>Paraphoxus ocellatus</i>, <i>G. O. Sars</i>.
 <i>Harpinia lævis</i>, <i>G. O. Sars</i>.
 <i>Amphilocheus melanops</i>, sp. n.
 <i>Metopa pusilla</i>, <i>G. O. Sars</i>.
 — <i>Bruzellii</i>, <i>Goës</i>.</p> | <p>1895. <i>Paratyclus uncinatus</i>, <i>G. O. Sars</i>.
 <i>Gammaropsis nana</i>, <i>G. O. Sars</i>.
 <i>Photis pollex</i>, sp. n.
 1896. *<i>Phoxocephalus pectinatus</i>, sp. n.
 †<i>Stenothoe crassicornis</i>, sp. n.
 1897. †<i>Parapleustes megacheir</i>, sp. n.
 1898. <i>Ambasia Danielsseni</i>, <i>Boeck</i>.
 <i>Callisoma Kröyeri</i>, <i>Bruzelius</i>.
 <i>Parvipalpus capillacea</i>, <i>Chevreaux</i>.</p> |
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A. O. WALKER and JAMES HORNELL.

Journ. Marine Zool. & Micros. vol. ii.

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|---|---|
| <p>1896. <i>Ampelisca gibba</i>, <i>G. O. Sars</i>.
 <i>Gammarus Berilloni</i>, <i>Catta</i>.</p> | <p>1896. <i>Menigrates obtusifrons</i>, <i>Boeck</i>.</p> |
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THOMAS SCOTT.

Papers on the Crustacea of the Firth of Forth and Loch Fyne published in the 'Annual Rep. Fish. Board of Scotland' of the several dates given; other papers are referred to in the notes. Mr. Scott's work has been admirable and his assiduity excessive. His lists of the marine Crustacea of the Firth of Forth include descriptions and most careful illustrations of an immense number of new Copepoda; and, taken together with his other papers on the land and freshwater Crustacea of the neighbourhood of Edinburgh, constitute by far the fullest information with respect to the Crustacean fauna of a district that has ever been published.

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|--|--|
| <p>1890. <i>Phoxocephalus Fultoni</i>, sp. n.
 <i>Siphonæcetes Colletti</i>, <i>Boeck</i>.
 1893. <i>Anonyx nugax</i>, <i>Phipps</i>.
 §<i>Cyproidea brevisrostris</i>, <i>T. & A. Scott</i>, sp. n.</p> | <p>1894. <i>Amphilochoides pusillus</i>, <i>G. O. Sars</i>.
 <i>Metopa propinqua</i>, <i>G. O. Sars</i>.</p> |
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* Ann. & Mag. Nat. Hist. ser. 6, vol. xvii. p. 343.

† Rep. Brit. Assoc. for 1896 (1897), p. 420. The "Report" contains a full list of all the Crustacea of the Liverpool district.

‡ Journ. Linn. Soc., Zool. vol. xxvi. p. 230.

§ Ann. & Mag. Nat. Hist. ser. 6, vol. xii. p. 244.

1894. <i>Paramphithoe monocuspis</i> , G. O. Sars.	1896. †? <i>Mæra Brooki</i> , sp. n.
<i>Apherusa borealis</i> , G. O. Sars.	1897. ? <i>Orchemenella minuta</i> , Krøyer.
<i>Harpinia crenulata</i> , G. O. Sars.	‡? <i>Ampelisca</i> Eschrichtii, Krøyer.
* <i>Metopa robusta</i> , G. O. Sars.	? <i>Stegocephaloides auratus</i> , G. O. Sars.
1896. <i>Amphilochoides interme-</i> <i>dus</i> , sp. n.	<i>Monoculodes tuberculatus</i> , G. O. Sars.
<i>Gammarus Duebeni</i> , Lillje- <i>borg</i> .	1898. <i>Dulichia monacantha</i> , G. O. Sars.
<i>Cheirocratus intermedius</i> , G. O. Sars.	

Fam. III. **Pontoporeiidae.**

[Genus 1. **PONTOPOREIA**, Krøyer.

[*Pontoporeia femorata*, Krøyer.

1842. *Pontoporeia femorata*, Krøyer, Naturhist. Tidsskr., 1 Rækkes, vol. iv. p. 153; Voyage en Scand. &c. pl. xxiii. fig. 2.
 1859. *Pontoporeia furcigera*, Bruzelius, Scand. Amphip. Gamm. p. 49.
 1876. *Pontoporeia femorata* and *furcigera*, Boeck, (138) pp. 197 & 201.
 1891. *Pontoporeia femorata*, G. O. Sars, (142) p. 123, pl. xli. fig. 1.

Off Hare Island, Waigat Sound, Greenland, in 175 fathoms, 'Valorous,' 1875.

Distrib. Klosterelv Fiord, East Finmark, 3-5 fathoms, 1890 (A. M. N.); Tromsø (*Schneider*); Spitsbergen (*Lovén*); Gulf of St. Lawrence (*S. I. Smith*): *Mus. Nor.* Throughout the Arctic Ocean and southward as far as the Baltic. Kiel (*Blanc*); West Sweden (*Lilljeborg*).]

Genus 2. **BATHYPOREIA**, Lindström.

I cannot regard some of the following forms as entitled to specific—indeed, they seem hardly worthy of varietal—

- Moray Firth (Ann. & Mag. Nat. Hist. ser. 6, vol. xiii. p. 148).

† Isle of Mull.

‡ The four following species are from the Clyde district. Of these *Ampelisca Eschrichtii*, *Stegocephaloides auratus*, and *Orchemenella minuta*, Krøyer, have not been seen by Mr. Scott, but are given by him from a MS. catalogue of Crustacea dredged by Sir J. Murray's steamer, the 'Medusa.' In noticing *Orchemenella minuta* in the paper preceding this (p. 204) I committed two errors, for the first of which I cannot account: the date 1870 is substituted for "16-17 fathoms," and in stating "we do not know the authority who identified the species," I had overlooked a note of Mr. Scott's at p. 109 (Fifteenth Ann. Rep. Fishery Board of Scotland), which states that the "Crustacea" were identified by R. I. Pocock, Esq. I have now consulted Mr. Pocock, and he tells me that he wishes that the occurrence of these species in Loch Fyne should be considered doubtful unless subsequently confirmed.

separation. Moreover, Jules Bonnier has stated that there is dimorphism in the males in this genus (Jules Bonnier, "Le dimorphisme des mâles chez les Crustacés Amphipodes," Comptes rendus Acad. Sci., Dec. 22, 1890).

50. *Bathyporeia norvegica*, G. O. Sars.

1862. *Bathyporeia pilosa*, Bate & Westwood, (1) vol. i. p. 304 (partly at any rate).

? 1876. *Bathyporeia pilosa*, Boeck, (138) p. 209, pl. vii. fig. 3.

1891. *Bathyporeia norvegica*, G. O. Sars, (142) p. 128, pl. xliii.

For remarks on Bate's specimens of *B. pilosa* see Walker, Ann. & Mag. Nat. Hist. ser. 6, vol. xv. p. 470. It is a question whether Bate's name *Guilliamsonii* (*Thersites Guilliamsonii*, Bate, Ann. & Mag. Nat. Hist. ser. 2, vol. xix. p. 146) ought not to be used for this species. Sars applies the name *Bathyporeia pilosa*, Lindström, to a Baltic form not yet found in our seas.

Hab. Apparently the commonest form in Britain. Shetland; Isle of Cumbrae; and Guernsey (*A. M. N.*); Banff (*T. Edward*); Aberdeen (*R. Dawson*); Whitburn, Co. Durham (*G. S. Brady*); Firth of Forth (*T. S.*): *Mus. Nor.* North Wales and Isle of Man (*A. O. W.*); 70-80 miles off Spurm Head (*T. S.*); Jersey (*Chevreux*).

Distrib. Ognebuct, off Jæderen, south coast of Norway (*G. O. Sars*); Le Croisic, Western France (*Chevreux*).

51. *Bathyporeia pelagica*, Bate.

1862. *Bathyporeia pelagica*, Bate & Westwood, (1) vol. i. p. 309, ♂.

1875. *Bathyporeia pilosa*, Stebbing, "On the Genus *Bathyporeia*," Ann. & Mag. Nat. Hist. ser. 4, vol. xv. p. 74, pl. iii.*

1877. *Bathyporeia tenuipes*, Meinert, "Crust. Isop. Amphip. et Decap. Daniæ," Naturhist. Tidsskr., 3 Rækkes, vol. xi. p. 101.

1891. *Bathyporeia pelagica*, Sars, (142) p. 129, pl. xliv. fig. 1.

Hab. Shetland and Isle of Cumbrae (*A. M. N.*); Banff (*T. Edward*); Aberdeen (*R. Dawson*); 25 miles off May Island, Firth of Forth (*Murray*); Firth of Forth (*T. S.*); 'Porcupine,' 1869, Stat. 18, west of Clew Bay, Ireland, 183 fathoms: *Mus. Nor.* 70-80 miles off Spurm Head (*T. S.*). Isle of Man; North Wales; Guernsey (*A. O. W.*); Jersey (*Sinel & Hornell*). St. Andrews (*M'Intosh*).

Distrib. With the preceding at Ognebuct, off Jæderen, South Norway, and Lofoten Islands (*Sars*); Tromsö and Vardö, Finmark (*Schneider*); Sweden (fide *Sars*); Denmark (*Meinert*); West France (*Chevreux*).

* Referred to by Sars, but fig. 1 appears to be *B. norvegica*, Sars, while the male is *B. pelagica*.

52. *Bathyporeia Robertsoni*, Bate.

1862. *Bathyporeia Robertsoni*, Bate & Westwood, (1) vol. i. p. 307.

1891. *Bathyporeia Robertsonii*, G. O. Sars, (142) p. 131, pl. xlv. fig. 2.

Hab. Isle of Cumbrae (*A. M. N.*); Firth of Forth (*T. S.*);
Mus. Nor. East Loch Tarbert, Loch Fyne (*T. S.*).

Distrib. Three adult males, Sörvær, West Finmark (*G. O. Sars*); Western France (*Chevreux*).

53. *Bathyporeia gracilis*, G. O. Sars.

1891. *Bathyporeia gracilis*, G. O. Sars, (142) p. 132, pl. xlv. fig. 1.

Hab. 'Poreupine,' 1869, Stat. 6, west of the Shannon, Ireland, in 90 fathoms: *Mus. Nor.*

Distrib. One male and one female, off West Norway, in rather deep water (*G. O. Sars*); Le Croisic, Western France (*Chevreux*).

Genus 3. HAUSTORIUS, Stadius Müller.

= *Lepidactylus*, Say, = *Pterygocera*, Latreille, = *Bellia*, Bate,
= *Sulcator*, Bate.

54. *Haustorius arenarius* (Slabber).

1769. *Oniscus arenarius*, Slabber, Naturkundige Verlostigengen &c. p. 92, pl. xi. figs. 3, 4.

1818. *Lepidactylus dytiscus*, Say, Journ. Acad. Nat. Sci. Philadelphia, vol. i. p. 379*.

1862. *Sulcator arenarius*, Bate & Westwood, (1) vol. i. p. 189.

1878. *Pterygocera arenaria*, Bovallius, "Notes on *Pterygocera arenaria*," K. Svens. Vet.-Akad. Handl. vol. iv. no. 8, pls. i., ii., iii.

1891. *Haustorius arenarius*, Sars, (142) p. 135, pl. xlvi.

Bovallius, in the paper referred to, gives figures of the variously constructed setæ and sensory organs of this very interesting and beautiful species.

Hab. Kames Bay, Isle of Cumbrae; near Sunderland (*A. M. N.*); Barmouth and Llanfairfechan, North Wales (*Stebbing*); *Mus. Nor.* Paignton, Devon (*Stebbing*); Burnt-island, Firth of Forth (*T. S.*).

Distrib. Karmo, West Norway (*Boeck*); Kattegat (*Bovallius*); Holland (*Slabber*); Western France (*Chevreux*); N.E. America (*S. I. Smith*).

* Prof. S. I. Smith has compared specimens from England which I sent him with the North-American species, and found them identical (*Trans. Connect. Acad.* vol. iv. 1880, p. 282).

Genus 4. UROTHOE, Dana.

Stebbing published an elaborate paper "On the Genus *Urothoe* and a New Genus, *Urothoides*" (Trans. Zool. Soc. vol. xiii. 1891). He examined the specimens then in my collection, and I follow here his lead, but think that some of the species are of doubtful value; but, on the other hand, I can still less acquiesce in Della Valle's views, who not only unites the whole of the forms here included, but adds *U. irrostrata*, Dana, *U. abbreviata*, Sars, and *U. Poucheti*, Chevreux. But on the question what characters suffice for specific distinction naturalists will always find it necessary to agree to differ.

54*. *Urothoe pulchella* (A. Costa).

1857. *Egidia pulchella*, A. Costa, "Crosc. Amfip. Regno di Napoli," Mem. d. R. Accad. d. Sci. di Napoli, vol. i. p. 190, pl. iv. figs. 3 a-g.

1887. *Urothoe pulchella*, Stebbing, l. c. p. 11, pl. iv. A.

1893. *Urothoe irrostrata*, Della Valle, (139) p. 664, pl. v. figs. 3, 8, pl. xxxvi. figs. 1-18, pl. lx. figs. 11, 12.

Hab. "Several specimens of this *Urothoe* have been obtained in the Firth of Forth; it is a smaller species than *U. marina*" (T. Scott, "Addit. to Fauna of the Firth of Forth," Fourteenth Rep. Fish. Board of Scotland, 1896, p. 159). This is the only notice of it as a British species.

Distrib. Naples (*A. M. N.*); West France (*Chevreux*).

I was struck with the lovely rose-colour of the species (or, at any rate, of the males) when I took them (see Della Valle, pl. v. fig. 8).

55. *Urothoe elegans*, Bate.

1862. *Urothoe elegans*, Bate & Westwood, (1) vol. i. p. 200.

1887. *Urothoe elegans*, Stebbing, l. c. p. 13, pl. i.

Hab. Shetland, 60-70 fathoms; Isle of Cumbrae (*A. M. N.*); off S.W. Ireland (*Haddon*); and the following from 'Porcupine,' 1869, Donegal Bay: Stats. 17 and 18, in 183 and 1230 fathoms, off Donegal Bay; also two other stations off west of Ireland, in 90 and 1630 fathoms: *Mus. Nor.* Hebrides (*A. M. N.*); off Ormes Head and North Wales and Blacksod Bay, Ireland (*A. O. W.*); Jersey (*Sinel & Hornell*).

Distrib. West France and Azores (*Chevreux*).

56. *Urothoe marinus*, Bate.

1862. *Urothoe Bairdii*, Bate & Westwood, (1) vol. i. p. 193, ♂.

1862. *Urothoe marinus*, Bate & Westwood, (1) vol. i. p. 195, ♀.

1887. *Urothoe marinus*, Stebbing, l. c. p. 16, pl. ii.

Hab. Balta Sound, Shetland; near Holy Island, Northumberland; Sleat Sound, Skye; Firth of Clyde (*A. M. N.*); Guernsey (*G. S. Brady*): *Mus. Nor.* Ardbear Bay, Ireland (*Brady & Robertson*); Liverpool district (*A. O. W.*); Firth of Forth (*T. S.*); Loch Fyne (*Sir J. Murray*, fide *T. S.*); Goodrington Sands, Devon (*Stebbing*).

Distrib. Denmark (*Meinert*); Western France (*Barrois &c.*).

56*. *Urothoe norvegica*, Boeck.

1876. *Urothoe norvegica*, Boeck, (138) p. 226, pl. vi. fig. 9, pl. vii. fig. 4.

1887. *Urothoe norvegica*, Stebbing, *l. c.* p. 21, pl. iv. B.

1891. *Urothoe norvegica*, G. O. Sars, (142) p. 138, pl. xlvii.

Hab. Stebbing gives as his only authority "The Shetland Isles, taken by the Rev. A. M. Norman in 1867." I have not these specimens in my collection, nor, indeed, any *Urothoe* taken in 1867. Mr. D. Robertson recorded it from Cumbrae, but clearly what he meant was *U. Bairdii*, and he adopted Boeck's nomenclature, which makes that *Urothoe* a synonym of *U. norvegica*.

Distrib. Trondhjem Fiord, Norway (*A. M. N.*): *Mus. Nor.* Sars records it in various depths from 20 to 100 fathoms from the south of Norway to West Finmark.

57. *Urothoe brevicornis*, Bate.

1862. *Urothoe brevicornis*, Bate & Westwood, (1) vol. i. p. 198.

1887. *Urothoe brevicornis*, Stebbing, *l. c.* p. 23, pls. iii. & iv. c.

Hab. Firth of Clyde (*D. R.*, specimens named *U. mirinus*): *Mus. Nor.* Llanfairfechan, North Wales, from the banks of little streams or pools left in the sands at low tide, and Goodrington, near Torquay (*Stebbing*); Largo Bay, Firth of Forth (*T. S.*); Guernsey and Valentia, Ireland (*A. O. W.*); Jersey (*Sinel & Hornell*).

Distrib. West coast of France (*Chevreaux*).

Fam. IV. Phoxocephalidæ.

Genus 1. PHOXOCEPHALUS, Stebbing.

= *Phoxus*, Kröyer (name preocc.).

(Including *Paraphoxus*, G. O. Sars, and *Metaphoxus*, J. Bonnier.)

Phoxocephalus appears to be a natural genus, and attempts to divide it on very slight variations of the mandible break up that natural group. The allied *Harpinia* is a parallel case; it might be split up on similar trivial differences in the mandible (see Sars's figures of mandible in *H. plumosa*, *H. pectinata*, and *H. crenulata*).

58. *Phoxocephalus Holbölli* (Kröyer).

1842. *Phoxus Holbölli*, Kröyer, Naturhist. Tidsskr. vol. iv. p. 151; 2 Rækkes, vol. i. 1844, p. 551.
 1853. *Phoxus Kröyeri*, Stimpson, Marine Invert. Grand Manan, p. 58.
 1861. *Phoxus Holbölli*, Bate & Westwood, (1) vol. i. p. 143.
 1876. *Phoxus Holbölli*, Böeck, (138) p. 214, pl. vii. fig. 5.
 1891. *Phoxocephalus Holbölli*, G. O. Sars, (142) p. 144, pl. xlix.

Hab. Isle of Cumbrae (*A. M. N.*); Banff, N.B. (*T. Edward*): *Mus. Nor.* Firth of Clyde and Firth of Forth (*T. S.*).

Distrib. Greenland, 'Valorous,' 1875; Svolvær, Lofoten Islands; Vadsö and Bog Fiord, East Finmark (*A. M. N.*); Casco Bay, N.E. America, 1873 (*S. I. Smith*, as "*Phoxus Kröyeri*"): *Mus. Nor.* Arctic Ocean generally. Rare in the more southern parts of Norway (*G. O. Sars*); West Sweden (*Goës*); Denmark (*Meinert*); west coast of France? (*Chevreaux*; but it is omitted in his most recent revised list).

The setæ on the anterior coxæ are usually more numerous than the four given by Bate and Westwood, usually 8-10. In the specimen figured by Sars they are still more numerous. When the mandible-palp is examined this species is easily distinguished from *Paraphoxus oculatus*, and this palp can often be seen projected without dissection. When that character is not visible I find the best points by which to recognize this species from *Paraphoxus oculatus* are the much shorter nails of the anterior peræopods, the shorter and stouter character of the three hinder peræopods, and the form of the posterior lobe of the last peræopod, which is truncated below.

59. *Phoxocephalus oculatus* (G. O. Sars).

1880. *Phoxus oculatus*, G. O. Sars, "Crust. et Pycnog. in itin. 2 et 3 Exped. Norveg. inventa," Archiv for Mathem. og Naturvid. 1880, p. 441.
 1885. *Phoxus oculatus*, G. O. Sars, (104) p. 154, pl. xiii. figs. 4, 4 a-c.
 1891. *Paraphoxus oculatus*, G. O. Sars, (142) p. 149, pl. li.
 1893. *Phoxocephalus oculatus*, Della Valle, (139) p. 740, pl. v. fig. 5, pl. xxxv. figs. 19-38.

Della Valle figures only 4-6 setæ on the coxæ of the gnathopods and anterior peræopods; but in a specimen sent to me by him and in others which I took myself at Naples these setæ are more numerous (6-10). His figure 28 of the last uropods does not agree with the Neapolitan specimens which I have examined, in which the inner branch is much shorter (as in Sars's figure). This species comes very near to, if it be not identical with, *Phoxus maculatus*, Chevreaux (*Bull. Soc. Zool. de France*, vol. xii., Feb. 28, 1888), which he has since called *Paraphoxus maculatus*; the following

words, however, scarcely accord with the present species:—
 “Pedes 3ⁱⁱ et 4ⁱⁱ paris [*i. e.* first and second peræopods] ungue
 multo brevioribus quam articulo 5^{to} elongato.”

The nails in *P. oculatus* are very long and afford a good
 characteristic as compared with the short nails of *Phoxo-*
cephalus Holbölli.

Hab. St. Magnus Bay, Shetland, 1867, a single specimen
 (*A. M. N.*; recorded in Shetland Report of 1868 as *Phoxus*
Holbölli): *Mus. Nor.* Seven miles off Bradda Head, Isle of
 Man, 31 fathoms (*A. O. W.*).

Distrib. Tromsö, Finmark (*J. S. Schneider*); Naples
 (*A. M. N.*): *Mus. Nor.* Greenland (*H. J. Hansen*); Jan
 Mayen; Finmark and Norway coast as far south as Farsund
 (*G. O. Sars*).

60. *Phoxocephalus simplex* (Bate).

1857. *Phoxus simplex*, Bate, *Ann. & Mag. Nat. Hist.* ser. 2, vol. xx.
 p. 525.

1861. *Phoxus simplex*, Bate & Westwood, (1) vol. i. p. 140.

1896. *Phoxocephalus simplex*, Calman, “On Species of *Phoxocephalus*
 and *Apherusa*,” *Trans. Roy. Irish Acad.* vol. xxx. p. 748, pl. xxxii.
 fig. 3.

1896. *Phoxocephalus pectinatus*, A. O. Walker, “On Two new Species
 of Amphipoda Gammarina,” *Ann. & Mag. Nat. Hist.* ser. 6, vol. xvii.
 p. 343, pl. xvi. figs. 1-6, and vol. xviii. p. 156.

1896. *Metaphorus typicus*, Bonnier, *Results sci. de Campagne du*
 ‘Caudan,’ *Edriophthalmes*, p. 630, pl. xxxvii. fig. 1.

1898. *Metaphorus pectinatus*, Chevreux, “Révis. des Amphip. de la
 côte océan de France,” *Assoc. Française pour Advanc. des Sci.* p. 477
 (no description or figure).

I cannot but think that this must be the *Phoxus simplex*
 of Bate. What is stated with respect to the want of eyes
 may have arisen from his suspicion that some special medium
 that he employed may have destroyed them. 1st. I have
 examined Bate’s specimen in the British Museum, and am
 not disposed to question Mr. Walker’s opinion that it is
 referable to *Phoxocephalus Holbölli*; but it certainly is not
 the specimen described and figured by Bate, for the antennæ
 are quite different. 2nd. As regards size, I have some
 specimens from Valentia which are much finer than usual
 and as long as the line above Bate and Westwood’s figure
 which indicates the length. 3rd. As regards the antennæ,
 the description of Bate and Westwood does not agree with the
 figure, where the rostrum is represented only as long as the
peduncles of the upper antennæ, and this is the case with the
 present species; and although the figure in the *Brit. Mus. Cat.*
 does agree with the description, is it not more likely that the

second figure is more correct than the first? 4th. Points I lay great stress upon are the difference in size of the gnathopods and the large process (represented in the Brit. Mus. Cat.) which is at the base of the palm of the second gnathopods. It is in form as a hood, from the inside of which rises a conspicuous sharp spine (see Calman, *gn.¹* and *gn.^{1z}*).

The *Phoxus simplex* of Boeck (nec Bate) is a synonym of *Leptophoxus falcatus*, G. O. Sars.

Hab. Firth of Clyde; Roundstone Bay and Valentia, Ireland; Brelade Bay, Guernsey (*A. M. N.*): *Mus. Nor.* Guernsey, 7 fathoms (*A. O. W.*); Cumbrae (*D. R.*, fide *Calman*).

Distrib. West coast of France (*Chevreux & Bonnier*).

61. *Phoxocephalus Fultoni*, T. Scott.

1890. *Phoxocephalus Fultoni*, T. Scott, "Additions to the Fauna of the Firth of Forth," Eighth Ann. Rep. Fish. Board Scotland, p. 327, pl. xii. figs. 10-12, pl. xiii. figs. 13-19.

1892. *Phoxocephalus Fultoni*, D. Robertson, "Second Contrib. Isop. and Amphip. Firth of Clyde," Trans. Nat. Hist. Soc. Glasgow, vol. iii. p. 13 (separate copy).

1893. *Phoxocephalus chelatus*, Dalla Valle, (139) p. 142, pl. v. fig. 10, pl. xxxv. figs. 29-35.

1896. *Phoxocephalus Fultoni*, Calman, "On Species of *Phoxocephalus* and *Apherusa*," Trans. Royal Irish Acad. vol. xxx. p. 743, pl. xxxi. figs. 1, 2.

Hab. Roundstone, Ireland, tow-net, 1874; Firth of Clyde, tow-net, 1884; Mylor Creek, Falmouth, 1884; Plymouth, tow-net, 1889; Guernsey (*A. M. N.*); Isle of Cumbrae (*D. R.*, as "*Phoxus Holbölli*"); *Mus. Nor.* Off St. Monace, Firth of Forth (*T. S.*); near Menai Bridge; Port Erin (Isle of Man); and Jersey (*A. O. W.*).

Distrib. Naples (*A. M. N.*); La Croisic, west coast of France (*Chevreux*).

I conclude that this is *Phoxus Holbölli* of Robertson's "First Contribution," as he sent me at that time specimens taken in the tow-net under this name. I subsequently took it myself in the Clyde by tow-net.

Genus 2. HARPINIA, Boeck.

[*Harpinia plumosa* (Kröyer).

1842. *Phoxus plumosa*, Kröyer, Naturhist. Tidsskr. vol. iv. p. 152; 2 Rækkes, vol. i. 1844, p. 563.

1891. *Harpinia plumosa*, G. O. Sars, (142) p. 151, pl. lii.

Greenland, 'Valorus,' 1875. An Arctic form, "Spetsbergen, Novaya Zemlia; the Kara Sea and the Siberian Polar Sea" (*G. O. S.*.)

62. *Harpinia neglecta*, G. O. Sars.

1862. *Phoxus plumosus*, Bate & Westwood, (1) vol. i. p. 146 (and of all British authors).

1890. *Harpinia antennaria*, Meinert, (71) p. 160, pl. i. figs. 39-41, ♂.

1891. *Harpinia neglecta*, G. O. Sars, (142) p. 153, pl. liii. fig. 1.

Hab. Shetland; Isle of Skye; Firth of Clyde; Northumberland and Durham coasts; Salcombe, Devon; Guernsey; off Bundoran, Ireland (*A. M. N.*); 'Porcupine,' 1869, Stat. 6, west of the Shannon, Ireland, 90 fathoms: *Mus. Nor.* North Wales and Isle of Man (*A. O. W.*); Loch Fyne, 80 fathoms, and Loch Ranza, Arran (*D. R.*); Loch Linnhe (*G. Brook*); Firth of Forth (*T. S.*).

Distrib. Bog Fiord, East Finmark, 3-5 fathoms; Trondhjem Fiord, Norway, 20-40 fathoms; Naples, 1887 (*A. M. N.*): *Mus. Nor.* Whole coast of Norway, Bohuslän, Kattegat (*G. O. Sars*); Western France (*Chevreux*).

63. *Harpinia pectinata*, G. O. Sars.

1891. *Harpinia pectinata*, G. O. Sars, (142) p. 154, pl. liii. fig. 2.

Hab. 'Porcupine,' 1869, Stat. 3, lat. 51° 38' N., long. 12° 50' W., 722 fathoms; Stats. 17, 18, 19, lat. 54° 15' to 54° 28', long. 10° 56' to 11° 44' W., 183-1360 fathoms; Stat. 23 a, lat. 56° 13', long. 14° 18', 420 fath. These stations are all to the west of Ireland and between Ireland and Rockall: *Mus. Nor.*

Distrib. Trondhjem Fiord, Norway, 250-300 fathoms (*A. M. N.*): *Mus. Nor.* From the south of Norway northwards to Tromsö and coast of Bohuslän (*G. O. Sars*); Western France (*Chevreux*).

64. *Harpinia crenulata*, Boeck.

1870. *Harpinia crenulata*, Boeck, (137) p. 53.

1876. *Harpinia crenulata*, Boeck, (138) p. 221, pl. viii. fig. 2.

1891. *Harpinia crenulata*, G. O. Sars, (142) p. 158, pl. lv. fig. 2.

1894. *Harpinia crenulata*, T. Scott, Ann. & Mag. Nat. Hist. ser. 6, vol. xiii. p. 147.

Hab. Off Farland Point, Isle of Cumbræ, 20-25 fathoms; Valentia, Ireland (*A. M. N.*): *Mus. Nor.* Off Bradda Head, Isle of Man, 39 fathoms (*A. O. W.*); vicinity of Incheith and other parts of the Firth of Forth, and Campbeltown Loch, Cantyre (*T. S.*).

Distrib. Trondhjem Fiord, Norway, 40-300 fathoms (*A. M. N.*); South Norway (*G. O. Sars*): *Mus. Nor.* South and West Norway (*G. O. S.*); Tromsö (*Schneider*); coast of Bohuslän (fide *Sars*); Denmark (*Meinert*); west coast of France (*Chevreux*).

[*Harpinia abyssii*, G. O. Sars.

1880. *Harpinia abyssii*, G. O. Sars, "Crust. et Pycnog. Nova exped. Norvegiæ anno 1877 et 1878 collecta," Archiv for Math. og Naturvid. p. 443, ♀.

1861. *Harpinia carinata*, id. ibid. p. 444, ♂.

1885. *Harpinia abyssii*, G. O. Sars, (104) p. 157, pl. xiii. figs. 5, 5 a-n, ♀.

1885. *Harpinia carinata*, id. ibid. p. 159, pl. xiii. figs. 6, 6 a-e, ♂.

1891. *Harpinia abyssii*, G. O. Sars, (142) p. 160, pl. lvi. fig. 1, ♂ ♀.

'Lightning,' 1868, Stat. 3, close to the Faroe Bank, in 229 fathoms, lat. 60° 31' N., long. 9° 18' W.

"Outside the great fishing-banks from the 63rd to the 75th degree of latitude, and extending westwards to the sea between Iceland and Jan Mayen" (*G. O. S.*.)]

65. *Harpinia lævis*, G. O. Sars.

1891. *Harpinia lævis*, G. O. Sars, (142) p. 161, pl. lvi. fig. 2.

Hab. 'Porcupine,' 1869, Stat. 24, lat. 56° 26' N., long. 14° 28' W., south of Rockall, 109 fathoms: *Mus. Nor.* Seven miles west of Niarbyl, Isle of Man, 45 fathoms, mud (*A. O. W.*).

Distrib. Röddberg, Trondhjem Fiord, Norway, 20-40 fathoms (*A. M. N.*): *Mus. Nor.* Sars gives as localities the same fiord and Hardanger Fiord, in 50-100 fathoms.

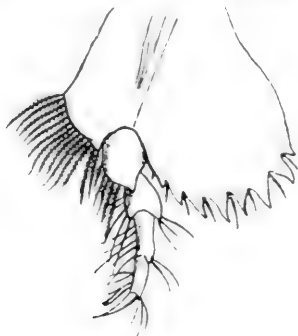
66. *Harpinia latipes*, sp. n.

Female.—The upper antennæ have the second joint of the peduncle edged with a row of six long plumose setæ, within which are two minute plumose setæ, and between these a single penicillate auditory organ. The first joint of the lower flagellum is nearly as long as the second joint of the peduncle and much longer than the last joint.

The lower antennæ have the penultimate joint furnished with about fourteen spines in the anterior set, and the posterior lobe is edged with twelve plumose setæ, within which are eight long slender straight spines, and in the space between them and the anterior set of spines there is a very long spine which, reaching forward, extends nearly to the extremity of the first joint of the flagellum; the last joint of the peduncle has eight long slender spines (not plumose setæ) on the posterior margin; the joints of the flagella of both pairs of antennæ are very oblique.

The gnathopods are obliquely oval and the palm is defined by a strong spine of some length; in the first pair the palm is somewhat longer than the remaining portion of the posterior margin, while in the second pair the slightly concave palm occupies nearly three fourths of the posterior margin.

The last peraeopods have a large forward projection of the basal joint edged with fifteen long plumose setae, while the



Harpinia latipes. Last peraeopod.

posterior lobe is largely developed, reaching downward to the extremity of the meros; the margin cut into nine serrations, five of which are very large, the uppermost of all considerably smaller, and the three lowest smaller still; a small seta is situated at the base of each serration; the ischium has eight setae on the anterior margins, the central of which are long and plumose; the ischium, meros, and carpus are subequal in length; the hand slightly longer and the nail longer than the hand.

The above description is taken from separated mounted limbs; the specimen itself I cannot at the present time find, so am unable to give further particulars, but the last peraeopod at once distinguishes it from all described species, and in the anterior lobe of the basal joint finds its counterpart only in *Harpinia abyssi*, G. O. Sars, from which the deeply cut posterior lobe at once distinguishes it.

Hab. A single female specimen taken by the 'Porcupine,' 1869, Stat. 47, lat. $59^{\circ} 34' N.$, long. $7^{\circ} 18' W.$, in 542 fathoms. This station is on the "Holtema"-ground, N.N.E. of the Butt of Lewis.

Fam. V. **Ampeliscidæ.**

Genus I. **AMPELISCA**, Kröyer.

67. *Ampelisca typica* (Bate).

1857. *Tetromatus typicus*, Bate, "Synopsis Brit. Edriophthalmous Crustacea," Ann. & Mag. Nat. Hist. ser. 2, vol. xix. p. 139.

? 1859. *Ampelisca carinata*, Bruzelius, Skand. Amphip. Gamm., K. Vet.-Akad. Hand. vol. iii. p. 87, pl. iv. fig. 16, ♂.

1861. *Ampelisca Gaimardi*, Bate & Westwood, (1) vol. i. p. 127 (nec *Ampelisca Gaimardi*, Kröyer).

1869. *Ampelisca carinata*, Norman, "Last Report Dredging Shetland Isles," Brit. Assoc. Rep. for 1868, p. 277, ♂.

1891. *Ampelisca typica*, G. O. Sars, (142) p. 165, pl. lvii.

Hab. Durham coast, Isle of Cumbræ; Lough Foyle, Ireland (*A. M. N.*); 'Porcupine,' 1869, Stat. 6, off S.W. Ireland, 90 fathoms: *Mus. Nor.* Firth of Forth; off Spurm Head; Loch Fyne (*T. S.*); Port Erin, Isle of Man (*A. O. W.*); Jersey (*Sin'l & Hornell*).

Distrib. Haakelsund in Kors Fiord, Norway, 3 fathoms; Hardanger Fiord, 40 fathoms; Fosse de Cap Breton, Bay of Biscay, 35-60 fathoms (*A. M. N.*): *Mus. Nor.* South and West Norway up to Trondhjem Fiord, 20-60 fathoms (*G. O. Sars*); Kattegat and Bohuslän (*Stockholm Museum*, fide *Sars*); West France (*Bonnier & Chevreux*).

The specimens in the British Museum named *Ampelisca Gaimardi* by Bate are, as Mr. Walker has pointed out, referable (at any rate the large ones) to *A. spinipes*, Boeck; but they are females—the typical male is not there. The males of *A. typica* and *A. spinipes* are in general characters not very dissimilar; but Bate's *A. Gaimardi*, which in 1869 I described and assigned to *A. carinata*, Bruzelius, appears to me, on account of the shortness of the upper antennæ, as well as some other points, to be the species of which Sars has described both sexes under Bate's original specific name *A. typica*.

68. *Ampelisca tenuicornis*, Lilljeborg.

1855. *Ampelisca tenuicornis*, Lilljeborg, Öfvers. af K. Vet.-Akad. Förhand. p. 123.

1869. *Ampelisca levigata*, Bate & Westwood, (1) vol. ii. p. 504 (nec *A. levigata*, Lilljeborg).

1869. *Ampelisca tenuicornis*, Norman, "Last Report Dredging Shetland Isles," Rep. Brit. Assoc. for 1868, p. 276.

1891. *Ampelisca tenuicornis*, G. O. Sars, (142) p. 167, pl. lviii. fig. 1.

Hab. Shetland; Isle of Skye; Tobermory, Mull; Firth of Clyde; off Seaham, Co. Durham; Salcombe, Devon; Donegal Bay, Ireland (*A. M. N.*); Kirkwall Bay, Orkney (*D. R.*); 'Porcupine,' 1869, Stat. 18, west of Clew Bay, Ireland, 183 fathoms: *Mus. Nor.* Loch Fyne (*D. R.*); Firth of Forth (*T. S.*); Port Erin, Isle of Man; Guernsey; Valentia and Dunbeacon Harbour, Ireland (*A. O. W.*). The late Dr. Robertson recorded this species also under the name "*Ampelisca propinqua*" from the Clyde, as I know from an examination of the specimens.

Distrib. Christiania Fiord, Norway (*A. M. N.*); Bohuslän,

Sweden (*Lilljeborg*): *Mus. Nor.* South and West Norway up to Trondhjem Fiord, in 30-100 fathoms (*G. O. Sars*); Kattegat (*Meinert*); West France (*Chevreaux*).

69. *Ampelisca spinipes*, Boeck.

1870. *Ampelisca spinipes*, Boeck, (137) p. 143.

1876. *Ampelisca spinipes*, Boeck, (138) p. 526, pl. xxxi. fig. 5.

1891. *Ampelisca spinipes*, G. O. Sars, (142) p. 173, pl. lx. fig. 2.

Hab. Shetland; Isle of Skye, 1866; Isle of Cumbrae, 1888; Northumberland coast, 1864; off Seaham, Co. Durham; near the Mewstone, Plymouth, 1889; Salcombe, Devon, 1875; Falmouth, 1884 (*A. M. N.*); Aberdeenshire, 1865 (*R. Dawson*); 25 miles off May Island, Firth of Forth, 35 fathoms, 1887 (*Sir J. Murray*); 'Porcupine,' 1869, Stat. 6, off S.W. Ireland, 90 fathoms; Stat. 18, to west of Clew Bay, Ireland, 183 fathoms; Stat. 33, south of Cape Clear, Ireland, 74 fathoms; Stat. 90, *Holtenia*-ground, N.N.E. of Butt of Lewis, 445 fathoms: *Mus. Nor.* Off Holy Island, Firth of Clyde, 36 fathoms, and near Skate Island, Loch Fyne, 80-100 fathoms (*D. R.*); common, Liverpool district and Isle of Man, also Dingle Bay and off Skillig, 70-80 fathoms (*A. O. W.*); the Minch, off Barra, 40 fathoms (*A. Somerville*, fide *D. R.*).

Distrib. Bergen Fiord, Norway (*A. M. N.*); West Norway (*G. O. Sars*): *Mus. Nor.* S. and W. Norway as far north as Lofoten Islands, in 30-100 fathoms (*G. O. Sars*); Kattegat (*Meinert*); Bohuslän (*Stockholm Museum*, fide *Sars*); Holland (*Hock*); Western France (*Chevreaux*).

70. *Ampelisca macrocephala*, Lilljeborg.

1852. *Ampelisca macrocephala*, Lilljeborg, "Havs-Crustaceer vid Kullaberg," *Öfvers. K. Vet.-Akad. Förhand.* p. 7.

1869. *Ampelisca macrocephala*, Norman, "Last Report Dredging Shetland Isles," *Brit. Assoc. Rep. for 1868*, p. 278.

1876. *Ampelisca macrocephala*, Boeck, (138) p. 531, pl. xxx. fig. 6.

1891. *Ampelisca macrocephala*, G. O. Sars, (142) p. 172, pl. lx. fig. 1.

Hab. The Minch (*A. M. N.*); 25 miles off May Island, Firth of Forth, 35 fathoms (*Sir J. Murray*); Isle of Skye; Isle of Cumbrae (*A. M. N.*): *Mus. Nor.* Port Erin, Isle of Man, and off Bull Rock, S.W. Ireland (*A. O. W.*); St. Andrews (*M'Intosh*).

Distrib. Bergen Fiord and Trondhjem Fiord, Norway, 20-40 fathoms; Varanger and Klosterelv Fiords, East Finmark, 15-150 fathoms (*A. M. N.*); Holstenborg, Greenland, 'Valorous,' 1875; N.E. America (*S. I. Smith*): *Mus. Nor.* Arctic Ocean, Labrador, Iceland, Spitsbergen, the Kara Sea (*G. O. Sars*); Bohuslän (*Bruzelius*); Kattegat (*Meinert*).

71. *Ampelisca assimilis*, Boeck.1870. *Ampelisca assimilis*, Boeck, (137) p. 142.1876. *Ampelisca assimilis*, Boeck, (138) p. 521, pl. xxxi. fig. 2.1891. *Ampelisca assimilis*, G. O. Sars, (142) p. 168, pl. lviii. fig. 2.

Hab. Off Marsden, Co. Durham, 10 fathoms; off St. Martin's Point, Guernsey, 1868 (*A. M. N.*); 'Porcupine,' 1869, Stat. 18, west of Clew Bay, Ireland, 183 fathoms: *Mus. Nor.* Near May Island, Firth of Forth (*T. S.*); Gairlock, West Scotland (*G. Brook*).

Distrib. Bergen and Trondhjem Fiords, Norway (*A. M. N.*): *Mus. Nor.* South and West Norway (*G. O. Sars*); Bohuslän (*Stockholm Museum*, fide *Sars*); west coast of France (*Chevreux*).

72. *Ampelisca brevicornis* (A. Costa).1853. *Araneops brevicornis*, A. Costa, Rend. Acc. Napoli, p. 171, and *Amfip. Napoli*, 1856, p. 180, pl. i. fig. 2.1855. *Ampelisca lævigata*, Lilljeborg, Öfvers. K. Vet.-Akad. Förhand. p. 123.1861. *Ampelisca Belliana*, Bate & Westwood, (1) vol. i. p. 135.1869. *Ampelisca lævigata*, Norman, "Last Report Dredging Shetland Isles," Brit. Assoc. Rep. for 1868, p. 277.1891. *Ampelisca lævigata*, G. O. Sars, (142) p. 169, pl. lix. fig. 1.1893. *Ampelisca brevicornis*, Della Valle, (139) p. 473, pl. iv. fig. 4, pl. xxxviii. fig. 39 *A. b.*, pl. xxxviii. figs. 3, 5, 6, &c., *A. b.*

Hab. Shetland; Valentia, Ireland (*A. M. N.*); Kirkwall Bay, Orkney (*D. R.*); Aberdeen coast (*R. Dawson*): *Mus. Nor.* Northumberland and Durham coasts (*A. M. N.*); Firth of Clyde and Loch Fyne (*D. R.*); Firth of Forth (*T. S.*); Isle of Man; off Southport; N. Wales (*A. O. W.*); Jersey (*Sinel & Hornell*).

Distrib. Fosse de Cap Breton, Bay of Biscay, 35-60 fathoms; Naples (*A. M. N.*); Bohuslän, Sweden, as "*A. lævigata*" (*Lilljeborg*): *Mus. Nor.* S. and W. Norway and northwards to the Lofoten Islands, in 20-60 fathoms (*G. O. Sars*); Kattegat (*Meinert*); Holland (*Hoek*); West France (*Chevreux*).

73. *Ampelisca gibba*, G. O. Sars.1882. *Ampelisca gibba*, G. O. Sars, (102) p. 107, pl. vi. fig. 1.1891. *Ampelisca gibba*, G. O. Sars, (142) p. 171, pl. lix. fig. 2.

Hab. 'Porcupine,' 1869, Stat. 3, off S.W. Ireland, 722 fathoms; Stats. 15 and 17, to west of Clew Bay, Ireland, 422 fathoms and 1230 fathoms: *Mus. Nor.* Guernsey (*A. O. W.*).

Distrib. 'Porcupine,' 1869, Stat. 11, outside entrance to

English Channel, 1650 fathoms; off Midtö Lighthouse, Hardanger Fiord, 150-180 fathoms, and Rödberg, Trondhjem Fiord, 150-250 fathoms (*A. M. N.*); West Norway (*G. O. Sars*): *Mus. Nor.*

74. *Ampelisca Eschrichtii*, Kröyer.

1842. *Ampelisca Eschrichtii*, Kröyer, Naturhist. Tidsskr. vol. iv. p. 155.

1862. *Ampelisca ingens* (Stimpson, MS.), Bate, Cat. Amphip. Crust. Brit. Mus. p. 92, pl. xv. fig. 2.

1876. *Ampelisca dubia*, Boeck, (139) p. 527 (young, *vide Sars*).

1876. *Ampelisca propinqua*, Boeck, (139) p. 533, pl. xxxi. fig. 8 (somewhat older, *vide Sars*).

1891. *Ampelisca Eschrichtii*, G. O. Sars, (142) p. 174, pl. lxi. fig. 1.

Hab. 'Porcupine,' 1869, Stat. 6, west of the Shannon, Ireland, in lat. 52° 25' N., long. 11° 40' W., 90 fathoms: *Mus. Nor.*

Distrib. 'Porcupine,' 1869, Stat. 36, lat. 48° 50' N., long. 11° 9' W., in 725 fathoms (the most southern known habitat), and Stat. 62, in the Faroe Channel, 125 fathoms; Tronsö (*Schneider*); Varanger Fiord, 125-150 fathoms, and Bog Fiord, both in E. Finmark (*A. M. N.*); Greenland (*Lovén*); Holstenborg, 30 fathoms, and Godhavn Harbour, 20 fathoms, 'Valorous,' 1875; Barents Sea ('Willem-Barents,' *Stebbing*); Gulf of St. Lawrence (*S. I. Smith*): *Mus. Nor.* Throughout the Arctic Ocean from Greenland to the Siberian Sea; on the Norway coast it occurs in the north, reaching as far south as Bergen (*G. O. Sars*); Bohuslän (*Lilljeborg*).

75. *Ampelisca odontoplax*.

1880. *Ampelisca odontoplax*, G. O. Sars, "Crust. et Pycnog. nova &c.," Archiv for Math. og Naturvid. p. 454.

1885. *Ampelisca odontoplax*, G. O. Sars, (104) p. 196, pl. xvi. fig. 4.

1891. *Ampelisca odontoplax*, G. O. Sars, (142) p. 176, pl. lxi. fig. 2.

Hab. 'Porcupine,' 1869, Stat. 65, lat. 61° 10' N., long. 2° 21' W., in 345 fathoms; this station is N.E. of Shetland and on the border-line of the "British Area": *Mus. Nor.*

Distrib. Off Midtö Lighthouse, Hardanger Fiord, Norway, in 150-180 fathoms, and Rödberg, in the Trondhjem Fiord, 250-300 fathoms (*A. M. N.*): *Mus. Nor.*

The type specimens were taken by the 'Vöringen' * off Helgeland, Norway, in 142 fathoms; and Sars has subsequently procured it at Hasvig on the west coast of Finmark, and at Bejan in the Trondhjem Fiord.

* Vessel of the Norwegian North-Atlantic Expedition.

76. *Ampelisca æquicornis*, Bruzelius.

1859. *Ampelisca æquicornis*, Bruzelius, "Bidrag till känn. om Skand. Amphip. Gammarid.," K. Vet.-Akad. Hand. vol. iii. p. 82, pl. iv. fig. 15.

1869. *Ampelisca æquicornis*, Norman, "Last Report Dredging Shetland Isles," Brit. Assoc. Rep. for 1868, p. 276.

1876. *Ampelisca æquicornis*, Boeck, (138) p. 524, pl. xxxi. fig. 3.

1891. *Ampelisca æquicornis*, G. O. Sars, (142) p. 177, pl. lxii. fig. 1.

Hab. Shetland; Isle of Skye; Guernsey (*A. M. N.*); 'Porcupine,' 1869, off Bundoran, Ireland: *Mus. Nor.* Off May Island, Firth of Forth (*Dr. Henderson*).

Distrib. Drobäk, Christiania Fiord; off Midtö Lighthouse, Hardanger Fiord, in 50-180 fathoms; Trondhjem Fiord, 150 fathoms (*A. M. N.*); 'Porcupine,' 1869, Stat. 78, lat. 60° 14' N., long. 4° 30' W., 290 fathoms: *Mus. Nor.* Whole of south and west coasts of Norway as far north as the Lofoten Islands, in 50-200 fathoms (*Sars*); Bohuslän (*Bruzelius*); West France (*Chevreaux*); Azores (*Barrois*).

Genus 2. BYBLIS, Boeck.

77. *Byblis Gaimardi* (Krøyer).

?1848. *Ampelisca Gaimardi*, Krøyer, Voyage en Scand. pl. xxiii. fig. 1.

1870. *Byblis Gaimardi*, Boeck, (137) p. 148.

1876. *Byblis Gaimardi*, Boeck, (138) p. 543.

1891. *Byblis Gaimardi*, G. O. Sars, (142) p. 183, pl. lxiv.

Hab. Off Seaham, Co. Durham (*A. M. N.*): *Mus. Nor.* Off St. Abbs Head, 40 fathoms (*Metzger*); near May Island, Firth of Forth, Jan. 1890 (*T. S.*).

Distrib. Trondhjem Fiord, Norway, 250-300 fathoms; Klosterelv Fiord, E. Finmark, 3-5 fathoms (*A. M. N.*); Tromsø (*Schneider*); 'Valorous,' 1875; Holsteinborg Harbour, Greenland, 7-35 fathoms: *Mus. Nor.* Arctic Ocean from Greenland to Siberian Sea (*G. O. Sars*); Bohuslän (*Bruzelius*); Kattogat (*Meinert*).

78. *Byblis erythrops*, G. O. Sars.

1882. *Byblis erythrops*, G. O. Sars, (102) p. 109, pl. vi. fig. 3.

1892. *Byblis erythrops*, G. O. Sars, (142) p. 187, pl. lxv. fig. 3.

Hab. 'Porcupine,' 1869, Stat. 3, to the west of Valentia, Ireland, lat. 51° 38' N., long. 12° 50' W., in 722 fathoms: *Mus. Nor.*

Distrib. Hardanger Fiord, Norway, in several places; Varanger Fiord, East Finmark, in 125-150 fathoms (*A. M. N.*); Bejan, near entrance of Trondhjem Fiord (*G. O. Sars*): *Mus. Nor.* The only other locality in which Sars has taken it is off Magerö, West Norway.

Genus 3. HAPLOOPS, Lilljeborg.

79. *Haploops tubicola*, Lilljeborg.

1855. *Haploops tubicola*, Lilljeborg, Öfvers. af K. Vet.-Akad. Förhand. p. 134, ♀.
 1855. *Haploops carinata*, id. ibid. p. 89, ♂.
 1868. *Haploops tubicola*, Norman, "Crustacea Amphipoda new to Science or to Britain," Ann. & Mag. Nat. Hist. ser. 4, vol. ii. p. 411, pl. xxi. figs. 1-3 (and references).
 1869. *Haploops tubicola*, Bate & Westwood, (1) vol. ii. p. 505.
 1876. *Haploops tubicola*, Boeck, (138) p. 537, pl. xxx. fig. 5.
 1876. *Haploops carinata*, id. ibid. p. 539, pl. xxx. fig. 6, ♂.
 1892. *Haploops tubicola*, G. O. Sars, (142) p. 192, pl. lxxvii.

Hab. Off Berwick-on-Tweed and near Holy Island, Northumberland; Shetland; Isle of Skye; several places in Firth of Clyde (*A. M. N.*): *Mus. Nor.* Off Durham coast and 7 miles off Tynemouth, Northumberland (*A. M. N.*); between Isle of Man and Great Ormes Head, 20-30 fathoms (*A. O. W.*); near Bass Rock and other parts of the Firth of Forth (*T. S.*); Loch Linnhe, W. Scotland (*G. Brook*).

Distrib. 'Porcupine,' 1869, Stat. 36, outside the entrance to the British Channel, in 725 fathoms; Godhavn Harbour, Greenland, in 5-20 fathoms, 'Valorous,' 1875; Bay of Fundy, N.E. America (*S. I. Smith*); Bog and Varanger Fiords, East Finmark (*A. M. N.*); Bohuslän, Sweden (*Lovén*); Naples (*Della Valle*): *Mus. Nor.* Whole coast of Norway, Arctic Ocean generally to Siberian Polar Sea; the Baltic (*G. O. Sars*); Denmark (*Meinert*); Western France (*Chevreur*).

In my Shetland Report this species was twice recorded by myself as *Haploops tubicola*, and also on Mr. Spence Bate's authority under the name "*Pontoporeia affinis*" by mistake. The species forms for itself a very thick tube of mud, in which it makes its home.

80. *Haploops setosa*, Boeck.

1870. *Haploops setosa*, Boeck, (137) p. 148.
 1876. *Haploops setosa*, Boeck, (138) p. 541, pl. xxx. fig. 7.
 1888. *Haploops setosa*, D. Robertson, Contrib. to Cat. Amphip. and Isop. Firth of Clyde, p. 23.
 1892. *Haploops setosa*, G. O. Sars, (142) p. 194, pl. lxxviii. fig. 1.

Hab. Dredged off Skate Island, Loch Fyne, in 100 fathoms, mud (*D. R.*): *Mus. Nor.* There are, I believe, only three spots in our seas between our islands in which a depth of 100 fathoms can be found. The others are near Cronlin Island in the Sound of Skye and between the islands of Cumbrae and Arran in the Firth of Clyde. The immediate

neighbourhood of these deep spots is the habitat of certain Mollusca and other animals not found, or scarcely to be found, elsewhere between our islands. Thus, Loch Fyne is the well-known locality of the shells *Cuspidaria costellata*, Deshayes, *Cuspidaria abbreviata*, Forbes, and *Alvania subsoluta*, Aradas, var. *abyssicola*, Forbes; here, too, are found the Crustacea *Nyctiphanes norvegica*, Sars, and *Euchata norvegica*, Boeck, in the greatest profusion (two Crustacea to which the Loch Fyne herrings seem to owe their large size and fine flavour), *Bythocypris complanata*, G. S. Brady, and other deep-water forms not so restricted in their distribution. In the Sound of Skye and neighbourhood are *Poromya granulata*, Nyst & Westend., *Cuspidaria abbreviata*, Forbes, and *costellata*, Desh., *Cryptodon ferruginosus*, Forbes, *Portlandia tenuis*, Phil., *Arca pectunculoides*, Scacchi, &c. Of the inhabitants of the deep hole between Cumbrae and Arran we know less, but Sir J. Murray procured *Nyctiphanes norvegica* there in great abundance. These northern deep-water forms probably made their way to these localities at a geological period when the British Islands were more submerged than they are now, and the depths therefore were greater. It is remarkable that in our times the depths of many of the Scotch lakes far exceed the depth of any part of the sea at all near to our coasts.

By the 'Porcupine' Exped. it was taken at Stat. 3, off the south-west of Ireland, in 722 fathoms, and at Stats. 74 and 88, west of the Shetland Islands, in 203 and 290 fathoms: *Mus. Nor.*

Distrib. 'Lightning,' 1868, Stats. 3 and 6, Faroe Channel, in 229 and 510 fathoms; 'Knight Errant,' Faroe Channel, Stat. 8, in 540 fathoms; 'Porcupine,' 1870, Stat. 56, near the island Pantellaria, in the Mediterranean, 390 fathoms; Varanger Fiord, E. Finmark, 125-150 fathoms; Rödberg, Trondhjem Fiord, Norway, 250-300 fathoms, and Hardanger Fiord, 150-180 fathoms (*A. M. N.*): *Mus. Nor.* Greenland, 48-183 fathoms (*H. J. Hansen*); Arctic Ocean generally.

I have received specimens under this name from Prof. S. I. Smith, which were taken in the Bay of Fundy, N.E. America. I am inclined, however, to think that they should be referred to *Haploops robusta*, G. O. Sars. They are the largest examples I have seen, and in most points, such as the form of the cephalon and of the third segment of the metasome, they agree with Sars's species; but the proportionate lengths of the joints of the peduncles of the two pairs of antennæ are different.

XLVII.—*On some Longicorn Coleoptera from the Island of Hainan.* By C. J. GAHAN, M.A.

THIS paper contains an account of the Longicorn beetles collected in Hainan by the late Mr. J. Whitehead. Twenty-four species are enumerated, of which six are described as new. It will be seen from the distribution given for the various species named that the Longicorn fauna of Hainan is, on the whole, very like that of Siam, Burma, N. India, and South China.

1. *Ægosoma hainanensis*, sp. n.

♂. *Æ. ornatocolli* (White) affine; nigro-fuscum, supra pube brevi fulvo-flavescente fere omnino obtectum; antennis articulo 5° scabroso, quam 6° duplo longiore.

Long. 38 mm.

Hab. Hainan (Whitehead).

Closely allied to *Æ. ornatocolle*, White, and agreeing with it in most of its characters, the chief difference being that in the new form almost the whole upper surface is covered with a short, dense, yellowish-tawny pubescence, somewhat similar to that forming the four prothoracic spots of *ornatocolle*. The fifth joint of the antennæ in the male is twice as long as the sixth, and is scabrous throughout its entire length. As only one example of this species was obtained, it may be doubted whether the differences indicated will prove to be constant when a larger series of specimens is examined. But out of a number of specimens of *ornatocolle* and of the very closely allied species *Æ. sinicum*, White, I have not found one at all approaching the present form in the amount of pubescence covering its upper surface.

2. *Ægosoma marginale*, Fabr.

A few examples of this species were obtained in Hainan. The species is distributed from China to the Malay Archipelago.

3. *Philus antennatus*, Saund.

This species has hitherto been recorded only from China, though a very closely allied species—*P. rufescens*, Pasc.—has been described from Penang.

It may be interesting to note here that both of these species of *Philus* have a double stridulating area on the mesonotum,

and in this respect differ from the other species placed in the genus, and, in fact, from all other known *Prionidæ*.

4. *Dialeges undulatus*, Gahan.

Three or four examples. This species was described from examples from Ceylon, Burma, and Siam.

5. *Ceresium sinicum*, White.

One example of this common Chinese species was obtained at Hainan.

6. *Eurybatus 10-punctatus*, Westw.

One male example. This species has been hitherto recorded only from N. India, Burma, Java, and Borneo, the last-named locality being very doubtful. Two specimens from Sarawak which Pascoe referred to the species are distinct from the N. Indian and Burmese forms, and probably belong to the Javan species *E. læta*, Lameere.

7. *Clytanthus Douei*, Chev., var.

Three examples.

8. *Chlorophorus annularis*, Fabr.

This is a very widely distributed Oriental species.

9. *Xylotrechus quadripes*, Chev., var.

One example. The postmedian cinereous band of the elytra is broader than in the typical form occurring in India, Burma, and Siam.

10. *Monohammus bimaculatus*, Gahan.

One example. The species was previously known only from N. India, Burma, and Siam.

11. *Pelargoderus apicalis*, sp. n.

Fuscus, supra tenuiter griseo-pubescentis; prothorace lateraliter obsolete tuberculato, fere mutico, disco subrugoso; scutello pube fulva dense oblecto; elytris basi granulosis, deinde sat dense fortiterque punctatis, versus basin sparsissime, sed in partem tertiam apicalem dense, fulvo-maculatis; corpore inferiore cum capite femoribusque maculatim fulvo-pubescentibus; antennis griseo-fulvis, articulis 3^o ad 10^{um} apice fuscis, articulis 3^o ad 5^{um} vel 6^{um} subtus sat dense ciliatis.

Long. 20, lat. 6 mm.

Hab. Hainan (*Whitehead*).

Dark brown, with a faint greyish pubescence covering the greater part of the pronotum and elytra, and a yellowish tawny pubescence, broken up into small spots, spread over the head, underside, legs, and the posterior two fifths or so of the elytra, a few spots of the same colour being very sparsely scattered over the anterior three fifths of the elytra, while four obsolete bands—two dorsal and two lateral—made up of the same tawny pubescence are present on the prothorax. Antennæ greyish tawny, except at the apex of the third and following joints, those of the female nearly twice as long as the body, with the first six or seven joints rather densely ciliate underneath; the scape rugosely punctured and less than half the length of the third joint, the latter being slightly thickened and somewhat rugose towards the base. Prothorax nearly cylindrical, the sides being but feebly rounded and the tubercles so small as to be almost quite obsolete; the disk somewhat rugose. Scutellum entirely fulvous pubescent. Elytra granulate at the base and rather thickly and strongly punctured from thence up to the thickly spotted posterior area. Prosternal process scarcely dilated near the middle of its length; the mesosternal process with a feeble cariniform tubercle along the middle.

This species, being founded upon a female specimen, is only provisionally placed in the genus *Pelurgoderus*. In general structure it approaches closely enough to *P. vittatus*, Serv., the type of the genus, the chief points of difference being that in the latter the antennæ are not ciliate underneath, the scape is relatively longer, and the prosternal process is distinctly enough dilated at about the middle of its length.

12. *Melanauster macrospilus*, sp. n.

Niger, nitidus; antennis albo-annulatis; elytris basi haud granulatis, utrisque maculis 11 aut 12 albis, ornatis; pectore abdomineque utrinque luteo-albo-plagiatis; processu mesosterni valde tuberculato.

Long. 28-38, lat. 11-14 mm.

Hab. Hainan (*Whitehead*).

Black and glossy. Prothorax with an acute conical tubercle on each side, below which there is a rather large luteous white spot; the disk with a somewhat raised or tuberculate area across the middle, the raised part consisting of two oblique tubercles towards each side and a postero-median longitudinally impressed tubercle which lies just in front of the deeper and more anterior of the two basal transverse

grooves. Scutellum luteous white. Elytra almost impunctate and altogether without granules, each with eleven or twelve whitish or luteous-white spots differing somewhat in size and form, the smallest being placed near the scutellum; four of the spots are placed close to the outer margin, one (rather large) at the apex, another in the basal depression above the shoulder, and the remaining four or five on the disk in such a position that the whole of the spots on the elytra, excluding the two large apical ones, form four somewhat irregular transverse series. On the underside a spot on each side of the mesosternum, an oblique patch on each side of the metasternum, and a row of five spots on each side of the abdomen are of a luteous-white colour, the rest of the ventral surface except along the middle having a faint greyish pubescence; the legs are also faintly grey, with a dorsal spot near the apex of each femur, the proximal half of the tibiæ, and the upperside of the tarsi luteous white. Antennæ of the male more than half as long again as the body; each of the joints narrowly ringed with luteous white both at the base and apex, except the first, which has a spot only near the apex, and the last three or four, which are almost entirely luteous white. Mesosternal process with a prominent tubercle, the anterior face of which is almost perpendicular, while the ventral face slopes downward in front.

13. *Melanauster similis*, sp. n.

Niger, nitidus; antennis albo-annulatis; prothorace supra vittis duabus luteo-albis, interruptis, notato; elytris albo-maculatis, basi sparse sed distincte granulatis; corpore subtus pedibusque griseo leviter pubescente; processu mesosterni modice prominente. Long. 42, lat. 20 mm.

Hab. Hainan (*Whitehead*).

This species somewhat resembles the preceding one, but is readily to be distinguished by the following characters:—The prothorax has two interrupted luteous-white bands on the disk and the postmedian tubercle on the disk is rather strongly raised and shows no trace of a notch or impression. The elytra are sparsely but distinctly granulate on the basal sixth; each is marked with about nine or ten larger and twelve to fourteen smaller luteous-white spots, all of which are more or less rounded in outline and arranged without any definite order. The underside of the body is covered with a rather faint bluish-grey pubescence, and there is a patch on each side of the prothorax and a spot on each cheek of a somewhat more distinctly bluish tint. The rings of pubescence on the

antennæ are of the same luteous-white colour as in the preceding species, and each ring embraces the apex of one joint and the base of the next, beginning from the apex of the third joint; but there is a ring also near the middle of the eleventh joint. The mesosternal process is not very prominent, its anterior face being perpendicular and the lower face almost horizontal, so that the angle between these two faces is very nearly a right angle.

This species and the preceding one seem to be most nearly allied to *M. imitator*, White, from Shanghai; but the latter differs from them not only in the size, number, and colour of the clytral spots, but also in having a much more feebly developed mesosternal tubercle.

14. *Melanauster chinensis*, Forst.

One example.

15. *Coptops polyspila*, Pasc.

One example. The pubescence in this example has a slightly reddish tint resembling that of *C. rufa*, Thoms., from the Andaman Islands, but in other respects it resembles the type of *C. polyspila*. *Coptops petechialis*, Pascoe, from Cambodia, and *C. lacertosa*, Pasc., from Penang, seem to be specifically identical with *C. polyspila*, the type of which came from Penang; and these three forms are probably only varieties of the Indian species *Coptops leucostictica*, White.

16. *Olenecamptus bilobus*, Fabr.

Four or five examples of this widely distributed species.

17. *Niphona Hookeri*, sp. n.

N. furcator (Bates) sat similis et affinis, sed postice minus attenuata; elytris apice transverse truncatis, angulis externis haud productis; cristis basalibus magis elongatis; tibiis intermediis maris intus ad apicem dente sat magna sed obtusa armatis.

Long. 18-28, lat. 6-9½ mm.

Hab. Hainan (*Whitehead*); N. India, Darjeeling and Sikkim (*Dr. Hooker*); Andaman Islands (*Atkinson coll.*); and China (*Bowring*).

Almost entirely covered with a dense yellowish tawny pubescence. Eyes rather large and coarsely granulate. Antennæ a little longer than the body in the male, shorter in the female, ciliated underneath, the ciliæ being denser and

somewhat longer on the last few joints. Prothorax unarmed at the sides, longitudinally rugose above, with the median ridge distinct and the others more or less broken, so that the disk presents towards the sides a somewhat roughly granulate appearance. Elytra narrowed behind and sinuately truncate in a transverse direction at the apex, the outer angles not being produced as in some of the allied species; each with a rather prominent ridge placed not far from the suture along the basal fourth and a second very much smaller ridge in the depression between this and the humeral prominence. Pubescence covering the middle of the abdomen and sometimes that on the breast of an ashy-white colour, the rest of the pubescence on the underside and legs being of the same colour as on the upperside.

One male specimen of this species was obtained at Hainan. Two female specimens from N. India, in the British Museum collection, undoubtedly belong to the same species, the only differences noticeable being of a sexual character. In the male, each of the middle tibiæ is armed on the inner side just before the apex with a large blunt tooth, which stands out almost at right angles. This character is present also in two other male specimens in the Museum collection—one from the Andaman Islands, the other being labelled as from China; and as these specimens only differ in being whiter underneath and along the margins and on the disk of the elytra, they may safely be referred to the same species.

18. *Pterolophia annulata*, Chevrolat.

One example.

19. *Zotale lineatus*, Gahan.

Mycerinosia lineatus, Gahan, Ann. Mus. Civ. Genov. (2) xiv. p. 75.

One example, agreeing very well with typical specimens from Burma.

Since I described this species I have been able to examine the type of the genus *Zotale*, Pasc. *Z. lineatus* is very closely allied to *Z. unicolor*, Pasc., and is certainly congeneric with it.

20. *Sybra posticata*, Gahan.

Sybra posticata, Gahan, l. c. p. 77.

One example. The species occurs also in Burma, Siam, and N. India.

21. *Serixia sedata*, Pasc.

Four examples. Occurs also in Siam and Burma.

22. *Serixia*, sp.

One example, apparently belonging to a new species, but not in sufficiently good condition to be satisfactorily described.

23. *Astathes cyanoptera*, sp. n.

A. episcopalis (Chevr.) affinis; flavo-testacea; elytris cyaneis, utriusque obsolete bicarinatis; antennarum scapo subtus testaceo, articulis 3^o-5^{um} fere omnino testaceis; ceteris plus minusve infuscatis; pedibus testaceis, tibiis versus apicem tarsisque nigro-fuscis. Long. 12-15, lat. 4½-6 mm.

Hab. Hainan (*Whitehead*).

Head (with the exception of the labrum), prothorax, and underside of the body yellowish testaceous in colour. Head rather strongly and thickly punctured in front and very sparingly on the vertex, slightly concave between the antennal tubercles, and marked with an impressed line along the middle. Antennæ with the first joint testaceous underneath and dark brown above; the joints from the third to the fifth almost wholly testaceous, and the remaining joints more or less deeply infuscate. Prothorax with a rather large but not abruptly raised umbone on the middle of the disk, this umbone, like the rest of the disk, being but very sparsely punctured. Elytra of a bright metallic-blue colour, distinctly punctured, and each bearing two very slightly raised lines or carinæ along the inner half, the sutural margin also being raised into a somewhat sharper and more distinct carina. Distal half of the tibiæ and the tarsi blackish brown, the rest of the legs having the same colour as the underside of the body.

This species is very closely allied to *A. episcopalis*, Chevr., and I was at first inclined to regard it as a variety of the latter. *A. episcopalis* differs, however, not only by the violaceous colour of its elytra, but also by the more thickly placed punctures on the umbone of the prothorax and on the vertex of the head; the third joint of its antennæ is entirely dark brown and the fourth to sixth joints are fuscous at the apex; the tibiæ are almost entirely brown, though this colour is somewhat hidden by the dense covering of fulvous setæ. *A. episcopalis*, Chevr., is found in China, Hong Kong, and Formosa. It is the true *violaceipennis* of Dejean's Catalogue,

but not the species described under that name by Thomson, which is very distinct and occurs in India, Burma, &c., and not, so far as I know, in China.

24. *Oberea*, sp.

One example.

In addition to the species enumerated above the collection contains one example referable to a new genus allied to *Merionæda*.

XLVIII.—*Descriptions of Two new Murines from Peru and a new Hare from Venezuela.* By OLDFIELD THOMAS.

Oryzomys prætor, sp. n.

Allied most nearly by proportions and skull-characters to *O. aureus*, Tomes, and *O. princeps*, Thos., but wholly different in colour. General appearance somewhat that of a small *Neotoma*.

Size large. Fur long, soft, close, and thick; hairs of back 13-15 millim. in length. General colour olivaceous fawn-grey, much darkened on the middle and posterior back by the numerous black ends to the longer hairs. Head, cheeks, shoulders, and flanks clearer yellowish grey. Under surface buffy white, quite without line of demarcation; slaty bases of hairs showing through; groins with a fulvous suffusion. Ears of medium size, blackish brown, much darker than the general colour. Outer sides of limbs like sides, inner like belly; upper surface of hands and feet uniform silvery white. Tail slightly longer than head and body, thinly haired, not pencilled, very finely scaled, the rings running about sixteen to the centimetre; its colour uniformly brown above, rather paler below.

Skull on the whole very similar to that of *O. princeps*, but with rather a broader and flatter brain-case and narrower and more parallel-sided interorbital region. Nasals rather broader. Outer plate of zygoma-root more projecting, so that the ante-orbital notch is better defined. Interorbital region narrow, parallel-sided, flat above; its edges square but not sharply so, traceable across the parietals to the outer corners of the interparietal, but not forming sharp ridges or beads. Interparietal

broad, strap-like, short antero-posteriorly. Palatal foramina large and open. Bullæ small. Molars broad and heavy.

Dimensions of the type (measured in the flesh by collector):—

Head and body 168 millim.; tail 180; hind foot 35; ear 25.

Skull: greatest length 40; basilar length 32.2; greatest breadth 22.3; nasals 15.6×5 ; interorbital breadth 4.2; interparietal 3.8×11.2 ; palatal length from henselion 17.4; diastema 11.1; palatal foramina 9.2×3.2 ; length of upper molar series 7.6.

Hab. Eastern slope of Paramo between San Pablo and Cajamarca, Peru. Alt. 4000 metres.

Type. Female. B.M. no. O. 3. 15. 3. Original number 719. Collected by Mr. Perry O. Simons, 10th November, 1899. One specimen only.

This fine species is no doubt most nearly allied to the Ecuadorean *O. aureus* and the Bogotan *O. princeps*, forming with these a small section of the genus, characterized by large size, soft fur, obsolete supraorbital ridges, large open palatal foramina, and a mountain habitat. As a species *O. prætor* is distinguished from the other two by many characters, of which the most obvious are its non-rufous colour and white feet.

At the same place as the type of *O. prætor* Mr. Simons obtained two rats referable to the interesting "*Thomasomys*" *cinereus*, first discovered by Dr. Stolzmann at Cutervo.

Phyllotis amicus, sp. n.

Intermediate both in size and colour between *Ph. Haggardi* and the peculiar little desert species *Ph. gerbillus*, whose reference to this group it satisfactorily confirms.

Fur fine, soft and sleek; the hairs on the back about 8-9 millim. in length. General colour above fawn-grey, finely lined with black. Face and crown quite like back. A line along cheeks, sides of neck, and flanks bright sandy yellow, dividing the dorsal colour from that of the belly. Under surface white, the bases of the hairs slaty. Ears very large, finely haired, their outer surface greyish brown, their inner fawn-grey. Upper surface of hands and feet pure white. Tail long, well-haired, and slightly pencilled terminally, brown above, white below.

Skull in general form quite like those of the two species above named, but its bullæ, in correlation with the external ears, are unusually large, being larger than in the decidedly bigger species *Ph. Haggardi*.

Dimensions of the type (measured in the flesh by collector):—

Head and body 82 millim.; tail 105; hind foot 23; ear 23.

Skull: greatest length 24.4; basilar length 18.1; greatest breadth 12.7; nasals, length 9.8; interorbital breadth 4; palate length 10; diastema 6; palatal foramina 5×1.7 ; length of upper molar series 3.8.

Hab. Tolon, coast district, Province Cajamarca, N.W. Peru. Altitude 100 m. Other specimens from Eten, on the coast, and from Reque, in its near neighbourhood.

Type. Male. B.M. no. O. 3. 1. 94. Original number 685. Collected 2nd November, 1899, by Mr. Perry O. Simons. Fourteen specimens examined.

This species is interesting as forming the connecting-link between the ordinary members of the genus and the aberrant *Ph. gerbillus* found in the deserts to the north-west. Occasional specimens of the latter are nearly as dark in colour, but even from these *Ph. amicus* may always be readily distinguished by its larger size, much larger ears, longer tail, slate-mixed belly, and yellowish lateral line. From *Ph. Haggardi*, on the other hand, it is separable by its smaller size and paler colour.

*Sylvilagus * orinoci*, sp. n.

General appearance much as in *S. Gabbi*, All., but probably really most nearly allied to *S. cumanicus*, Thos.

Colour above coarsely grizzled buffy and black, the marbling not so coarse as in *S. cumanicus* and the tone not unlike that of *S. Gabbi*. Underfur pale plumbeous basally, black terminally. Outer fur with a subterminal band of buffy, much darker than in *S. cumanicus* and with a black tip. Forehead dark buffy rufous. Cheeks greyish, area round eye whitish and that between eye and ear darker, all as in *S. cumanicus*, but the contrasts not nearly so marked. Nape-patch clear rufous. Ears shorter than in the allied species, their anterior backs greyish, gradually darkening at the terminal edges to black; their fringes, posterior backs, and whole inner surface silvery grey. Chin and throat white, a faint line along centre of chin brown. Pectoral collar deep buffy. Belly whitish, not sharply defined, mixed laterally with buffy, which latter colour also invades the white on each side in the ante-inguinal region. Outer sides of limbs buffy, inner whitish, the latter continued on to the tops of the hands and feet. Tail quite short and stumpy, indistinctly brown above, pale buffy below.

* See Major, Trans. Linn. Soc. (2) Zool. vii. p. 514 (1899).

Skull, as compared to that of *S. cumanicus*, smaller and more delicate; muzzle narrower anteriorly; frontal processes of premaxillæ terminating about one tenth of an inch in front of the end of the nasals; palatal foramina narrower; bullæ larger in proportion, especially anteriorly. Incisors with the same deep simple notch in front as in *S. cumanicus*.

Dimensions of the type (taken by the collector in the flesh):—

Head and body 355 millim.; tail 27; hind foot 70 (c. u. 75); ear from notch 55.

Skull: greatest length 70; basilar length 55; greatest breadth 34; nasals 31.2×13.5 ; interorbital breadth 16.6; intertemporal breadth 13.8; palatal foramina 19.5×6.2 ; length of upper tooth-row (alveoli) 14.

Hab. Maipures, Upper Orinoco.

Type. Female. B.M. no. 99. 9. 11. 49. Collected 22nd January, 1899, by Geo. K. and Stella M. Cherrie. Two specimens examined.

This species is more or less intermediate in size, as in geographical position, between the comparatively large *S. cumanicus* (and its ally *S. Margaritæ*, Miller) and the little *S. brasiliensis*.

XLIX.—On a new Genus and Species of Bulbul and an apparently new Species of Cyornis. By Col. C. T. BINGHAM, F.Z.S.

DURING a recent two months' tour in the Southern Shan States, Upper Burma, I had opportunities for making a small collection of the birds frequenting the high plateau-lands in those States. I was fortunate also in being able to spend three or four days on Loi-San-Pa, a mountain nearly 8000 feet in height, situated in the Möng Köng State.

Among the birds procured, I find after careful comparison with published descriptions and with the series of birds contained in the Indian Museum, Calcutta, that the following species, descriptions of which are given below, have apparently not been previously described. One of these birds is a Bulbul closely resembling in habits the species belonging to the genus *Hypsipetes*, Vigors, but differing so markedly from them in certain points of structure and in colour, and also from all known Bubluls, that I have no hesitation in proposing a new genus for its reception.

CERASOPHILA *, gen. nov.

Like *Hypsipetes*, possesses short legs, with a non-scutellated tarsus and a forked tail, but differs in having a more curved culmen, a bare unfeathered patch of skin round the eye, and the under tail-coverts of a colour different from that of the rest of the underparts, as in *Molpastes*, *Otocompsa*, &c.

Cerasophila Thompsoni, sp. n.

The whole head and neck snow-white, the white of these parts abruptly defined from the colour of the back and breast, and extending further down on the upper back than on the sides of the neck and breast; the back, rump, upper tail-coverts, wing-coverts, scapulars, the outer webs of the two inner tertiaries, the breast, sides, and stomach a clear ash-grey; the primary wing-feathers, the secondaries, the tertiaries, with the exception noted above, and the tail hair-brown; vent and under tail-coverts light bright chestnut; the under wing-coverts and axillaries, the lower portion of the stomach, and some of the lower feathers on the thighs pale grey with a wash of light chestnut.

Bill, legs, and feet coral-red, claws horny; a bare patch of skin round the eyes, conspicuously wider below the eye than above it, greyish tinged with yellow, the eyelids with a rim of bright vermilion-red. Iris whitish yellow to pale yellow.

The sexes are alike in plumage and differ only very slightly in size.

♂. Length 7·8 inches, wing 3·8, tail 3·8, tarsus 0·7, bill from gape 0·85.

♀. Length 7·8 inches, wing 3·7, tail 3·85, tarsus 0·7, bill from gape 0·85.

These measurements were taken in the flesh.

Hab. Loi-San-Pa, 6500 feet, Mōng Kōng State, Southern Shan States, Upper Burma.

I know of only one *Hypsipetes* that approaches the above species in coloration, that is *H. leucocephalus*, Gmelin, from China, which also has a white head as its name implies, but then, apart from the structural differences pointed out above, Gmelin's species is a much larger bird. A skin in the Indian Museum collection measures:—Length 9·5 inches, wing 4·8, tail 4, tarsus 0·7, bill from gape 1·1. Also, except the white head and neck, its plumage is black and the under tail-coverts are concolorous with the stomach, as in all known species of *Hypsipetes*. *Cerasophila Thompsoni* bears a superficial

* κέρανος = a cherry-tree.

resemblance to some of the Grey Starlings (*Sturnia*); the grey plumage, white head, and above all the bare eye-patch contributing not a little to this likeness. It seems clear, however, that its short tarsi, forked tail, and above all its habit of keeping in small parties to the tops of trees, and rarely, if ever, descending to the ground, point to a close affinity with *Hypsipetes*.

On my visit to Loi-San-Pa the wild cherry-trees were in full bloom, and all day long were visited by numbers of *Hypsipetes concolor*, *Chloropsis Hardwickii*, *Lioptila melano-leuca*, and other birds. Among these the above-described species was most conspicuous with its white head and grey plumage. Its call, so far as I could catch the note amid the babel of sound made by all the birds on the trees, was very similar to that of *Hypsipetes*.

I have named the species after Mr. H. N. Thompson, of the Indian Forest Department, a keen observer and field-naturalist, who was with me on Loi-San-Pa, and was the first to discriminate as new and procure specimens of this beautiful Bulbul.

Cyornis brevirostris, sp. n.

Forehead, sides of the head and neck, crown, occiput, nape, back, scapulars, the greater wing-coverts, and the sides of the body under the wings uniform dark slaty blue (the colour of a dark rock-pigeon); rump and upper tail-coverts paler blue; lesser wing-coverts and the wings dark brown; tail black, the base narrowly on the two central feathers and broadly on the remainder white; chin, throat, breast, and the upper half of the stomach bright orange; lower portion of stomach, the thighs, and under tail-coverts white, faintly washed with olive-brown; under wing-coverts and axillaries pale orange-yellow. Bill, legs, and feet black; iris dark brown.

♂. Length 4·8 inches, wing 2·9, tail 1·8, tarsus 0·6; bill from gape 0·4, from front 0·24.

Hab. Kalaw, 4000 feet, Myilat State, Southern Shan States, Upper Burma.

The dimensions given above are from the dry skin, as unfortunately when procured I did not discriminate it from *C. sapphira*. It is a *Cyornis* in colouring, and seems nearest to *C. Tickelli*, Blyth, but very much smaller and very much duller in colour, entirely wanting the glistening blue feathers on the forehead, bend of the wing, &c. Its extremely short bill also serves to distinguish it from that and all other species of *Cyornis*.

The types of both the above-described species are in the Indian Museum, Calcutta.

L.—*Note on the Common Hedgehog* (*Erinaceus europæus*, *Linnaeus*) and its *Subspecies or Local Variations*. By G. E. H. BARRETT-HAMILTON.

A COLLECTION of small mammals recently made by the late Mr. W. Dodson in Roumania included two hedgehogs which differ considerably from ordinary British and Continental animals in their coloration. In naming them I have been obliged to overhaul the whole series in the collection of the British Museum, and it may be well to here summarize the result of my work.

The colours of the hedgehog are so dull that they do not at first sight seem to afford much scope for extensive local variations as compared with those of other mammals. So far as the specimens of the common species at my disposal go, this is borne out only to a certain extent—that is to say, while I know of no brilliant local developments, there are yet wide differences in colour between the hedgehogs, say, of Mount Lebanon, of South Spain, and of Great Britain. But those who wish to see for themselves what striking developments may, under the influence of natural selection, be evolved from so apparently poor material should look at the specimens of other genera and species from the Ethiopian and Oriental Regions. In some of these blacks and whites are used with very conspicuous effect; but the brightest form of which I have seen a specimen is *E. frontalis*, Smith, of South Africa, with its almost orange frontal patch and brilliantly tinted spines.

The colour of the underside and other haired surfaces of our common British hedgehog is due to a mixture in variable proportions of dirty brown and dirty white hairs. Some specimens are altogether brown, but in others there is a considerable quantity of the dirty white hairs, which do not, however, assume any particular discernible pattern or arrangement. The lightest skins which I have seen are those of two quite small individuals collected by Mr. W. R. Ogilvie Grant in Elgin, Scotland. They have the underside and the nose nearly white, but possess a dark not very well-defined breast-spot and traces of a dark median ventral area.

The spines of the upper surface are marked with an alternation of black or dark brown and dirty white annulations, usually in three bands, of which the central is dark, while the two extremities of the spines are light. A small dark tip may or may not be present.

I find that apparently the coloration tends to become lighter as the animal ranges southward, until Spanish specimens are almost white. This is effected by a lightening not only of the hairs but also of the spines. These appear to become whiter along their whole length, so that while in one spine the dirty is represented by a purer white and the brown band has little intensity, in another the brown band may have entirely disappeared and the colour is white throughout the whole length of the spine. In its extreme form this becomes a very well-marked subspecies, which I accordingly here take the opportunity to describe.

Another phase of the animal is represented in Italy, where, as regards colour, the hedgehogs are slightly paler than those of Western Europe. In Sicily there is a subspecies of which the longer, thicker bristles have broader white and more strongly contrasted deeper black annulations. The Roumanian hedgehogs are distinguishable by the fact that the dirty-white hairs of the under surface are arranged in a defined breast-spot, thus approximating (in this respect only) very closely to *E. concolor*, Martin, of which the Museum possesses the type specimen from Trebizond. In other respects the type of *E. e. concolor* is of highly remarkable appearance, and differs in its dark burnt-umber coloration from specimens from Mount Lebanon, which, although similar to *E. e. concolor* in size and proportions, possess the white tips to the spines which characterize our own hedgehog. I suspect, however, that the colour of the former is due to the process of preservation to which it was subjected, and hence I refer the Lebanon specimens to *E. e. concolor*. Lastly, two specimens from Pekin and Chefoo show that there occurs at the extreme eastern limit of the great Palaearctic Region a hedgehog which, although paler, is yet not very widely different from our own.

One or two points of general interest deserve a brief notice before I pass on to enumerate the various subspecies; and, firstly, it is interesting to find Eastern European mammals approaching or intergrading with those of Western Asia. Several similar instances have recently been brought before our notice. Thus we have *Ovis ophion urmiana** of the islands of Lake Urmi, intermediate between *O. ophion* of Cyprus and *O. orientalis* of Asia; *Microtus Musignani illyricus*† of Bosnia, intermediate between *M. Musignani* of Spain and *M. persicus* of Kurdistan and Persia; *Meles meles mediterraneus*‡ of Crete, intermediate between *M. m. typicus* of

* A. Günther, Journ. Linn. Soc., Zool. vol. xxvii. p. 374.

† Barrett-Hamilton, Ann. & Mag. Nat. Hist., March 1899, p. 225.

‡ *Id. op. cit.* Nov. 1899, p. 383.

Europe and *M. m. canescens* of Persia; and *Mustela foina mediterranea**, occurring in South Spain and Asia Minor, and at Kandahar.

Secondly, it is curious to find that, whereas in the case of the weasel † there is a tendency for the white belly of northern specimens to become yellow in the south, in the hedgehog the process would seem to be reversed; but it is just possible that we may find a parallel in the light *Eliomys pallidus* of Sicily, in *Mustela foina mediterranea*, in *Microtus Musignani illyricus*, and in *Meles meles mediterraneus*.

As regards cranial differences, I find that I can distinguish between, on the one hand, the similarly coloured Roumanian and the true *concolor*, and there are also characters whereby the hedgehogs of different parts of Europe may be separated, as, for instance, the British and the Italian. It is noticeable that the sagittal crest may be developed in quite young specimens, as in one from South Germany, in which the teeth of the permanent dentition are only just making their appearance. The size of certain of the teeth is subject to some variation in different individuals. This is, I think, especially the case as regards *inc.*², a tooth the size and position of which is relied upon in part by my friend Mr. W. E. de Winton ‡ as a distinguishing characteristic between *E. algirus*, Duvernoy, and *E. europæus*. This tooth is usually far larger in the latter than in the former species; but I find it quite small in some individuals, as in a (perhaps not quite) adult from Cardiff, and intermediate in size in a large male from Haddingtonshire, Scotland. The shape of the frontal process of the premaxilla seems to be a quite reliable subspecific character.

The following subspecies are recognizable:—

(1) *Erinaceus europæus occidentalis*, subsp. n.

Type from Haddingtonshire, Scotland; presented by Mr. W. Eagle Clarke (for particulars see below).

Distinguishing characteristics. Colour of underside a mixture of dirty white and dirty brown without definable pattern. Spines with at least three bands as above described. Skull with conspicuous frontal processes to the premaxillæ, with a blunt or nearly square posterior termination, and seldom showing a sharply defined point or angle; these processes usually extend backward for more than half the length of the nasals.

Dimensions (in millim.) of four selected specimens:—

* Barrett-Hamilton, *op. cit.* June 1898, pp. 441-2.

† *Id. op. cit.* Jan. 1900, p. 41.

‡ "On a Collection of Mammals from Morocco," P.Z.S. 1897, pp. 955-6.

	Head and body.	Tail.	Hind foot.	Ear.	Skull.	
					Basal length.	Breadth at zygoma.
♂, Cardiff, Wales, 26th May, 1899 (<i>R. Drane</i>)	263	20	43	22	53	36
♂, Innerwick, Haddingtonshire, Scotland, 8th April, 1899 (<i>W. Eagle Clarke</i>). Type of subspecies. (Mammæ 8.) The skull is the largest I have seen	218	17	42	28	57	84
No. 93. 10. 30. 2. ♂, Ennis, Co. Clare, Ireland, 21st Sept., 1893 (<i>J. W. Scott</i>)	252	30	40		..	..
♀ juv., Hardington, Gloucester- shire (<i>R. Hooper</i>), 15th Nov., 1894	179	23	35	21	damaged.	

Distribution. The British Isles and probably parts of median Western Europe.

Since all the British skulls can be distinguished from those of continental hedgehogs, I have no alternative but to separate the Western hedgehogs.

(2) *Erinaceus europæus typicus*, Linnæus, Syst. Nat. ed. x. p. 52 (1766).

Type locality Upsala, Sweden.

Distinguishing characteristics. In size and colour similar to *E. e. occidentalis*, but the skull may be distinguished by the frontal processes of the premaxillæ, which, although extending backward half the length of the nasals, end in a sharply defined point.

A specimen (no. 93. 3. 1. 7) from Aker Island, Røms Island, Norway (62° N. lat.), 28th May, 1890, has the dimensions of the skull 55.5 × 36. A skull from Switzerland is also of this form.

Distribution. Scandinavia and central continental Europe. Most German animals which I have seen are intermediate in their characters, and their exact identification must await the arrival of Eastern European specimens.

(3) *Erinaceus europæus hispanicus*, subsp. n.

Type No. 95. 3. 3. 2 (unsexed) of the British Museum collection, from Seville, Spain (for particulars see below).

Distinguishing characteristics. General size perhaps a little smaller than that of *E. e. typicus* and feet and legs more slender. Coloration markedly paler, being almost white in the extreme form. The bristles in many cases lack the black

central band altogether; the underside is white and the hairs of the legs and head are paler than in *E. e. typicus*.

The skull differs from that of *E. e. typicus* or *occidentalis* in that the frontal processes of the premaxillæ are inconspicuous and extend backward not further than, sometimes less than half the length of, the nasals.

The following are the dimensions (in millim.) of four specimens, as taken from the labels, and to which I have added details for the skulls:—

	Head and body.	Tail.	Skull.	
			Basal length.	Breadth at zygoma.
No. 95. 3. 3. 1. ♂, Seville, Spain, 26th Jan., 1895 (collected for the late Lord Lilford by A. Ruiz)	210	15	53 (damaged)	36
No. 95. 3. 3. 2. Unsexed, ditto. (Type of subspecies.) 14th Oct., 1894	230	20	56	38
No. 95. 3. 3. 3. ♀, ditto, 30th Dec., 1894	210	..	..	..
No. 95. 3. 3. 4. ♀, ditto, 14th Oct., 1894	210	15	54 (damaged)	36

Distribution. At present only known from Seville, but this is probably the hedgehog of South Spain, having a distribution perhaps corresponding to *Lepus Lilfordi*, de Winton.

(4) *Erinaceus europæus italicus*, subsp. n.

Type No. 98. 10. 2. 5 of the British Museum collection, from Siena, Italy (for particulars see below).

Distinguishing characteristics. Size perhaps a little smaller than that of *E. e. typicus* and colour slightly paler.

The skull is similar to that of *E. e. typicus*.

The following are the dimensions (in millim.) of four specimens:—

	Head and body.	Tail.	Hind foot.	Ear.	Skull.	
					Basal length.	Breadth at zygoma.
No. 98. 10. 2. 5. ♂, Siena, Italy, 30th March, 1898 (<i>the late Signor S. Brogi</i>). (Type of subspecies.)	220	28	42	25	51.5	34.5
No. 98. 10. 2. 6. ♂, ditto, 22nd August, 1898.	210	30	40	30	52	34.5
No. 98. 10. 2. 7. ♀, ditto, 30th March, 1898.	200	23	43	27	50	36
No. 98. 10. 2. 8. ♀ juv., ditto, 1st Sept., 1898	208	32	38	29	48	31.5
Original no. 126. ♀, Crau- Sales, Haute-Savoie, 1600 metres, 5th Dec., 1899 (<i>A. Robert</i>)	222	19	41	26	50	32

Distribution. Italy (besides the above I have seen also a specimen, no. 97. 3. 7. 1, from Calapiano *, Empoli, Florence, collected by Mr. A. H. Savage Landor), reaching at least northwards to Switzerland.

(5) *Erinaceus europæus roumanicus*, subsp. n.

Type original no. 50, from Gageni, Roumania (for particulars see below).

Distinguishing characteristics. In size, proportions, and coloration of the upperside agrees with *E. e. typicus*, but in coloration of the underside with *E. e. concolor*, Martin, having like that subspecies a dirty white spot on the breast.

Two skulls at my disposal are distinguishable from five of *E. e. concolor* by their greater size, including that of the teeth, especially of pm.^3 . They agree, however, with *E. e. concolor* in the inconspicuous posteriorly squared frontal processes of the premaxillæ, which thus end far more bluntly even than the corresponding processes of *E. e. europæus*, and fail to reach backward to half the length of the nasals; anteriorly the nasals are broader than in other subspecies.

Dimensions (in millim.) of two specimens:—

	Head and body.	Tail.	Hind foot.	Ear.	Skull.	
					Basal length.	Breadth at zygoma.
♂ (immature), Gageni, Roumania, 28th April, 1899 (the late W. Dodson)	170 (about)	28	41	24	50	32
Original no. 50. ♀ (adult), ditto, 19th April, 1899. (Mammæ 8.) (Type of subspecies.)	306	24	43	28	54.5	36

Distribution. At present known only from the type specimens, but this form probably ranges eastwards until it meets and perhaps intergrades with *E. e. concolor*. It was discovered by the late Mr. W. Dodson.

(6) *Erinaceus europæus concolor*.

Erinaceus concolor, W. Martin, P. Z. S. 1837, pp. 102, 103.

Type No. 55. 12. 24. 83, from the Museum of the Zoological Society of London, collected by Mr. Keith Abbott at Trebizond.

* This, although a young specimen, bears the date of 19th February, 1897.

Distinguishing characteristics. Size smaller than that of *E. e. europæus* and tarsi proportionately longer; annulations of the spines very indistinct, being almost absent in the type specimen, in which the colour (both of the spines and of most of the hairs) is an almost uniform vandyke-brown or burnt umber (Ridgway's nomenclature); the chest is, as in *E. e. roumanicus*, dirty white, and there is a spot of the same colour on the forehead and before each ear. The spines reach further forward on the head than in *E. e. europæus*.

I prefer to regard the remarkable coloration of the type as having been artificially produced, and to identify with this subspecies four specimens (nos. 94. 5. 7. 7 to 10) collected by Mr. Saleem Baroodly on Mount Lebanon. In these the general size and proportions are as in *E. e. concolor*, but the white tips to the spines are present, although the annulations of their basal parts are less distinct than in those of other known subspecies.

Skull with the frontal processes of the premaxillæ resembling those of *E. e. roumanicus*, but with the teeth, and especially $\frac{pm}{3}$, smaller than in that subspecies. All the skulls are imperfect, but the palatal length both of the type and of two of the Mount Lebanon skulls reaches only 31, as against 33 millim. in *E. e. roumanicus*, and thus indicates a smaller animal.

Distribution. At present known only from Trebizond and Mount Lebanon.

(7) *Erinaceus europæus Consolei*, subsp. nov.

Type No. 98. 10. 6. 1, from near Palermo, Sicily (Mr. J. I. S. Whitaker).

Distinguishing characteristics. Spines longer and thicker than in continental subspecies, and with the subterminal white bands much broader and often obliterating the small dark tips; the median dark band is also blacker and more sharply contrasted with the white bands. Colour of underside lighter than in *E. e. europæus*.

Skull with premaxillæ moderately short and resembling those of *E. e. hispanicus*. In the type the frontal processes do not quite reach backward as far as the centre of the nasals.

Dimensions (in millim.) of the type:—

Head and body.	Tail.	Hind foot.	Ear.	Skull.	
				Palatal length.	Breadth at zygoma.
252	50	40	23	33 (damaged)	36

Distribution. At present known only from the type, which is from Sicily, and certainly represents an interesting local development of the hedgehog, for the opportunity of describing which we are indebted to Mr. J. I. S. Whitaker. At his suggestion I have pleasure in connecting it with the name of Signor Console, his museum curator, to whose energy the British Museum is indebted for a long series of Sicilian mammals, including the types of my *Eliomys pallidus* and *Glis insularis*.

(8) *Erinaceus europæus sibiricus*.

Erinaceus sibiricus, Erxleben, Syst. Règn. An. 1777, p. 172.

Type unknown.

Description. “*E. europæus*, notæo ex rufo-fusco et flavido variegato; gastræo dilute cinereo, flavido-lavato” (L. J. Fitzinger, Sitzb. d. k. Akad. d. Wiss. I. Abth., Nov.-Heft, Jahrg. 1867, p. 9).

Distribution. Siberia.

I have never seen a specimen of this form.

(9) *Erinaceus europæus dealbatus*.

Erinaceus dealbatus, R. Swinhoe, P. Z. S. 1870, p. 450.

Type No. 61. 6. 2. 5, from Peking. Collected by R. Swinhoe.

Distinguishing characteristics. A pale form of *E. europæus* of which we know very little, Swinhoe's description having been taken from a quite young individual, and hence being not very reliable.

The only adult skull which is available for comparison is that of no. 74. 1. 24. 23, collected by Swinhoe at Chefoo, China, and in which the frontal processes of the premaxillæ are inconspicuous and terminate posteriorly in a sinuous line with no sharply defined point. The dimensions reach 54×35 .

Distribution. At present only known from Chefoo and Peking, China.

(10) *Erinaceus europæus amurensis*.

Erinaceus europæus, L., var. *amurensis*, L. v. Schrenck, Reisen und Forschungen im Amur-Lande in den Jahren 1854–1856, Bd. i. pp. 100–105, pl. iv. fig. 2 (1858).

Typical locality Amurland.

The Museum possesses no specimen of this subspecies, so that I cannot compare it with others.

In Morocco, Algeria, Tripoli, and Tunis *E. europæus* is represented by the distinct *E. algirus*, the distinguishing characteristics of which have been so well pointed out by my friend Mr. W. E. de Winton (*op. et loc. cit.*). Mr. de Winton has identified with this hedgehog a single specimen from Andalucia, and regards its occurrence in Spain (should there have been no mistake as to the labelling and origin of the specimen) as an interesting extension of the range of a North-African mammal to Europe. I have recorded * the existence of a similar doubtful skull of another North-African mammal, *Eliomys mumbyanus* (Pomel), from North-west Spain.

LI.—ASIATIC *TORTRICIDÆ*.

By the Rt. Hon. LORD WALSHINGHAM, M.A., LL.D., F.R.S.

THE *Tortricidæ* of Asia present several points of interest to the students of European *Tineina* through the great resemblance exhibited by many of their number to species with which we are already well acquainted. Although at present the amount of material available is scarcely sufficient to justify any general conclusions, it is apparent that there is in this case, as in parallel instances on both sides of the Equator, a strong tendency to what may be called bands of alliance running east and west within the range of certain degrees of latitude; and that although these bands throw out some few projections to north or south in exceptional instances, such projections are more intimately connected with the question of elevation and temperature than with that of mere geographical distribution. Through the very generous help of my friend Mr. J. H. Leech, I am in possession of valuable series of many Chinese, Japanese, Corean, and Himalayan species collected by himself and hitherto undescribed. These series he has most kindly supplemented by collections made by Mr. and Mrs. Pratt in Central China, by Mr. Pratt in Asiatic Turkey, by Mr. Manley in Japan, and by natives in China, Japan, and Asiatic Turkey. The acquisition of the collection of *Tineina* and *Pterophoridae* made by the late Mr. H. J. S. Pryer has afforded me some insight into the extension of European and North-American as well as Asiatic continental and Malaysian forms into the Islands of Japan. The alliance of the *Tortricidæ* of Japan with those of Western Europe is perhaps even more strongly marked than that of the intermediate Asiatic species, but perhaps the larger proportion received

* Ann. & Mag. Nat. Hist. March 1899, p. 227 (footnote).

from the smaller area of Japan may in some degree account for an impression which further research may prove erroneous. A curious instance of structural divergence, scarcely amounting to special difference, occurs in the familiar *Olethreutes arcuella*, Clerck. The late Dr. Clemens founded the North-American genus *Ecartema* on the strength of a lobe depending from the limbus in the hind wings, a character not occurring in the genus *Penthina*, Tr. (Stgr. Cat.). The Japanese specimens of *arcuella*, although identical with British examples in colour and markings, have a short lobe in the position occupied by that of *Ecartema*, and a careful examination of English specimens reveals the fact that the same excrecence exists here in an aborted (or undeveloped) form: thus the Japanese *Olethreutes* closely approaches *Ecartema* and tends to connect our *arcuella* with the species of that genus existing in the Western and Eastern States of America, some of which occur also in Japan.

In sending for publication a few descriptions of new Asiatic *Tortricidæ*, I renew the expression of my grateful thanks to my numerous correspondents.

In all cases where specimens have been purchased from Dr. Staudinger, I have adopted his or Herr Bang Haas's MS. names with a view to facilitate identification, although I had previously named the species differently in my own MS. descriptions from specimens already in my collection.

OXYGRAPHIA, Hb.

n. syn.=RHACODIA, Hb

§*PERONEA*, Crt., =†*OXYGRAPHIA*, Hb. †*OXYGRAPHIA*, Wilk., =*RHACODIA*, Hb., =*TERAS*, Tr., =**TERAS*, Hein., =**ACILLA*, Meyr.

In the European lists the emargination of the costa in the fore wings is relied upon as a generic character for separating *Rhacodia*, Hb. (= *Teras*, Tr.) from **Teras*, Hein., &c. Prof. Fernald in his Catalogue of North-American Tortricidæ (1882) included both forms in *Teras*, Tr., evidently regarding the amount of excavation as only a special character. If any doubt existed as to the correctness of Prof. Fernald's action, full justification will be found among the species now described, some of which are intermediate between *Rhacodia*, Hb., and *Teras*, Hein., and might be referred to either.

649 (1). *Oxygrapha quadridentana*, sp. n.

Antennæ dull fawn-grey. [*Palpi* missing.] *Head* pale fawn-colour. *Thorax* reddish fawn-colour, posteriorly paler. *Fore wings* reddish green; the convexity on the costa adorned with four conspicuous teeth or tufts of scales, the first and

largest immediately before the middle of the costa, the second and smallest immediately after the middle, the third on vein 10, and the fourth at the end of vein 9 where the wing is bent down to the pointed and depressed apex; the spaces between these teeth, especially on each side of the second tooth, are narrowly clear white, which is also indicated on the underside; the whole surface of the wing is striated with narrow lines of slightly raised fuscous scales, of which the most conspicuous are four—the first from the costa at one-fifth from the base running obliquely outwards to the fold, the second at two-fifths from the base bulging obliquely outwards and reaching the dorsum a little beyond the middle, the third from the second tooth to the tornus, the fourth a short one enclosing the angular apex, these are all more or less interrupted and irregular; cilia reddish fawn, tipped with whitish ochreous above and below the apex, and slightly shaded with ochreous along the tornus. *Exp. al.* 20 mm. *Hind wings* brownish grey; cilia the same colour, but paler at their ends and having a narrow subochreous line running along their base. *Abdomen* grey. *Legs* pale whitish ochreous.

Type, ♀ (60192) Mus. Wlsm.

Hab. CHINA—Chang Yang (Ichang), 4000–6000 feet (*Pratt*). Unique.

649 (2). *Oxygrapha cærulescens*, sp. n.

Antennæ pale cinereous. *Palpi* greyish brown externally, pale cinereous internally. *Head* pale cinereous. *Thorax* bluish grey. *Fore wings* shining blue-grey, with four transverse lines of greyish brown, containing a few raised brown scales distributed along them; the costa is marked at the depression with a conspicuous creamy white patch preceded and followed by chestnut-brown, and a little beyond it is a second smaller patch of creamy white; the four greyish brown bands are situated thus:—one from near the base running obliquely to the fold and crossing it to the dorsum, this band contains a strong spot of raised chestnut-brown scales below the fold; the second from the anterior margin of the first costal patch, curving obliquely outwards and reaching the dorsum beyond the middle, contains three spots of raised chestnut-brown scales above the fold; the third, from the chestnut patch between the two pale costal patches, runs to the dorsum before the tornus and contains some raised chestnut-brown scales above the middle of the wing; the fourth before the termen, approaches it about the middle but runs parallel to it towards the tornus; cilia pale cinereous beyond the brown

line along their base except at the tornus. The pale costal patches are both visible on the underside. *Exp. al.* 24 mm. *Hind wings* greyish brown; cilia slightly paler. *Abdomen* greyish brown. *Legs* pale cinereous.

Type, ♀ (70290) Mus. Wlsm.

Hab. JAPAN (*Pryer*, 1886). Unique.

If held in certain lights the shining blue-grey of the fore wings can be made to appear entirely greyish brown.

649 (3). *Oxygrapha paradiseana*, sp. n.

[*Teras paradiseana*, Stgr. List, XXXVI. (1892-3) MS.]

Antenna cinereous. *Palpi*, *head*, and *thorax* pale yellowish green; the last with a greyish sheen. *Fore wings* with the costa abruptly rounded at the base, thence sinuate nearly to the apex, termen excavate beneath the falcate apex; with oblique alternate bands of pale yellowish green and pale shining leaden grey (giving a general pale olive appearance); a large bright golden yellow tornal patch, slightly reticulated with reddish fuscous, is diffused inwardly along the dorsum, where it blends with and almost obliterates the green bands, this contains a large triangular purplish fuscous blotch at about three-fourths from the base; the base is pale grey; the first green band from near the base crosses the fold obliquely outwards; the second, from before the depression of the costa, is dilated obliquely as far as the apex of the purplish fuscous triangle; the third and fourth green bands go to the upper edge of the bright golden yellow patch, the upper margin of which is straightly bounded by vein 6; the extreme apex of the wing is shining leaden grey, having a dark fuscous reflection in certain lights; the cilia, which are well developed on the costa before the depression are up to that point greyish brown, for the remainder of the costa creamy whitish, at the apex bright chestnut, and below the apex along the termen nearly to the tornus white, with a strong bright ferruginous line along their base, at and about the tornus they are bright golden yellow with a ferruginous tinge. On the underside the costa is whitish and the terminal cilia distinctly white. *Exp. al.* 22-23 mm. *Hind wings* reddish brown; cilia pale cinereous, inclining to whitish along the termen, a greyish brown shade near their base. *Abdomen* reddish brown, anal tuft paler. *Legs* shining creamy white.

Type, ♀ (60193); ♂ (5067) Mus. Wlsm.

Hab. JAPAN (*Pryer*, 1886); YESSO—Hakodate, VIII. 1886 (*Leech*). AMUR (one specimen received from Staudinger). Five specimens.

649 (4). *Oxygrapha delicatana*, Chr.

Teras delicatana, Chr. Bull. Soc. Imp. Nat. Mosc. LVI. 60-1. No. 96 (1881)¹: *sep.* 148-9 (1882)¹.

Hab. AMUR—Wladiwostok¹, VII.-VIII.¹ JAPAN—HONDO—Oiwake (Pryer, 1885).

650. *Oxygrapha cristana*, Schiff.

Teras cristana, Stgr. & Wk. Cat. Lp. Eur. 232. No. 650 (1871).

Hab. EUROPE. JAPAN—HONDO—Oiwake (Pryer, 1885).

650 (1). *Oxygrapha tunicatana*, sp. n.

Antennæ greyish cinerous, paler beneath. *Palpi* greyish fuscous, very pale ochreous beneath. *Head* and *thorax* dark purplish fuscous. *Fore wings* rather narrow; dark purple, or purplish fuscous, with scattered groups of raised scales, the largest and most conspicuous crossing the middle of the fold, with a few greyish cinereous scales at its outer end and a small group of detached similar scales above it; the costa strongly fringed before the middle with mixed purplish fuscous and greyish cinereous scales, giving it a more than naturally depressed appearance; at and beyond the middle of the costa are some groups of greyish cinereous scales, and from the tornus to the apex a large patch of greyish cinereous extends widely to above the middle of the wing and narrowly to the costa before the apex, this patch is strongly mixed with rich brown scales, the lines of the veins running through it being slightly indicated; cilia chestnut-brown, tipped with pale cinereous, a reduplicated pale cinereous line along their basal half, a small purplish grey dot at the tip of the apical cilia, with a slightly paler one below it. *Underside* with the costa streaked obliquely with pale cinereous and fuscous alternately. *Exp. al.* 22 mm. *Hind wings* pale, shining, whitish grey, tinged with very pale cinereous towards the apex; cilia very pale cinereous. *Abdomen* pale cinereous. *Legs* whitish ochreous, hind tarsal joints shaded above with bands of grey.

Type, ♂ (60195) Mus. Wlsm.

Hab. JAPAN—Ikao (Leech, 1886); HONDO—Oiwake, X. 1886 (Leech). Two specimens.

This is probably a variable species: the specimen from Oiwake is almost certainly a variety in which the dark purplish fuscous colour is confined to a dark basal patch, and having a roseate suffusion over the middle of the wing extending to the tornus; the raised tufts are in the same position as in the type.

653 (1). *Oxygrapha hispidana*, Chr.

Teras hispidana, Chr. Bull. Soc. Imp. Nat. Mosc. LVI. 61-2. No. 97 (1881)¹; *sep.* 149-50 (1882)¹.

Hab. AMUR—Radeffka¹, Nikolsk¹, Wladiwostok¹, IV.-V.¹
JAPAN—Yesso (*Pryer*, 1882); HONDO—Yokohama (*Manley*, 1888).

The characters by which Christoph distinguishes this species from *abietana*, Hb., and *hastiana*, L., are certainly recognizable; the species is, however, extremely variable, and had it not been for the careful manner in which the differences are described I should have hesitated to separate it from *abietana*.

660 (1). *Oxygrapha japonica*, sp. n.

Antennæ cinereous. *Palpi*, *head*, and *thorax* white, the last with a strong conical crest above posteriorly. *Fore wings* very clear white to beyond the middle, with two small greyish spots on the costa; three strong raised tufts of clear white raised scales about the fold, two before the middle, on each side of it, and one on the fold beyond the middle; a minute coal-black spot near the base of the dorsum; the outer edge of the white part of the wing runs obliquely outwards from the costa to the dorsum, and beyond it the apical portion of the wing is bright ferruginous mixed with chocolate-brown and fuscous scales, with some spots and streaks of shining metallic leaden grey and some raised tufts of brown scales; a whitish spot on the costa before the apex; cilia cinereous, tinged with brown, especially towards the apex, and with a slender pale line along their base. *Exp. al.* 15-16 mm. *Hind wings* pale cinereous; cilia slightly paler, with a slender subochreous line running along their base. *Abdomen* cinereous. *Legs* very pale cinereous, hind tarsal joints faintly spotted.

Type, ♀ (70301); ♂ (70302) Mus. Wlsm.

Hab. JAPAN—HONDO—Oiwake (*Pryer*, 1885). Five specimens.

This species is allied to *Boscana*, F., *variegana*, Schiff., &c., &c., but it has the thoracic tuft and raised scales more conspicuous.

660 (2). *Oxygrapha undulana*, sp. n.

[=*Teras undulana*, Bang Haas, in Stgr. List, XLII. 23 (1898-9) MS.]

a. *undulana* + *undulana*, n. var.

Antennæ greyish fuscous. *Palpi* short, the terminal joint

almost concealed; pale cinereous, shaded with fuscous externally. *Head* pale cinereous. *Thorax* pale greyish cinereous. *Fore wings* pale greyish cinereous, with greyish fuscous transverse shading; several spots of raised scales accompany a faint ill-defined shade at about one-fourth, being conspicuous immediately above and below the fold, other groups accompanying a rather more visible oblique shade about the middle, of these the strongest are on the cell and just below the fold; the shading on the terminal and apical area converges on the termen above the tornus (in some specimens there are short blackish dashes, one below the costa before the middle, one above the fold before its middle, and another from the cell to the middle of the termen); cilia pale greyish fuscous, with tawny reflections, a darker shade running along their base. *Exp. al.* 12-14 mm. *Hind wings* brownish grey, darkening towards the apex and termen; a dark dividing line near the base of the brownish grey cilia. *Abdomen* pale cinereous, with some pale fuscous shading. *Legs* pale cinereous, the tarsi spotted with fuscous.

Type, ♂ (7281) Mus. Wlsm.

Hab. ASIATIC TURKEY—*HALEB*—Shar Devesy (*Native Coll.* 1893); Zeitun (received from *Staudinger*). Six specimens.

β. undulana + coprana, n. var.

In one variety a large snow-white basal patch appears, reaching further along the costa than along the dorsum, its outer extremity marked by a patch of raised black scales on the cell. The tegulæ of this specimen are also snow-white; in other respects it presents no appreciable difference from the typical form, indeed on the outer two-thirds of the wing, with the exception of a few scattered white scales, the position and extent of the shading is precisely similar to that of the others. *Exp. al.* 14 mm.

Type, ♂ (61557) Mus. Wlsm.

Hab. ASIATIC TURKEY—*HALEB*—Shar Devesy (*Native Coll.* 1893). Unique.

662 (=663). *Oxygrapha Boscana*, F.*

- I. *Teras Boscana*, Stgr. & Wk. Cat. Lp. Eur. 233. No. 662 (1871).
- II. *Teras parisiana*, Stgr. & Wk. Cat. Lp. Eur. 233. No. 663 (1871).
Teras scabrana, Fern. Tr. Am. Ent. Soc. X. 5. No. 5 (1882).

Hab. EUROPE. UNITED STATES. JAPAN—*HONDO*—*Oiwake* (*Pryer*, 1885).

* In deference to the wishes of the Editors I have not objected to the use of capital initials for special names derived from persons, although my preference is strongly opposed to a practice involving inconsistencies almost unavoidable.—WLSM.

A single specimen of brood I. from Oiwake.

Prof. Fernald records brood II. from New York and Pennsylvania, and suggests that *trisignana*, Rbsn., may be identical with brood I. In Staudinger and Woocke's 'Catalog' the name *parisiana*, Gn., is adopted for brood II., while Prof. Fernald designates this brood *scabrana*, Crt. Curtis referred Fabricius's *Pyralis scabrana* to the genus *Leptogramma*, and Stephens referred the same name to the genus *Acleris*. Neither of these authors published a new species as *scabrana*, and as their names are now regarded as "erroneous in adoption," they cannot be accepted as valid.

Leptogramma parisiana, Gn. (1815), must sink as a synonym of *Glyphiptera ulmana*, Dp. (1834), the validity of which is in no way affected by the earlier *Tortrix* (*Eudemis*) *ulmana*, Hb. Should it be desirable to refer to the second brood under a varietal name it should be called *Boscana*, F. [II. *ulmana*, Dp.].

(663). *Oxygrapha nivisellana*, Wlsm.

Teras nivisellana, Wlsm. Ill. Lp. Het. B. M. IV. 2, Pl. LXI. 3 (1879)¹;
Fern. Tr. Am. Ent. Soc. X. 8. No. 16 (1882)².

Hab. UNITED STATES—Maine², New York², California¹, Oregon¹, V.¹, VIII.¹ JAPAN—*KIUSIU* (two specimens received from Mr. J. H. Lecch).

664. *Oxygrapha literana*, L.

Teras literana, Stgr. & Wk. Cat. Lp. Eur. 233-4. No. 664 (1871).

γ. literana, L. + *squamana*, F.

Hab. EUROPE. ASIATIC TURKEY—*HALLEB*—Shar Devesy (*Native Coll.*).

670 (1). *Oxygrapha albiscapulana*, Chr.

Teras albiscapulana, Chr. Bull. Soc. Imp. Nat. Mosc. LVI. 63-4. No. 98 (1881)¹: *sep.* 151-2 (1882)¹.

Hab. AMUR—Wladiwostok¹, V.¹ COREA—Gensan (*Lecch*, 1886).

A single specimen, which appears to be a dark variety of this species, distinguished from others of the genus by the distinct division of the tegulæ into a dark anterior and a pale posterior half; in the specimen before me the paler portion cannot be called clear white, as in the original description, but I am not acquainted with any other species possessing the same peculiarity, and in a genus so variable I cannot venture to describe it as distinct without access to the type or some further reliable evidence.

676 (2). *Oxygrapha Pryerana*, sp. n.

Antennæ, palpi, and *head* varying from greyish brown to pale ochreous; palpi short, with the terminal joint scarcely exposed. *Thorax* pale brownish grey or whitish ochreous. *Fore wings* pale brownish grey or whitish ochreous, with a red-brown or grey-brown triangular costal patch, on which the costa is perceptibly depressed; this patch is often mottled with fuscous, the pale ground-colour of the wing sometimes showing on its upper side; several small flecks of slightly raised blackish scales are scattered about the wing-surface, especially at the basal fourth and about the apex of the costal triangle, and there are also some blackish dots on the apical fourth; the costal patch is generally mottled with greyish fuscous; cilia pale reddish brown, ochreous, or whitish ochreous, sometimes with a slight shade along their middle. The underside shows some mottling on the costa. *Exp. al.* 17-18 mm. *Hind wings* very pale brownish grey; cilia shining white, with a grey line running through them near their base. Underside freely reticulated along the costa and towards the apex. *Abdomen* dark grey; anal tuft whitish ochreous. *Legs* whitish ochreous, hind tarsal joints slightly spotted above.

Type, ♀ (70328); ♂ (70329) Mus. Wlsm.

Hab. JAPAN (Pryer, 1886); HONDO—Yokohama (Manley, 1888). Twenty-two specimens.

A variable species nearly allied to *ferrugana*, Tr., but differing chiefly in the perceptibly depressed costa, which in the western species is straight; the raised scales are also more perceptible in *Pryerana*.

679 (1). *Oxygrapha platynotana*, sp. n.

Antennæ greyish cinereous, basal joint chestnut. *Palpi* short, terminal joint scarcely showing beyond the densely clothed median joint; chestnut. *Head* and *thorax* chestnut. *Fore wings* shining chestnut, inconspicuously spotted and striated with slender lines of pale whitish ochreous, enclosing pale streaks and spots of the ground-colour; these are especially visible along the dorsum and on the basal third about the middle of the wing; two distinct, straight, slender, oblique lines cross the wing, pointing outwards from the costa to the dorsum; the first leaving the costa at one-third from the base reaches the dorsum at nearly two-thirds from the base, and is very slightly sinuated outwards at about its middle; the second from the costa at nearly two-thirds from the base,

runs straight to the tornus; these lines are pale whitish ochreous, and the chestnut ground-colour of the wing is slightly intensified immediately adjacent to their outer margins; cilia chestnut, with a slender whitish-ochreous line along their base and another before their middle, they are also tipped with whitish ochreous. *Exp. al.* 22 mm. *Hind wings* grey; cilia scarcely paler. *Abdomen* grey; anal tuft very pale brownish. *Legs* pale whitish ochreous.

Type, ♂ (60196) Mus. Wism.

Hab. JAPAN—Ikao (*Leech*, 1886). Unique.

A peculiar and distinct species, in which the two transverse lines, shaded on their outer margins, present the appearance of raised streaks and at first sight recall to mind the American genus *Platynota*, Clem., which, however, differs in neuration.

680 (1). *Oxygrapha affinitana*, Snell.

Teras affinitana, Snell. Tijds. v. Ent. XXVI. 185-7, Pl. XI. 2, 2 a (1883)¹.

Antennæ greyish fawn. *Palpi* short, terminal joint projecting but little beyond the densely clothed median joint; brownish ochreous, slightly paler than the head. *Head* and *thorax* brownish ochreous; face slightly paler. *Fore wings* bright brownish ochreous, with a faint roseate sheen, interrupted by straggling lines of raised brownish ochreous scale-spots (to the number of 12 or 13), the majority of these are on the apical half of the wing; cilia pale brownish ochreous. *Exp. al.* 15 mm. *Hind wings* brownish grey; cilia pale cinereous, with a slender ochreous line at their base, followed by a narrow brownish grey shade. *Abdomen* brownish ochreous. *Legs* very pale whitish ochreous.

Hab. N. ASIA—Chingan-gebergte¹, VII.¹ JAPAN (*Pryer*, 1886); *Kiusiu*—Nagasaki, VI. 1886 (*Leech*).

683 (1). *Oxygrapha fuscotogata*, sp. n.

Antennæ cinereous. *Palpi* short, terminal joint exposed; reddish ochreous. *Head* pale yellowish ochreous above, tinged with reddish brown at the sides. *Thorax* mixed yellowish ochreous and reddish brown. *Fore wings* bright yellow-ochreous on the basal half, reddish brown beyond, much reticulated and striated throughout; on the pale basal portion of the wing is a brown patch at the base of the costa, showing a dark leaden grey sheen in some lights; a reddish brown angulated slender line runs from the end of this patch obliquely outwards nearly to the fold, whence it is bent back

to the dorsum, the reticulations on this part of the wing are reddish brown; from the apical half of the wing the darker colouring encroaches upon the basal half along the costa, and from its origin a slender line of mixed blackish and reddish scales divides the darker from the paler half; beyond this line a dark leaden grey suffusion extends from near the costa to the dorsum, a narrower suffused fasciaform band running parallel to it after a second line of blackish scales on the brown ground-colour; again beyond this on the brown ground-colour is a third line of blackish scales running from the costa at two-thirds obliquely outwards and bent down to the tornus; a third curved dark leaden grey band crosses the wing before the apex, and the apex itself is of the same colour preceded by reddish brown; the extreme costa on the outer half is narrowly pale ochreous; cilia dark leaden grey tipped with whitish ochreous, except at the tornus; the leaden-grey bands are slightly glossy in certain lights. Underside pale brownish fuscous, the costa and outer half of the cilia on the termen very pale ochreous. *Exp. al.* 14–15 mm. *Hind wings* brownish fuscous; cilia very pale cinereous, with a darker shade running through them before their middle. *Abdomen* brownish fuscous. *Legs* ochreous, smeared and barred with fuscous.

Type, ♂ (70305) Mus. Wlsm.

Hab. JAPAN (*Pryer*, 1886). Two specimens.

This species is allied to *reticulata*, Ström, but is somewhat smaller and more distinctly divided into two colours on the fore wing, and, moreover, the hind wings are very decidedly darker than in that species.

ARCHIPS, Hb.

= *CACÆCIA*, Hb., = *PTYCHOLOMA*, Sph., = *LOZOTÆNIA*, Sph.

684 (1). *Archips*? *longicellanus*, sp. n.

Antennæ, ♂ slightly pubescent; brownish cinereous. *Palpi* rather slender, closely appressed to the face, terminal joint short, exposed; cinereous brown. *Head* cinereous brown, rather densely clothed above. *Thorax* rather robust; cinereous brown, clouded with greyish fuscous posteriorly. *Fore wings*, ♂ with a long costal fold, abruptly terminated at some distance from the base; cinereous brown; a large basal patch, enclosed on its outer edge by a slender greyish ochreous line, is wider on the dorsum than on the costa, and is mottled with reddish brown, it has also a strong patch of greyish fuscous scales on the dorsum near the tornus; a

transverse fascia from the middle of the costa to the tornus is bounded on its inner edge by a narrow greyish ochreous line, and is much mottled with reddish brown, it has also a few fuscous scales at its upper end about the edge of the costal fold, and others at its lower extremity adjacent to the tornus; a subapical patch of the same colour is diffused with some slender streaks along the termen; between the basal patch and the central fascia the wing is much shaded with greyish fuscous scales, and the outer edge of the fascia itself is scarcely defined, almost blending with the general colour of the wing-surface; indeed, the markings throughout are not very conspicuous; cilia pale shining cinereous, tinged with brownish towards the apex. *Exp. ol.* ♂ 22-25, ♀ 23-29 mm. *Hind wings* brownish fuscous; cilia shining whitish. *Abdomen* rather robust, brownish fuscous. *Legs* whitish ochreous.

Type, ♂ (70384); ♀ (70385) Mus. Wlsm.

Hab. JAPAN (*Pryer*, 1886). HONDO—Yokohama (*Mantley*, 1888). CHINA—Chang Yang, 4000-6000 feet (*Pratt*, 1886). Twenty specimens.

The female has the wings much more elongate than the male, the apex produced, the termen concave below the apex and bulging in the middle; the costa is much arched as in the usual forms of *Archips*, which the male also strongly resembles. The neuration agrees with that of *Archips* in having all the veins separate in the fore wings; the neuration of the hind wings is also similar; but it differs from all species with which I am acquainted in its unusually long discal cell in the fore wings, which reaches to four-fifths the wing-length; the discal veins are therefore very short, vein 3 from near the lower angle of the cell being much recurved, a difference which might well be regarded of generic value. The cell in the female is scarcely, if at all, longer than in the ordinary forms of *Archips*, but vein 3 arises rather nearer to vein 4 than is usual.

685 (1). *Archips similis*, Btl.

Cacæcia similis, Btl. Ill. Typ. Lp. Het. B. M. III. 79, Pl. LX. 4 (1879)¹.

Hab. COREA—Fusan, 24. VI. 1886 (*Leech*). JAPAN—HONDO—Yokohama¹; Oiwake, VI.-VII. 1887 (*Pryer*).

Extremely nearly allied to, if not identical with, *piceanus*, L.; it is distinguished only by its larger size and brighter coloration. This is probably the species recorded in *Staudinger and Wocke's 'Catalog' (235. No. 685) as piceana, L., from East Siberia.*

685 (2). *Archips ingentanus*, Chr.

n. syn. = *subrufana*, Snell.

Tortrix ingentana, Chr. Bull. Soc. Imp. Nat. Mosc. LVI. 64-6. No. 99 (1881)¹; sep. 152-4 (1882)¹. *Tortrix subrufana*, Snell. Tijd. v. Ent. XXVI. 187-9, Pl. XI. 3, 3 a (1883)².

Hab. AMUR—Askold¹; Suifun²; Wladiwostok, VII.¹ COREA—Gensan, VI. 1886 (*Leech*). CHINA—Chang Yang (*Pratt*); Che-tou; Omei-shan, VI.-VII.; Pantze Fang, VI.-VII. JAPAN—Yesso (*Pryer*, 1882); Hakodate, VIII. 1886 (*Leech*). HONDO—Fushiki, VII. 1887 (*Leech*); Oiwake (*Pryer*, 1885); Tsuruga, VII. 1886 (*Leech*); Yokohama (*Manley*, 1888). KASHMIR—Scinde Valley, 7000 feet, VI. 1887 (*Leech*).

This species appears to vary considerably in size and in the extension of the markings, as also in the amount of shading and of yellowish colouring in the hind wings, but it never possesses a tuft of darkened scales on the costa before the apex of the hind wings in the female; thus it is allied to *podanus*, Sc., rather than to *decretanus*, Tr.

686 (1). *Archips asiaticus*, sp. n.

Antennæ smoky greyish. *Palpi* short, closely appressed to the face; greyish ferruginous. *Head* and *thorax* smoky greyish. *Fore wings*, ♂ with the costal fold somewhat wider and more strongly developed than in the European *podanus*, Sc.; tawny reddish, with a triangular streak from the base of the dorsum pointing obliquely outwards and terminating in a patch of blackish scales on the upper edge of the fold, the base of the triangle being developed into a projecting tuft on the flexus; a large costal patch of a darker shade than the ground-colour, and having a somewhat purplish hue, spreads downward to the fold, covering almost the entire middle third of the wing, its inner edge narrowly pale-margined at the apex (which is somewhat more strongly falcate than in *podanus*), the costa being much depressed before it; a streak of blackish scales runs downward along the upper third of the termen, and within it is a second group of similar scales blending with a tawny shade which is continued along the lower half of the termen to the tornus; cilia tawny reddish, tipped at the apex with black, paler at the tornus. Under-side brownish ferruginous on the costal fold, with a greyish shade along the dorsum, the apical third of the wing bright orange-ochreous, without reticulations. ♀ with the costa deeply impressed on the outer half, the termen strongly sinuate beneath the produced apex; tawny, with a strong

vinous or purplish tinge, with three or more oblique transverse lines, the first two running outward from the costa before the middle, the first evenly convex, the second almost straight as far as the fold, thence bent back to the dorsum; another before the apex reaches the termen above the tornus; an elongate ferruginous costal patch lies along the depressed portion of the costa, a purplish fuscous patch on the dorsum, within the first transverse line, and an apical streak of mixed blackish and ferruginous scales from the apex reaches halfway down the termen; cilia tawny, blackish at the apex, touched with ferruginous below it, paler at the tornus. Underside pale ochreous, shading to rich orange-ochreous on the apical third, without reticulations. *Exp. al.* ♂ 20—♀ 26 mm. *Hind wings*, ♂ reddish ochreous on the upper half, smoky greyish on the lower half, the cilia corresponding in colour: underside corresponding to the fore wings in its different shades of colouring, but without the brown streak at the base of the costa, also without reticulations. ♀ orange-ochreous, the costa whitish ochreous, without a projecting tuft of scales, within vein 1c shaded with greyish, cilia corresponding: underside pale ochreous, shading to rich orange-ochreous on the apical third, without reticulations. *Abdomen*, ♂ smoky greyish, anal tuft with an ochreous tinge; ♀ greyish at the base, touched with orange-ochreous posteriorly. *Legs* ochreous.

Type, ♂ (60403); ♀ (60404) Mus. Wlsm.

Hab. COREA—Gensan, VI. 1886 (*Leech*), VII.—IX. 1887 (*Ito*). Eight specimens.

This species differs from *podanus*, Sc., in the male having a larger costal fold, in the absence of reticulation, and in the much brighter orange-ochreous colour of the wing; also on the upperside in the somewhat more diffused and ill-defined pattern of the markings.

689. *Archips crateganus*, Hb.

Tortrix (*Cacacia*) *crategana*, Stgr. & Wk. Cat. Lp. Eur. 235. No. 689 (1871).

Hab. EUROPE. JAPAN—HONDO—Oiwake (*Pryer*, 1885); Yokohama (*Manley*, 1888). W. CHINA—Omei Shan, VI.—VII.

One specimen from Oiwake (♂, 70398 Mus. Wlsm.) has the neuration abnormal. In the left fore wing veins 7 and 8 are stalked and 6 separate, while in the right wing 6 and 7 are stalked and 8 is separate.

691 (1). *Archips breviplicanus*, sp. n.

Antennæ cinereous. *Palpi* short; reddish ochreous. *Head* dull reddish ochreous. *Thorax* greyish fuscous above, touched with reddish at the sides. *Fore wings* rather straight, with a very short costal fold at the base, termen straight, slightly concave below the apex, tornus rounded; reddish ochreous, with a reddish fuscous patch near the base of the dorsum, a large reddish fuscous patch from beneath the costa at one-third, widened and diffused outwards on the middle of the wing, and thence more or less connected with a paler reddish fuscous patch beyond the middle of the costa, which does not reach the dorsum, except by a narrow line at its inner edge; the pale ground-colour of the wing is reticulated with irregular waved reddish fuscous striæ; a small reddish brown spot at the extreme apex, and the costal fold is also reddish brown; cilia reddish brown, pale cinereous at the tornus. *Exp. al.* 17 mm. *Hind wings* yellowish ochreous, shaded with greyish fuscous on their inner half and having a bright red-brown gloss at the apex; cilia pale cinereous. *Abdomen* pale cinereous, with a slight ochreous tinge. *Legs* whitish ochreous.

Type, ♂ (60426) Mus. Wlsm.

Hab. COREA—Gensan (Ito, 1887). Unique.

This species is distinguished by its short costal fold and narrower wings from *ingentanus*, Chr., some varieties of which it slightly resembles in general appearance.

692. *Archips sorbianus*, Hb.

Tortrix (*Cacaciâ*) *sorbiana*, Stgr. & Wk. Cat. Lp. Eur. No. 692 (1871).

Hab. EUROPE—ASIATIC TURKEY—*HALEB*—Shar Devesy 13-14, VI. 1890 (*Native Coll.*).

692 (1). *Archips adumbratanus*, sp. n.

Antennæ brownish fuscous. *Palpi* recurved, not closely appressed to the head, somewhat roughly clothed on the median joint, terminal joint exposed; brownish fuscous externally, pale cinereous on their inner sides. *Head* brownish cinereous. *Thorax* dark greyish brown. *Fore wings*, ♂ with a rather long and very narrow costal fold, scarcely reaching to the base; greyish brown, with a slight rufous tinge in some lights; a basal patch, central fascia, and apical patch dark greyish brown, inclining to reddish brown, and more or less defined by reddish brown streaks along their

margins; the basal patch is wider on the dorsum than on the costa, the central fascia is oblique from the middle of the costa to the dorsum before the tornus, the apical patch, beginning on the costa at two-thirds from the base, is diffused along the termen and is accompanied by some dark brown streaks nearly to the tornus; between these markings the wings have a decidedly greyish tinge accompanied by a slight reddish or vinous gloss; cilia greyish brown. *Exp. al.* ♂ 26, ♀ 34 mm. *Hind wings* brownish fuscous; cilia pale cinereous. *Abdomen* brownish fuscous, anal tuft cinereous. *Legs* pale cinereous.

Type, ♂ (70396); ♀ (70393) Mus. Wlsm.

Hab. JAPAN (*Pryer*, 1886). Two specimens.

The female is much larger than the male, it has a rather more ochreous tinge, and there is some reddish ochreous about the apex of the hind wings.

692 (2). *Archips Lafauryanus*, Rag.

Tortrix Lafauryana, Rag. Bull. Soc. Ent. Fr. 1875, lxxii; Ann. Soc. Ent. Fr. XLV. (5 s. VI.: 1876) 403-5 (1876), pl. VI. 2 (1877).

Hab. EUROPE—France, England. COREA—Gensan (*Ito*, 1889).

Eleven specimens, which I cannot separate from this species, have the same characteristic costal fold, and the somewhat faintly indicated markings are placed in precisely similar positions to those of the European species. The Korean specimens are somewhat larger, and of a generally lighter colour, but I see no sufficient distinction to justify me in describing it as a separate species.

692 (3). *Archips liratanus*, Chr.

Tortrix lirata, Chr. Bull. Soc. Imp. Nat. Mosc. LVI. 68-9. No. 102 (1881)¹; *sep.* 156-7 (1882)¹.

Hab. AMUR—Askold¹. COREA—Fusan, 24, VI. 1886 (*Leech*); Gensan (*Ito*, 1887). JAPAN (*Pryer*, 1886). HONDO—Tsuruga, VII. 1886 (*Leech*). KIVSU—Satsuma, V. 1886 (*Leech*).

693. *Archips semialbanus*, Gn.

Tortrix (Cacacia) semialbana, Stgr. & Wk. Cat. Lp. Eur. 236. No. 693 (1871)¹. *Cacacia semialbana*, Swinh. & Cotes, Cat. Moths Ind. 695. No. 4740 (1889)².

Hab. Europe¹. COREA—Gensan, VI. 1886 (*Leech*).

CHINA—Chang Yang (*Pratt*). KASHMIR—Dras Ladak, 7000 feet, 20 VI. 1887 (*Leech*); Scinde Valley, 7000 feet, VI. 1887 (*Leech*); Goorais Valley, 7000 feet, VIII. 1887 (*Leech*). PUNJAB—Dharmasala (*Hocking*). NEPAL—Dana, VI. 1888 (*McArthur*). SOLUN². SIKKIM².

703 (1). *Archips circumclusanus*, Chr.

Tortrix circumclusana, Chr. Bull. Soc. Imp. Nat. Mosc. LVI. 66-7. No. 100 (1881)¹; *sep.* 154-5 (1882)¹.

Hab. AMUR—Wladiwostok, VI.¹ JAPAN—Yesso (*Pryer*, 1882).

704 (2). *Archips fuscocupreanus*, sp. n.

Antennæ dark brown. *Palpi* ochreous brown. *Head* umber-brown. *Thorax* dark umber-brown, with a slight purplish tinge. *Fore wings* dark umber-brown, with a cupreous gloss between the dark reddish brown basal patch and the oblique central fascia, of the same colour, which runs from before the middle of the costa to near the tornus; the basal patch is rounded on the termen about the middle of the wing and dilated outwards on the dorsum, it is partly overspread with purplish and is margined externally by a slender brownish ochreous line; the central fascia is also dilated outwardly below the middle and is margined on its inner side by a narrow waved pale brownish ochreous line; before the apex of the wing is a third fasciaform patch of dark brown; cilia purplish cinereous. *Exp. al.* ♂ 18, ♀ 20 mm. *Hind wings* dark brown; cilia shading to pale brownish cinereous. *Abdomen* umber-brown, anal tuft brownish cinereous. *Legs* whitish ochreous.

Type, ♂ (60178); ♀ (60086) Mus. Wlsm.

Hab. JAPAN—KIVSIU—Satsuma, V. 1886 (*Leech*). Six specimens.

The female is paler than the male, the ground-colour inclining to cinereous, but with a reddish gloss, decidedly paler than the purplish tint of the male.

705 (2). *Archips imitator*, sp. n.

Antennæ, ♂ ciliated; reddish brown. *Palpi* very short, not reaching to the front of the head, terminal joint almost concealed; reddish brown. *Head* reddish brown. *Thorax* reddish brown, mixed with yellowish ochreous. *Fore wings*, ♂ with a long narrow costal fold from the base; shining pale canary-

yellow reticulated with golden red, with two red-brown (or purplish brown) narrow fasciæ—the first from about the middle of the costal fold to the middle of the dorsum, adjacent to which it is considerably widened, the second from the outer end of the costal fold to the tornus widened at each extremity; a reddish brown streak along the termen to the apex; the costal fold is reddish brown, transversely striated with darker reddish brown; cilia shining pale yellow, clouded with brownish fuscous at the tornus. *Exp. al.* 25 mm. *Hind wings* brownish grey; cilia shining whitish cinereous. *Under-side* paler than the fore wings. *Abdomen* greenish grey. *Legs* pale ochreous.

Type, ♂ (70422); ♀ (70424) Mus. Wlsm.

Hab. JAPAN—YESSO (*Pryer*, 1882). HONDO—Oiwake (*Pryer*, 1885). Four specimens.

Had I not fortunately possessed a male of *Pandemis sinapina*, Btl., I should have regarded this as Butler's species, but it differs in its much stouter palpi and in the male having a costal fold; these characters would place *imitator* in the genus *Archips*, Hb., but it very strongly resembles *sinapina*, Btl., and *quercifoliana*, Fitch (an American species).

706. *Archips æriferanus*, H.-S.

Tortrix (*Ptycholoma*) *æriferana*, Stgr. & Wk. Cat. Lp. Eur. 236. No. 706 (1871).

Hab. EUROPE. JAPAN—HONDO—Oiwake (*Pryer*, 1885).

714. *Archips striganus*, Hb.

Tortrix (*Lozotenia*) *strigana*, Stgr. & Wk. Lp. Eur. 237. No. 714 (1871)¹. *Tortrix strigana*, Chr. Hor. Soc. Ent. Ross. XII. 224 (1876)².

Hab. EUROPE¹. COREA—Gensan, VI. 1886 (*Leech*); Fusan, 9 VI. 1886 (*Leech*). JAPAN—KIVSIV (*Leech*). PERSIA—Kasumkent².

In one strongly marked variety the oblique line of spots which crosses the fold coalesce to form a fascia reaching three parts across the wing, all the markings being of a rich red chestnut-brown, and the hind wings also are somewhat darker than in the ordinary forms; but I cannot regard this as more than a local variety, since in the Corean specimens the markings tend to be more pronounced and browner than in European specimens.

PANDEMIS, Hb.

698. *Pandemis ribeana*, Hb.

Tortrix (*Pandemis*) *ribeana*, Stgr. & Wk. Cat. Lp. Eur. 236. No. 698 (1871).

Tortrix (*Pandemis*) *cerasana*, Stgr. & Wk. Cat. Lp. Eur. 236. No. 699 (1871).

β . *ribeana*, Hb. + *cerasana*, Hb.

Hab. EUROPE. KASHMIR—Scinde Valley, 7000 feet, VI. 1887 (*Leech*).

701. *Pandemis heparana*, Schiff.

Tortrix (*Pandemis*) *heparana*, Stgr. & Wk. Cat. Lp. Eur. 236. No. 701 (1871).

Hab. EUROPE. COREA—Gensan, VI. 1886 (*Leech*). CHINA—Omei Shan, VI.-VII.; Che-tou, 12,000 feet, VI.-VII. JAPAN (*Pryer*, 1886).

[To be continued.]

LII.—*Rhynchotal Notes*.—IV. Heteroptera: Pentatominae (*part.*). By W. L. DISTANT.

THE present contribution extends to the completion of the subfamily Pentatominae as contained in the British Museum, descriptions of more undescribed species forming the material of another paper elsewhere. Several references refer to Westwood's species described in the Hope Catalogues; all these types are now in my hands for revision, and the synonymic notes relating to them are only reserved for completion.

Genus OCHROPHARA.

Ochrophara corinna.

Pentatoma (?) *corinna*, Kirby, Journ. Linn. Soc., Zool. xxiv. p. 84, pl. iv. fig. 12 (1891).

Genus BRACHYMNA.

Brachymna, Stål, Stett. ent. Zeit. xxii. p. 142 (1861).

Balsa, Walk. Cat. Het. ii. p. 410 (1867).

Brachymna tenuis.

Brachymna tenuis, Stål, Stett. ent. Zeit. xxii. p. 142 (1861).

Balsa extenuata, Walk. Cat. Het. ii. p. 410. n. 1 (1867).

Genus THOLOSANUS.

Tholosanus? colligata.

Pentatoma colligata, Walk. Cat. Hct. ii. p. 310. n. 149 (1867).

I have placed this species doubtfully, or, rather, provisionally, in my genus *Tholosanus*, from which it differs by the broad and less attenuated scutellum. The type and only specimen has the antennæ mutilated, and thus exact generic identification is impossible.

Genus PLEXIPPUS.

Plexippus fulvescens.

Rhaphigaster fulvescens, Dall. List Hem. i. p. 238. n. 27 (1851).

Dallas's type and only representative was unlocalized; in Dr. Atkinson's Indian collection, now in the British Museum, are specimens from Mungphu and Utakamand.

Sikkim (Coll. Dist.).

Plexippus affinis, sp. n.

Dull ochraceous, thickly and darkly punctate, the coloration distinctly darker on the head and anterior half of pronotum; body beneath and legs very pale ochraceous; abdominal stigmatal spots black, a castaneous spot on apical segment. Abdomen above reddish ochraceous, the apical area violaceous; connexivum darkly punctate, with small black marginal spots at incisures.

Antennæ fuscous, apical joint ochraceous, apices of fourth and fifth joints piceous, second joint much shorter than the third, third and fourth joints subequal in length; pronotum with the lateral margins distinctly piceous, the anterior-lateral and anterior margins narrowly ochraceous. Rostrum reaching the posterior coxæ.

Long. 11 millim.; exp. pronot. angl. $6\frac{1}{2}$ millim.

Hab. Continental India, Sikkim (Atkinson Coll.: Brit. Mus.). Naga Hills, W. Yunan (Coll. Dist.).

The greater length of the rostrum and the shorter second joint of the antennæ are not congeneric characters, but scarcely warrant at present the formation of a new genus.

Genus DICTYOTUS.

Dictyotus æqualis.

Pentatoma æqualis, Walk. Cat. Het. ii. p. 310. n. 150 (1867).

Dictyotus Roei, Dall. (nec Westw.) List Hem. i. p. 140, pl. iii. fig. 4 (1851); Dist. Ann. & Mag. Nat. Hist. ser. 7, vol. iv. p. 434 (1899).

Since publishing my note on this species (*supra*) I have examined Westwood's type, and find it is quite distinct from the species identified by Dallas in the British Museum collection as *D. Roei*. Walker's name therefore now stands, though he described the species in a wrong genus and irrespective of it being represented by a series in Westwood's name and under the genus *Dictyotus*.

Dictyotus detersus.

Mormidea detersa, Walk. Cat. Het. iii. p. 554 (1868).

Somewhat the shape and form of *D. similis*, Dall. *Dictyotus* requires revision; all the species which Dallas included in his genus do not appear to be congeneric.

Genus EURINOME.

Eurinome inconspicua.

Pentatoma inconspicua, Montrouz. Ann. Soc. Linn. Lyon, (2) v. p. 249 (1858).

Pentatoma circumdata, Walk. Cat. Het. ii. p. 307. n. 137 (1867).

Eurinome marginalis.

Pentatoma marginalis, Walk. Cat. Het. ii. p. 306. n. 136 (1867).

Pentatoma submarginalis, Tryon, Ann. Queensl. Mus. ii. p. 16 (1892).

Mr. Tryon's description exactly represents Walker's type. Walker's description of this species is more than usually careless and incomplete.

Genus PERIBALUS.

Peribalus dubius.

Pentatoma? dubia, Dall. List Hem. i. p. 237. n. 10 (1851).

Peribalus abbreviatus.

Holcostethus abbreviatus, Uhler, U.S. Geol. Surv. Montana, 1872, p. 397.

Genus TOLUMNIA.

Tolumnia æola.

Pentatoma æola, Dall. List Hem. i. p. 248. n. 38 (1851).

Second joint of antennæ slightly longer than the third, apical margin of corium slightly concave. Other characters generally as in *Tolumnia*.

Genus TIBRACA.

Tibraca limbiventris.

Tibraca limbiventris, Stål, Bidr. till Rio-Jan. i. p. 19 (1858).

Mormidea basalis, Walk. Cat. Het. iii. p. 553 (1868).

Mormidea Walkeri, Leth. & Sev. Cat. Gén. Hémi. t. i. p. 124 (1893).

Tibraca basalis, Dist. Ann. & Mag. Nat. Hist. ser. 7, vol. iv. p. 438 (1899).

Since placing Walker's species in the genus *Tibraca* (supra) I have examined Stål's type of *T. limbiventris*, and find them both conspecific.

Genus EYSARCORIS.

Eysarcoris subarmata.

Hoplistodera armata, Walk. Cat. Het. ii. p. 266. n. 7 (1867).

Closely allied to *E. guttigera*, Thunb. Scutellum a little longer, pronotal angles very slightly more produced.

Eysarcoris? insurgens.

Hoplistodera insurgens, Walk. Cat. Het. ii. p. 265. n. 5 (1867).

This species has the pronotal angles prominently and acutely produced and directed slightly forward. Excluding this character it is allied to *E. guttigera*, Thunb.

Eysarcoris? ænescens.

Hoplistodera ænescens, Walk. Cat. Het. ii. p. 266. n. 6 (1867).

Very closely allied to the preceding species, but differing by having the apices of the pronotal angles slightly recurved.

Eysarcoris alienus, Walk. Cat. Het. ii. p. 275. n. 15 (1867).

This species is founded on a single specimen without abdomen. Walker describes the sternal process, which "is forked hindward," but proceeds to remark that "it differs somewhat from the typical form of *Eysarcoris*, but hardly sufficient to

constitute a new genus." As far as can be predicated in its mutilated condition, it seems to be very closely allied to the genus *Brachystethus*.

Genus BRACHYNEMA.

Brachynema biplaga.

Rhaphigaster biplaga, Walk. Cat. Het. ii. p. 373. n. 94 (1867).

Pentatoma? tetrastigma, Walk. (nec Herr.-Schäff.) loc. cit. p. 311. n. 154.

Walker's type, and also the second specimen he identified as *P. tetrastigma*, Herr.-Schäff., were unlocalized. The British Museum now possesses specimens from the Atkinson collection which are labelled "Gulistan," Afghanistan.

Genus THYANTA.

Thyanta parvula.

Rhaphigaster parvulus, Dall. List Hem. i. p. 279. n. 16 (1851).

The type and sole representative of this species is unlocalized, but seems clearly to belong to the genus *Thyanta*.

Genus AFRANIA.

Afrania, Stål, Hem. Afr. i. p. 180 (1864).

Sala, Walk. Cat. Het. ii. p. 404 (1867).

Afrania Wahlbergi.

Strachia Wahlbergi, Stål, Öfv. Vet.-Ak. Förh. 1853, p. 220.

Sala colorata, Walk. Cat. Het. ii. p. 405. n. 1 (1867).

Afrania exigua.

Sala exigua, Walk. Cat. Het. iii. p. 575 (1868).

Genus EURYDEMA.

Eurydema rugosa.

Eurydema rugosa, Motsch. Étud. x. p. 22 (1861); Dist. Ann. & Mag. Nat. Hist. (5) viii. p. 28 (1881).

Tropicoris rugosus, Leth. & Sev. Cat. Gén. Hémi. t. i. p. 183 (1893) (nec Dist.).

Genus STENOZYGUM.

Stenozygum gemmea.

Strachia gemmea, Walk. Cat. Het. ii. p. 346. n. 93 (1867).

Strachia lepida, Walk. loc. cit. p. 347. n. 94.

Strachia sanguineguttatum, Voll. Versl. Ak. Amst. Nat. (2) ii. p. 185 (1868).

*Stenozygum speciosum.**Strachia speciosa*, Dall. List Hem. i. p. 261. n. 10 (1851).*Strachia inornata*, Walk. Cat. Het. ii. p. 331. n. 66 (1867).

Genus AROCERA.

*Arocera placens.**Strachia placens*, Walk. Cat. Het. ii. p. 316. n. 21 (1867).

Genus VULSIREA.

*Vulsirea violacea.**Cimex violaceus*, Fabr. Syst. Rhynch. p. 167. n. 63 (1803); Herr.-Schäff. Wanz. Ins. iv. p. 89, fig. 425 (1839).*Vulsirea superba*, Walk. Cat. Het. ii. p. 354. n. 9 (1867).

Genus ANAXILAUS.

*Anaxilaus camatulus.**Pentatoma camatula*, Dall. List Hem. i. p. 237 (1851).*Anaxilaus vesiculosus.**Cimex vesiculosus*, Herr.-Schäff. Wanz. Ins. v. p. 65, fig. 509 (1839).

Australia, Adelaide. (Three specimens, Brit. Mus.)

This is not synonymous with the above as catalogued by Lethierry and Severin, but quite distinct (*cf.* Bergroth, Rev. d'Ent. t. x. pp. 206-7, 1891).

Genus NOVATILLA.

Novatilla, Dist. Trans. Ent. Soc. Lond. 1888, p. 479.

Dr. Bergroth (Rev. d'Ent. t. x. p. 206, 1891) has stated that *Novatilla* "est identique au genre *Anaxilaus*, Stål." The two genera have, however, little in common, and the structure of the head is alone sufficient to separate them. Stål founded his genus *Anaxilaus* on the *Pentatoma camatula*, Dall. This statement by Bergroth has been accepted by Lethierry and Severin in their 'Cat. Gén. Hémiptères.'

*Novatilla fasciata.**Novatilla fasciata*, Dist. Trans. Ent. Soc. Lond. 1888, p. 480, pl. xiii. fig. 2.*Anaxilaus fasciata*, Bergr. Rev. d'Ent. t. x. p. 206 (1891); Leth. & Sev. Cat. Gén. Hémipt. t. i. p. 164 (1893).

Novatilla virgata.

Pentatoma virgata, Dall. List Hem. i. p. 249 (1851).

Novatilla virgata, Dist. Trans. Ent. Soc. Lond. 1888, p. 480.

Anaxilais virgata, Leth. & Sev. Cat. Gén. Hém. t. i. p. 164 (1893).

? *Novatilla Barnardi.*

Anaxilais Barnardi, Bergr. Rev. d'Ent. t. x. p. 205 (1891).

This species probably belongs to *Novatilla*, as Dr. Bergroth describes it as "*A. fasciato*, Dist., affine, sed notis allatis facile distinctum."

Genus NEZARA.

Nezara Dallasi.

Rhaphigaster marginatus, Dall. List Hem. i. p. 277. n. 8 (1851) (nom. præocc.).

Nezara naspirus.

Rhaphigaster naspirus, Dall. List Hem. i. p. 276. n. 6 (1851).

Nezara rinapsus.

Rhaphigaster rinapsus, Dall. List Hem. i. p. 277. n. 7 (1851).

Menida rinapsus, Leth. & Sev. Cat. Gén. Hém. t. i. p. 175 (1893).

Nezara stictica.

Rhaphigaster sticticus, Dall. List Hem. i. p. 281. n. 22 (1851).

Pentatoma aspersa, Walk. Cat. Het. ii. p. 292. n. 53 (1867).

Nezara viridula.

Cimex viridulus, Linn. Syst. Nat. ed. x. p. 444 (1758).

Cimex torquatus, Fabr. Syst. Ent. p. 710 (1775).

Pentatoma vicaria, Walk. Cat. Het. ii. p. 303. n. 122 (1867).

Nezara parnisus.

Rhaphigaster parnisus, Dall. List Hem. i. p. 279. n. 14 (1851).

Nezara prunasis.

Rhaphigaster prunasis, Dall. List Hem. i. p. 279. n. 15 (1851).

Nezara marginalis.

Pentatoma marginale, Herr.-Schäff. Wanz. Ins. iii. p. 95, t. civ. fig. 320 (1836).

Strachia olivacea, Walk. Cat. Het. ii. p. 322. n. 40 (1867).

Arocera olivacea, Leth. & Sev. Cat. Gén. Hém. t. i. p. 159 (1893).

Nezara gravis.

Strachia gravis, Walk. Cat. Het. ii. p. 322. n. 39 (1867).

Allied to *N. marginalis*, H.-Sch.

Nezara chloris.

Pentatoma chloris, Westw. in Hope Cat. i. p. 38 (1837).

Pentatoma mentiens, Walk. Cat. Het. ii. p. 296. n. 92 (1867).

Genus BANASA.

Banasa varians.

Rhaphigaster dimidiatus, Stål, Bidr. till Rio-Jan. i. p. 22 (1858).

Banasa varians, Stål, Enum. Hem. ii. p. 43 (1872).

Pentatoma subrufescens, Walk. Cat. Het. ii. p. 290. n. 50 (1867).

Banasa inopinata.

Rhaphigaster inopinatus, Walk. Cat. Het. ii. p. 358. n. 18 (1867).

Lethierry and Severin (Cat. Gén. Hém. t. i. p. 166) have queried this species as a synonym of *Nezara sparnia*, Dall., probably misled by Walker having differentially referred to that species, with which, however, it has nothing in common.

Genus PALLANTIA.

Pallantia macula.

Rhaphigaster macula, Dall. List Hem. i. p. 284. n. 32 (1851).

Pentatoma diffusa, Walk. Cat. Het. ii. p. 290. n. 49 (1867).

Genus SABÆUS.

Sabæus spinosus.

Rhaphigaster spinosus, Dall. List Hem. i. p. 278. n. 10 (1851).

Sabæus spinosus (part.), Leth. & Sev. Cat. Gén. Hém. t. i. p. 168 (1893).

Mormidea ductor, Walk. Cat. Het. ii. p. 264. n. 64 (1867).

Sabæus humeralis.

Rhaphigaster humeralis, Dall. List Hem. i. p. 278. n. 11 (1851).

Sabæus spinosus (part.), Leth. & Sev. Cat. Gén. Hém. t. i. p. 168 (1893).

Cuspiconu smaragdina, Walk. Cat. Het. ii. p. 380. n. 7 (1867).

Lethierry and Severin (*supra*) have regarded these two species as being synonymic. In *S. spinosus* the pronotal spines are slightly recurved backward; in *S. humeralis* they are directed moderately forward and somewhat upward. In all the specimens of this species which I have examined the reddish spot is present at the base of these spines.

Genus HYLLUS.

Hyllus fasciatus, sp. n.

Olivaceous green; head and a broad fascia between and occupying the humeral angles of the pronotum dark ochraceous; a pale greenish rounded spot at apex of scutellum; body beneath and legs greenish; pronotal angles beneath reddish ochraceous, with their margins and apex black; disk of abdomen ochraceous. Antennae greenish ochraceous, second joint shorter than the third, fourth and fifth joints subequal in length. Pronotal angles robust, slightly recurved, their apices and lateral margins black.

Long. $9\frac{1}{2}$ millim.; exp. pronot. angl. 8 millim.

Hab. Ceylon (*Green*: Brit. Mus.).

Allied to *H. florens*, Walk., differing by the more robust and recurved pronotal spines, fasciate pronotum, &c.

Genus PLAUTIA.

Plautia prolata.

Pentatoma prolata, Walk. Cat. Het. ii. p. 306. n. 135 (1867).

Plautia discolor.

Pentatoma discolor, Walk. Cat. Het. ii. p. 305. n. 134 (1867).

Plautia fimbriata.

Cimex fimbriatus, Fabr. Ent. Syst. iv. p. 121. n. 159 (1794).

Rhaphigaster rufoviridis, Walk. Cat. Het. ii. p. 364. n. 57 (1867).

Plautia grossepunctata.

Pentatoma grossepunctata, Kirby, in Andrews, Monogr. Christmas Isld. p. 128, pl. xv. fig. 2 (1900).

Genus ZANGIS.

Zangis impar.

Rhaphigaster impar, Walk. Cat. Het. ii. p. 374. n. 96 (1867).

Rhaphigaster Ludekingii, Voll. Versl. Ak. Amst. Nat. (2) ii. p. 187 (1868).

Walker's type was unlocalized. I possess a specimen from Sumatra collected by Mr. Forbes, and this habitat agrees with that of Vollenhoven's typical specimens.

Zangis varicornis.

Rhaphigaster varicornis, Dall. List Hem. i. p. 281. n. 20 (1851).

*Zangis subpunctata.**Pentatoma subpunctata*, Walk. Cat. Het. ii. p. 307. n. 133 (1867).*Rhaphigaster melanostictus*, Voll. Versl. Ak. Amst. Nat. (2) ii. p. 187 (1868).

Walker, in his description, has made no mention of a small black spot on each lateral margin of the scutellum a little before its apex.

Genus ASTYANAX.

*Astyanax subauctus.**Hoplistodera subaucta*, Walk. Cat. Het. ii. p. 267. n. 8 (1837)

Genus ANTESTIA.

*Antestia anchora.**Cimex anchora*, Thunb. Nov. Ins. Sp. ii. p. 47, pl. ii. fig. 60 (1783).*Strachia pardalis*, Walk. Cat. Het. ii. p. 330. n. 64 (1867).*Strachia platyspila*, Walk. loc. cit. p. 337. n. 78.*Antestia pulchra.**Pentatoma pulchra*, Dall. List Hem. i. p. 253 (1851).*Strachia heterospila*, Walk. Cat. Het. ii. p. 331. n. 65 (1867).*Antestia partita.**Strachia partita*, Walk. Cat. Het. ii. p. 334. n. 74 (1867).*Strachia subcostalis*, Walk. loc. cit. p. 335. n. 75.*Strachia semiviridis*, Walk. loc. cit. p. 336. n. 76.*Pentatoma plebeja*, Voll. Versl. Ak. Amst. Nat. (2) ii. p. 185 (1868).

Apparently a variable and widely spread species throughout the Malay Archipelago. I possess examples from Port Moresby which cannot be distinguished from typical Javan forms described by Vollenhoven as *P. plebeja*.

*Antestia polyspila.**Strachia polyspila*, Walk. Cat. Het. ii. p. 336. n. 77 (1867).Allied to *A. securigera*, Walk.*Antestia degenera.**Pentatoma degenera*, Walk. Cat. Het. ii. p. 304. n. 132 (1867).*Pentatoma punctatissima*, Kirby, Journ. Linn. Soc., Zool. xxiv. p. 83 (1891).*Antestia variegata.**Cimex variegatus*, Thunb. Nov. Ins. Sp. ii. p. 48, pl. ii. fig. 62 (1783).Var. *Cimex olivaceus*, Thunb. Hem. rostr. Cap. ii. p. 2 (1822).*Strachiapentatomoides*, Walk. Cat. Het. ii. p. 325. n. 51 (1867).

Genus MENIDA.

Menida histrio.

Cimex histrio, Fabr. Mant. ii. p. 296. n. 176 (1787).

Rhaphigaster strachioides, Walk. Cat. Het. ii. p. 365. n. 63 (1867).

Menida apicalis.

Rhaphigaster apicalis, Dall. List Hem. i. p. 285 (1851).

Menida megaspila.

Antestia megaspila, Walk. Cat. Het. iii. p. 559 (1868).

Scutellum very broad—*Menida* ?

Menida labecula, sp. n.

Ochraceous, thickly, coarsely, brownly punctate. Head with the lateral and basal margins and the margins of the central lobe piceous. Pronotum with two transverse foveate spots on anterior area. Scutellum with a large discal castaneous spot near base and two smaller spots of the same colour near apex, behind which is a smaller linear spot; apex paler and less punctate. Connexivum ochraceous, spotted with castaneous. Body beneath and legs ochraceous, lateral margins and apical segment of abdomen castaneous; a cluster of black punctures near anterior coxæ and some silky piceous transverse patches on lateral areas of meso- and metasternum. Antennæ ochraceous, second joint a little shorter than third, apical joints sometimes castaneous.

Long. 5 millim.

Hab. Ceylon (*Green* : Brit. Mus. *Lewis* : Coll. Dist.).

A short and broad species allied to *M. distincta*, Dist.

Menida pæcila.

Rhaphigaster pæcilus, Dall. List Hem. i. p. 287. n. 38 (1851); Leth. & Sev. Cat. Gén. Hém. t. i. p. 200 (1893).

Closely allied to *M. lythrodes*, Germ.

Menida pallipes.

Rhaphigaster pallipes, Dall. List Hem. i. p. 287. n. 39 (1851); Leth. & Sev. Cat. Gén. Hém. t. i. p. 200 (1893).

Lethierry and Severin, in their most useful catalogue, remark (*Antestia*, sec. Distant). Some confusion must have arisen. The *Antestia pallipes*, Dall., = *Pentatoma pallipes*, Dall. List Hem. i. p. 239. n. 17 (1851).

Menida bisignata.

Rhaphigaster bisignatus, Walk. Cat. Het. ii. p. 366 (1867).

Menida discoidalis.

Rhaphigaster discoidalis, Walk. Cat. Het. iii. p. 568 (1868).

Menida indecora.

Rhaphigaster indecorus, Walk. Cat. Het. iii. p. 568 (1868).

Menida continuus.

Rhaphigaster continuus, Walk. Cat. Het. ii. p. 368. n. 76 (1867).

Var. *Rhaphigaster interruptus*, Walk. loc. cit. p. 369. n. 77.

Menida rubriplaga.

Rhaphigaster rubriplaga, Walk. Cat. Het. ii. p. 365. n. 64 (1867).

Menida leucophæa.

Antestia leucophæa, Walk. Cat. Het. ii. p. 281. n. 19 (1867).

[To be continued.]

LIII.—*Description of a new Cetoniid Beetle from East Africa.* By E. A. HEATH, M.D., F.L.S.

Golianthus (Sphyrorrhina) Wisei.

Shining black. Thorax septangular in shape and very coarsely and thickly punctured, with three narrow ochraceous longitudinal lines, the central line being faintly continued through the scutellum. The anterior part of pronotum is slightly raised to a point, on each side of which are two small ochraceous spots, one at base of head, the other on disk a little before centre. The head is anteriorly prolonged into a square frontal horn-like process 5 lines in width and 4 lines from front to base, its anterior angles terminating in a spine. The anterior horn is about 9 lines in length and granularly rugose, broad at its base (about $3\frac{1}{2}$ lines). It is triangular in shape, rising abruptly from the head to a height of about 3 lines, then convexly depressed to its apex for 6 lines. It gradually lessens in size to the apex, which is terminated by a cruciform process with its angles curved backward, the horn forming a bridge-like structure over the horn-like clypeus.

The elytra are much more finely punctured, and are covered with irregular rows of small spots and blotches of the same colour as the lines on the thorax; they have also two short elongate ochraceous spots, one above the other, at the base two similar spots on each margin just above the middle, and two small blotches at the end, one on each side of the suture. The pygidium is rough, with long black hairs at the vent; there is a fringe of black hairs at the sides of



the abdomen, which is also shining black, punctured, and more or less covered with black hairs. The anterior femora are hairy, the anterior tibiae are more sparingly so and have one inner spine near the apex and three outer spines. The intermediate legs have black hairs on the femora and a thick fringe of black hair on the inner side of the tibiae, with three terminal spines. The posterior legs have the femora less hairy, but have the same fringe of black hairs on the inner side of the tibiae. All the legs are thickly punctured.

Long. from head to apex of elytra 20 lines; max. lat. 12 lines.

Hab. British East Africa.

Allied to *Golianthus Fornassini*, Westw., from which it differs by the much more produced head, the bridge-like horn, with its broad and triangular base, the longer and more attenuated scutellum, and the three spines to the lateral margin of the anterior femora, &c.

BIBLIOGRAPHICAL NOTICE.

The Students' Flora of New Zealand and the outlying Islands. By THOMAS KIRK, F.L.S. Wellington, N.Z.: J. Mackay, Government Printer. 1899. Super Royal 8vo, pp. vi, 408.

WE have in this fragment the last work on which the late Professor Kirk was engaged at the time of his lamented death in March 1898, being the whole of the material he had put into the hands of the printer. It is well known that he had been occupied on an account of the flora of his adopted country for many years, and no better man could have undertaken it. The hope is expressed in the Introduction that the completion may be entrusted to other hands, and if the author's notes are sufficiently brought together it may be accomplished by his son.

The Government printers have done their part well, sundry small typographical errors being no doubt due to the fact that the author could not correct the proof himself. Besides the Errata set out on p. 384 (which may be considered as corrected), the most important error noted by us in glancing through the volume is on page 72, where the reference to *Gayia Lyallii*, "J. E. Baker . . . 37," should read "E. G. Baker . . . 137," while on page 379, in the sixth line, the first two letters have dropped out from DICOTYLEDONS. Again, under the genera *Azorella* and *Helichrysum* there are references given which are entirely misleading as they stand; it is also unfortunate, too, that the author should have preferred to cite Allan Cunningham's paper by its title as "Præcursores," instead of referring to its proper place in the 'Annals of Natural History,' ser. 1, iv. (1840), where the page should be cited instead of the running number of the plants; this could have been supplied from the 'Index Kewensis,' which the author has employed elsewhere.

Turning to the scientific points of interest in the volume, we note that a new genus, *Huttoniella*, is established for four species of *Carmichaelia*, on account of the pods being indehiscent, the seeds not exceeding three in number, and the radicle conduplicate. Furthermore, the genus *Hoheria* is retained for the original species, *H. populnea*, A. Cunn.; *Shawia paniculata*, Forst., is re-established,

the author considering that Bentham and Hooker had suppressed it from a mistaken idea as to the constancy of its characters, and *Raoulia* is retained solely for convenience.

Altogether about 950 species are enumerated, of which 262, or nearly two sevenths of the total number, are introduced plants, which are especially numerous in Leguminosæ, including 7 species of *Medicago*, 13 of *Trifolium*, and 6 of *Vicia*; 49 plants are described as new, and a dozen are transferred to different genera.

The volume embraces the first half of the whole phanerogamic flora, from Ranunculaceæ to Compositæ inclusive, with a glossary of terms, a synopsis of the work, and two indexes. Apart from the shape, which is a little awkward for use, we can only express our pleasure at so much of the New Zealand flora being issued and brought down to the present time, the admirable handbook of Sir Joseph Hooker having long since been out of print.

MISCELLANEOUS.

Scriptotricha or *Paracantha* ?

SEVERAL years ago, when resident in Colorado, the writer found a Trypetid fly breeding in the heads of thistles. A specimen was sent to the Department of Agriculture at Washington, and was identified as *Scriptotricha culta*, under which name I published an account of it in the 'Sixth Report of the Colorado Biological Association,' Jan. 16, 1889. The fly and its habits were there described in a manner sufficient for recognition. In *Trans. Amer. Ent. Soc.* xx. p. 369 (1893), the insect was again referred to as *Scriptotricha culta* (Wied.).

In *Journ. N. Y. Ent. Soc.*, Dec. 1899, Mr. D. W. Coquillett proposes the name *Paracantha*, with the *Carphotricha culta* (Wied.) as the type.

On looking into the matter I found no mention of *Scriptotricha* in the literature, except in the places just cited, and concluded that it must have been a MS. name. Mr. Coquillett, at my request, has been so kind as to investigate its history, and he finds that the fly I sent in was identified by the late Mr. Linell as *Carphotricha culta*, but Mr. Pergande misread the name as *Scriptotricha culta*, and in the latter form it was sent to me.

Now the question is, will *Scriptotricha* hold, and if so, who is its author? It was published in connexion with a description, and would be valid but for the fact that it originated in a mistake. I am inclined to consider, on the whole, that it will rank with misprints, and the name *Paracantha* will apply to the fly*.

In any case, this explanation seems necessary, to avoid future misunderstandings.

T. D. A. COCKERELL.

Mesilla Park, New Mexico, U.S.A.,
Jan. 27, 1900.

* I entirely agree with Professor Cockerell, and am glad that he has put the matter on record.—C. DAVIES SHERBORN.]



INFRACIENS S. CILIOLIS



THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

[SEVENTH SERIES.]

No. 29. MAY 1900.

LIV.—*Observations on Bees collected at Las Vegas, New Mexico, and in the adjacent Mountains.* By T. D. A. COCKERELL, Professor of Entomology, New Mexico Agricultural College.

Bombus proximus, Cresson, 1863.

This has priority of place over *Howardi*, Cresson, and must be used for the species. The *proximus* form is the usual one in New Mexico (Monument Rock &c.), but Miss W. Porter took a male of *B. proximus*, var. *Howardi* (*B. Howardi*, Cress. 1863), at San Ignacio, Sept. 1, 1899. The var. *Howardi* has the second and third segments of the abdomen yellow (some black hair at the base of the second), whereas *proximus* proper has the second segment black as well as the first.

Bombus juxtus, Cresson, 1878.

This has a very perfect mimic in *Volucella facialis*, Will., which Miss Wilmatte Porter collected in company with it on flowers of wild plum at Beulah, N. M., May 30, 1899.

Andrena Porteræ, sp. n.

♀.—12 millim. long.

Black, with black pubescence. Superficially this looks

exactly like *A. nigerrima*, Casad, but it differs as follows:—Wings yellower, stigma paler; clypeus much more produced and much more sparsely punctured; malar space much longer, nearly as long as broad; abdomen practically impunctate, the sparse punctures barely visible, the broad hind margin of the first segment, which in *nigerrima* is so conspicuously punctured, quite smooth and impunctate. The process of the labrum is obtuse and entire.

Differs at once from *A. nigra*, Prov., by the very sparsely punctured clypeus.

Hab. Las Vegas Hot Springs, N. M., at flowers of *Salix*, spring of 1899 (*Wilmatte Porter*).

The following four species all appear in the latter half of summer or early autumn, and agree in having the abdomen of the tessellate-impunctate type and the process of labrum produced and emarginate. They may be separated as follows:—

Mesothorax smooth, shining; hair at apex of abdomen white.	
Process of labrum with a deep emargination; stigma black	<i>xanthigera</i> , Ckll.
Process of labrum with a shallow emargination; stigma pale	<i>albovirgata</i> , Ckll.
Mesothorax granular, dull.	
Process of labrum usually with a deep emargination; size larger; hair at apex of abdomen sooty.	
Clypeus densely punctured . . .	<i>apacheorum</i> , Ckll.
Clypeus sparsely punctured . . .	<i>apacheorum</i> , var.
Process of labrum with a shallow emargination; size smaller; clypeus tessellate and rather sparsely punctured . .	<i>segregans</i> , Ckll.

Andrena xanthigera, sp. n.

♀.—Length about 9 millim.

Black, with rather long greyish-white pubescence. Eyes parallel, facial quadrangle broader than long; cheeks ample; vertex dull and granular; front striated; antennæ black, a little ferruginous beneath towards the ends; sides of face with rather abundant long hair; clypeus shining, very closely punctured at the sides, sparsely in the middle, with an impunctate median line; malar space almost obsolete; process of labrum produced, deeply emarginate, the emargination rectangular; mesothorax shining but microscopically tessellate, with sparse, feeble, minute punctures, and a few larger ones scattered about; metathorax granular, dull, basal area

triangular, without a rim, very feeble, longitudinally plicate at the sides of the extreme base; tegulae dark testaceous; wings hyaline, faintly but quite noticeably smoky at apex; nervures dark brown, stigma black; third submarginal cell long, narrowed more than half to marginal; legs black, with pale pubescence; small joints of tarsi clear ferruginous; basal joint of middle tarsus broadened; spurs white; abdomen rather broad, microscopically tessellate, with a sericeous lustre; all the segments with apical bands of long white hair, that on the first very thin, on the others very dense; apical pubescence also white.

Hab. San Ignacio (between Las Vegas and Beulah), N. M., Sept. 1, 1899 (*Wilmatte Porter*).

Closely related to *A. nubecula*, Smith, but the cloud at the apex of the wings is not nearly so dark, the first abdominal segment has a hair-band (wanting in *nubecula*), and the size is a little larger. Perhaps it is only a geographical race of *A. nubecula*, which inhabits Canada and the U. S. east of the plains, coming as far west as Lincoln, Nebraska, whence I have specimens collected in August and September, sent by Prof. L. Bruner. The type specimen of *A. xanthigera* has the sides of the metathorax and the hind femora and tibiae heavily loaded with orange pollen, doubtless gathered from one of the Compositae. A Lincoln *nubecula* is loaded in exactly the same way.

Andrena albovirgata, sp. n.

♀.—Length about $7\frac{1}{2}$ millim.

Similar to *A. xanthigera*, but differing in the basal process of the labrum having only a shallow gently rounded emargination; the stigma light brown; the wings not clouded at apex; the first abdominal segment with the band thinner or reduced to some scattered hairs; the shining disk of mesothorax with weaker excessively minute punctures.

Hab. San Ignacio, N. M., Sept. 1, 1899; two (*Wilmatte Porter*). They carry a very small amount of orange-yellow pollen.

Andrena apacheorum, Ckll., 1897, var. *a*.

♀.—Length about $9\frac{1}{2}$ millim.

Black, with dull white pubescence, *except at the apex of the abdomen, where it is greyish brown*, and on the tibiae and tarsi, where it is mostly brownish grey. Facial quadrangle broader than long; vertex dull and granular; front striated; antennae obscurely brown beneath towards tips; *clypeus*

strongly and densely punctured, a small space in the middle near the anterior margin smooth and shining; anterior margin of clypeus transversely sulcate; process of labrum with a deep angular emargination; mesothorax dull, minutely tessellate, with very sparse and feeble punctures; legs black, small joints of tarsi slightly ferruginous, spurs white; base of metathorax dull, granular, not enclosed; tegulæ dark; *wings yellowish*, nervures brown, stigma deep honey-colour; abdomen broad, microscopically tessellate, first four segments with broad but very thin apical bands of dull white hair.

Hab. Hill above Beulah, N. M., Aug. 19, 1899 (*Wilmatte Porter*).

I thought at first this might be distinct from *apacheorum*, but after careful comparison I must regard it as the same, notwithstanding the difference in the process of the labrum, which in the type of *apacheorum* is truncate, the truncation depressed centrally, but scarcely emarginate.

Andrena apacheorum, var. β .

♀.—Differs as follows:—Process of labrum with emargination rounded, not angular; clypeus shining, sparsely punctured on the disk, with a median impunctate stripe; wings quite dark, stigma somewhat darker.

Hab. Hill above Beulah, Aug. 19 (*Wilmatte Porter*).

Another form of *apacheorum*, which appears to be remarkably variable. This insect resembles *A. solidaginis* and *A. asteris* in many of its characters, but the abdominal bands of *solidaginis* are much narrower and *asteris* differs in various small details.

Andrena segregans, sp. n.

♀.—Length about 8 millim.

Black, with white pubescence, dull on mesothorax and scutellum, with a decided grey tint, *some black hairs on vertex and about the base of the antennæ*; hair of tarsi greyish, inclining to fuscous, *of apex of abdomen stained with greyish brown, but not actually sooty*. Process of labrum broadly truncate, the truncation concave, but only slightly so; clypeus with strong punctures, not very dense; antennæ dark; vertex granular; mesothorax dull, microscopically tessellate, with sparse feeble punctures; basal area of metathorax triangular, minutely roughened, with a slight and delicate rim, obsolete medially; tegulæ dark; wings smoky; stigma and nervures very dark brown; abdomen shining, practically impunctate, narrower than in *apacheorum*, with thin white hair-bands on

the apical margins of the segments, that on the first almost obsolete.

♂.—Similar in most respects; face entirely dark; antennæ entirely dark; abdomen a little more punctured, more generally pruinose, with the hair-bands less distinct; pubescence generally longer, but of the same colour on head and thorax.

Hab. Beulah, N. M., July 26, 1899 (*Wilmatte Porter*).

Andrena vicina, Smith, 1853.

Hab. Beulah, N. M., May 30, 1899, at flowers of wild plum, 3 ♀ (*Wilmatte Porter*).

New to New Mexico.

Andrena platyparia, race *occidentalis*, Ckll., 1896.

Hab. Beulah, N. M., July 26, 1899, 1 ♂ (*Wilmatte Porter*).

Andrena argemonis, Ckll., 1896.

Hab. Las Vegas, July 21, at flowers of *Petalostemon candidus*, 1 ♂, 1 ♀ (*Ckll.*); July 30, at flowers of *Cleome serrulata*, 1 ♀ (*Wilmatte Porter*); Aug. 11, at flowers of *Petalostemon candidus*, 2 ♀ (*W. Porter*). Gallinas River, at La Cueva, Aug. 6, 1 ♀ (*Porter & Ckll.*). San Geronimo, at flowers of *Petalostemon candidus*, July 23, 1 ♂, 3 ♀ (*A. Garlick*).

Andrena americana, Dalla Torre, 1896.

Hab. San Ignacio, Sept. 1, 2 ♀ (*Wilmatte Porter*); Beulah, end of August, 1 ♂ (*Ckll.*).

New to New Mexico, and quite unexpected here. The specimens agree with those from Connecticut.

Andrena helianthi, Rob., 1891.

Hab. Las Vegas, Aug. 11, 1 ♀ (*A. Garlick*); Aug. 2, at flowers of *Verbesina encelioides*, 1 ♂ (*Wilmatte Porter*); Aug. 12, at flowers of *Helianthus annuus*, 1 ♂ (*A. Garlick*). Rociada, Aug. 20, 1 ♀ (*Ckll.*).

Andrena mellea, Cresson, 1868.

Hab. Las Vegas, Aug. 11, 1 ♀ (*A. Garlick*).

A beautiful species, previously known only by the unique type.

Andrena aureocincta, Ckll., 1896.

Hab. San Ignacio, Sept. 1, 1 ♂ (*Wilmatte Porter*).
Previously known only by the unique type.

Andrena grandior, Ckll., 1897.

Hab. Beulah, July 26, 1 ♀ (*Wilmatte Porter*); Aug. 18, 1 ♀ (*Ckll.*).

Previously known only from Washington State. The specimens are 10 millim. long, thus a trifle smaller than the type. Easily known from *rugosa* by the broad lateral frontal depressions, which follow the orbital margin, whereas in *rugosa* they diverge from it below, leaving a smooth shining space adjacent to the eye. *A. rugosa* is also a vernal species, flying in April.

Andrena nitidior, sp. n.

♀.—Length 12 millim.

Black, with ochraceous pubescence, dense on head and thorax; abdomen shining, microscopically tessellate, the excessively minute sparse punctures indicating the origins of the almost invisible short hairs; the sides rather more hairy, tending to form thin bands at the sides of the apical margins of the second and third segments and all along the margin of the fourth; apex densely clothed with light reddish-ochraceous hair; hind tarsi and small joints of the other tarsi ferruginous; wings smoky, a little darker on outer margin; stigma and nervures dark ferruginous; stigma very narrow; second submarginal cell large; process of labrum broad and low, emarginate.

Very similar to *A. helianthi*, with the same pubescence on the head and thorax, the same narrow stigma, &c., but easily distinguished by the smaller shining abdomen and the darker wings. The base of the metathorax is minutely granular, the enclosure only defined by the absence of hair and its finer sculpture; the mesothorax is entirely dull and coarsely granular, the parapsidal grooves distinct; the lateral facial depressions are broad and follow the orbital margin to their lower ends; the clypeus is strongly punctured; the flagellum is only faintly ferruginous beneath towards the end.

Hab. San Ignacio, Sept. 1, 1899, 2 ♀ (*Wilmatte Porter*).

One has the hind tibiæ light ferruginous, with a dark blotch in front and behind. In the other the hind tibiæ are covered with bright orange pollen, as also the femora and base of metathorax. Superficially the insect has a considerable resemblance to *A. pruni*, Rob.

Andrena semirufa, sp. n.

♀.—Length almost 13 millim.

Black, with reddish-ochraceous pubescence, fairly dense on head and thorax, ferruginous on the mesothorax and scutellum; hair at apex of abdomen black. Facial quadrangle about square; vertex microscopically tessellate; lateral frontal depressions receding from the orbital margin below; antennæ dark; clypeus strongly, densely, and more or less confluent punctured, with a narrow longitudinal impunctate ridge; process of labrum broad, ending in a thickened truncation, not in the least emarginate; malar space short, but distinct, minutely punctured; mesothorax minutely tessellate, closely punctured at the sides, sparsely in the middle; base of metathorax granular, defined only by an impressed line; tegulae very dark brown; wings yellowish, nervures dark brown, stigma dark ferruginous; third submarginal cell narrowed more than half to marginal; scopa of hind femora and tibiae very abundant; pubescence of tarsi grey-brown on outer side, reddish within, spurs orange; abdomen microscopically tessellate, shining, with only minute hair-punctures; dorsal surface of abdomen practically nude, the margins of the segments not banded; sides hairy; vertex with thin bands of long pale brownish hairs.

Hab. Las Vegas Hot Springs, at flowers of *Salix*, spring of 1899 (*Wilmatte Porter*).

Judging from Smith's short description, this must come very close to *A. nivalis*, Sm., from Hudson's Bay. It also runs to *nivalis* in Provancher's table of Canadian *Andrenæ*; but it is, I think, certainly a different species. In Schmiedeknecht's table of European *Andrenæ* (♀) it runs to 64, but does not agree with the species there indicated.

Paranomia Nortoni (Cresson, 1868, as *Nomia*).

Hab. Las Vegas, July 18, at flowers of *Lycium vulgare*, 1 ♂ (*Wilmatte Porter*).

Anthophora Porteræ, sp. n.

♂.—Length 15 millim.

Very robust (6 millim. between the bases of the wings), black, densely clothed on head, thorax, and base of abdomen with erect greyish-white hair, very slightly mixed with black. Clypeus nude, but densely fringed with snow-white hair; clypeus (except the narrow anterior edge), labrum (except two large spots at sides of base), subtriangular (rose-

thorn shaped) lateral face-marks, and broad stripe on scape pale primrose-yellow; mandibles wholly dark, slender, with a distinct tooth within near tip; eyes olive-green; tongue about 12 millim. long; pubescence of thorax so dense as to conceal the surface; tegulae piceous; wings hyaline, with a faint brownish tinge; nervures piceous, first recurrent nervure joining second submarginal cell about its middle; legs black, even to the tarsi (claws ferruginous at base), with very long white hair; tarsi with some black hair on inner side; spurs black; basal joint of hind tarsus neither broadened nor toothed; middle tarsus with very long black and white hairs, last joint ciliated on each side with long black hairs, something like a peacock's feather; abdomen densely hairy at base, thinly so beyond, so as to appear dusty; hind margins of the segments brownish; third and following segments with inconspicuous black hairs; apex narrowly truncate.

♀.—Similar; face wholly black, clypeus more strongly punctured; wings browner; hair of vertex and mesothorax distinctly mixed with black; pygidial plate long and very narrow.

Hab. Romeroville, N. M., April 29, 1899, at flowers of wild gooseberry, 1 ♂ (*Wilmatte Porter*); Mojave Desert, California, 1 ♀ (*Ehrhorn*).

Looks like a species of *Centris*.

Anthophora occidentalis, Cresson, 1869.

Hab. Las Vegas, July 20, at flowers of *Cnicus ochrocentrus*, 1 ♀ (*Ckll.*); July 20, at flowers of *Cleome serrulata*, 1 ♀ (*Wilmatte Porter*); July 22, at flowers of *Convolvulus sepium* (var.), 1 ♂ (*Wilmatte Porter*).

Anthophora bomboides, Kirby, var. *neomexicana*, nov.

♂ ♀.—Pubescence of vertex, thorax, and abdomen except apex bright orange-ferruginous, of cheeks black in female, white in male; in the female the red hair covers the first three abdominal segments (the others being black), in the male it covers the first three and most of the fourth. Clypeus and face-marks of male cream-colour; apex of abdomen bidentate.

Hab. Las Vegas, June 18, at flowers of alfalfa, 1 ♂ (*Ckll.*); July 8, at flowers of *Lycium vulgare*, 2 ♀ (*Wilmatte Porter*). Beulah, May 30, 1 ♀ (*Wilmatte Porter*). Las Vegas, June 3, 1 ♀ (*R. Devine*).

In typical *bomboides* the pubescence, where not black, is white or whitish, and on the male abdomen it covers the three first dorsal segments. This is from 65° N. lat.

In var. *canadensis*, Cresson (♂), the pubescence is lemon-yellow instead of white, and only the first and base of second dorsal segments of the abdomen are clothed with yellow hair. This is from Ontario. A male from Olympia, Washington State, June 21, 1895, may be provisionally referred here, though the hair of the vertex, scutellum, and hind part of mesothorax is black, and the light hair which covers the first two dorsal segments of the abdomen is strongly inclined to ferruginous. It was collected by Mr. T. Kincaid. This Washington form tends towards *A. sodalis*, Cresson, from Nevada, which I feel convinced is only another variety or race of *bomboides*. *A. insularis*, Smith, from Vancouver Island is known only in the female, but I suspect that it may be a female *bomboides* of the *canadensis* type, and belong with the just-mentioned Olympia male. Whether in this case the western form (*insularis*) can be separated subspecifically from the eastern (*canadensis*) can only be determined in the light of more ample material. A female from Sioux Co., Nebr., sent by Prof. L. Bruner, resembles the var. *neomexicana* in the colour of the pubescence, but differs in having the hair of the vertex, scutellum, and mesothorax black; herein it resembles *insularis*, but it differs in having the pubescence of the tibiæ and tarsi black.

Osmia (Chalcosmia) faceta, Cresson, 1878.

Hab. Beulah, May 30, at flowers of *Salix*, 2 ♂ (*Wilmatte Porter*), 1 ♂ (*Helen Blake*).

A variable species, best known by its steel-blue colour and the structure of the apex of the abdomen.

Osmia (Chalcosmia) densa, Cresson, 1864.

Hab. Beulah, Aug. 18, 1 ♀ (*Wilmatte Porter*).

New to New Mexico. Known by the hair of the clypeus being black, though that of the adjacent sides of face is white. The anterior margin of the clypeus is quite different from that of female *faceta*.

Osmia (Ceratosmia) lignaria, Say, var. *α*.

♀.—Smaller, only 9½ millim. long.

Pale hair on abdomen practically confined to first segment;

median impressed line of mesothorax longer, extending as far back as the level of the tegulæ.

Hab. Romeroville, April 29, 1 ♀, at flowers of wild gooseberry (*W. Porter*); Las Vegas (*R. Devine*).

It is possible that this is a distinct species, and it may even prove to belong to *O. montana*, Cresson, of which only the male has been described.

Osmia (Melanosmia) nigrifrons, Cresson,
var. *subaustralis*, nov.

♀.—Smaller, length 10 millim.

Anterior margin of clypeus with a distinct but broad and shallow emargination, from the middle of which proceeds a very fine raised line traversing the whole length of the clypeus, but only visible in a favourable light; apical tooth of mandibles longer; mesothorax with a smooth sparsely punctured space on the middle of its disk; sides of face tinged with greenish (dark purple-blue in *nigrifrons*); mesothorax black, with a faint green tinge posteriorly; wings clearer.

Hab. Beulah, July 26, 1 ♀ (*Wilmatte Porter*).

Probably a distinct species. Cresson, when describing *nigrifrons*, seems to have confused this insect with it, as he says "clypeus truncate or obtusely emarginate."

Osmia (Melanosmia) ribifloris, sp. n.

♀.—Length 11 millim.

Thickly built (breadth of abdomen 4 millim.), dark shining blue, including the legs, and tegulæ more or less; *pubescence black*; wings only faintly tinged with brownish, but the upper half of the marginal cell occupied by a dark brown streak; mandibles very broad, without any patch of rufous hairs, bidentate, the apical tooth quite long, the other small but sharp, nearer to it than to the inner angle; apex of clypeus entire, shining, slightly rounded; punctures of front and mesothorax strong, large, separate; punctures of abdomen distinct but not dense; ventral scopa all black; spurs black; joints 2 to 4 of anterior tarsi inversely cordiform.

Hab. Romeroville, April 29, 1899, 2 ♀, at flowers of wild gooseberry (*Wilmatte Porter*); Las Vegas, 1 ♀ (*R. Devine*).

Allied to *O. Bruneri* and *cobaltina*, but larger and much more darkly coloured. The spurs of the hind tibiæ are small and not hooked at the tip, thus resembling those of *cobaltina* and differing from those of *Bruneri*. From several superficially similar species it is distinguished by the blue legs.

Anthidium Porteræ, sp. n.

♂.—Length about 15 millim.

Robust (breadth of abdomen $5\frac{1}{2}$ millim.); black, with white pubescence, pale ochraceous on mesothorax, scutellum, and vertex. Markings pale lemon-yellow; clypeus yellow; wedge-shaped lateral face-marks, ending at the level of the lower part of antennal sockets, mandibles (except their bidentate tips), oblong spot above eyes, mark on each side of mesothorax in front, mark on tegulæ, stripe above tegulæ, four oblong marks on scutellum, stripe on anterior tibia, interrupted stripe on middle tibia, spot at base of hind tibia, basal joint of middle and hind tarsi, and interrupted bands on abdomen pale yellow. The abdominal bands are interrupted in the middle and broadly notched on each side in front, on the first two segments completely divided, on the sixth segment scarcely notched. Apical segment ferruginous, as figured by Cresson for *A. mormonum*, except that the lateral lobes are broader and less curved inwards. Last ventral segment with a single large ferruginous spine, black at tip. Scape with a yellow stripe; labrum black. Wings broadly dusky on outer margin; second recurrent nervure joining second submarginal cell at its tip.

♀.—Length about 12 millim.

Marked much like the male, but clypeus black, with a large pale yellow blotch on each side anteriorly, the blotches uniting briefly on the anterior margin; femora and bases of abdominal segments more or less ferruginous; scape entirely black; ventral scopa white. Hardly at all different from the female of *cognatum*, which, however, is easily distinguished in the male.

Hab. Las Vegas, Aug. 11, 1899, at flowers of *Petalostemon candidus*, 1 ♂ (*Wilmatte Porter*); also in the Mesilla Valley, Aug. 23, at flowers of *Cevallia sinuata*, ♂ (*Ckll.*), and Mesilla, June 30, ♀ (*Ckll.*).

This is what I have hitherto recorded as *A. maculifrons*, Smith, and I believe it is the species so identified by Cresson. Unfortunately *maculifrons* was described only from the female, and as there are several similar females known in this group, associated with males which have excellent characters at the apex of the abdomen, it may be impossible to certainly identify Smith's species. However, so far as Smith's description goes, it points to *A. montivagum*, Cress., rather than to the present insect, the size being quite too small for *A. Porteræ*. It is not known or believed, however, that Smith had any material from the Rocky Mountains, and it is most likely that his insect came from the Southern States.

Anthidium cognatum, Cresson, must be added to the fauna of New Mexico, having been collected by Townsend in the Organ Mountains, the male in Fillmore Cañon, Aug. 29, the female in Soledad Cañon, Aug. 15. I had unfortunately confused this also with *maculifrons*: the apex of the abdomen is black (instead of ferruginous, as it is in *Porterae*), and is very distinct in its lobes and teeth, as figured by Cresson; the median spine of the last ventral segment is very short, with a long posterior slope, its point directed forwards (cephalad).

Anthidium paroselæ, Ckll., a small species of the same group, was described only from the female, but I have two males collected at Mesilla, June 17, at flowers of *Parosela scoparia*, along with the original female. The male has the same face-markings as male *Porterae*, but the yellow stripe on the scape is rudimentary, the second joint of the flagellum is ferruginous, and the flagellum thence to the tip is ferruginous beneath (in *Porterae* it is black). The apical lobes of the abdomen are yellow, with hyaline margins, but formed, as also the central and lateral spines, much as in *Porterae*. The ventral surface of the abdomen is black, and the last ventral segment is not spined.

Anthidium maculosum, Cresson, 1878.

♂.—Marked like the female, except that the clypeus and adjacent sides of face are yellow, the upper edge of the lateral yellow, flat, and exactly on a line with the top of the clypeus. Antennæ wholly black. Apex of abdomen black, as also the lateral spines, the whole quite of the type of *A. cognatum*, but the lobes long and very narrow, though blunt at ends.

Hab. Las Vegas, July 6, at flowers of *Verbena Macdougalii*, 1 ♂ (*Wilmatte Porter*).

The above species are true *Anthidium*, congeneric with *A. manicatum* of Europe. The second recurrent nervure is interstitial with the second transverso-cubital, contrary to what is stated by Ashmead in *Trans. Amer. Ent. Soc.* xxvi. p. 78.

DIANTHIDIUM, n. subg. of *Anthidium*.

Type *A. curvatum*, Smith (*interruptum*, Say).

Sexes of about the same size; second recurrent nervure passing beyond the tip of the second submarginal cell; apex

of male abdomen truncate or somewhat trilobed; hind coxæ usually with a stout spine in male.

This is Cresson's Section 2 (Proc. Ent. Soc. Philad. 1864, p. 374).

Anthidium (Dianthidium) parvum, Cresson, 1878.

This is what has been reported from New Mexico heretofore as *A. pudicum*, but small examples agree sufficiently with Cresson's description of *parvum*. It differs from *pudicum* (which is, perhaps, only a race of *parvum*) by having the pale markings yellow instead of white or cream-colour; male with no supraclypeal mark (*pudicum* ♂ has a small triangular mark); a stripe instead of a dot behind the summits of the eyes; apical margin of male abdomen truncate rather than trilobate. The female sometimes has a yellow frontal spot and a supraclypeal spot.

Hab. Las Vegas, June 15, 2 ♀ (*R. Devine, N. E. Cochran*); June 23, at flowers of *Cleome serrulata*, ♂ ♀ (*Ckll.*); Aug. 10, at flowers of *Grindelia squarrosa*, 2 ♂ (*Sarah L. Mize*). Santa Fé, Aug. 2, nesting in a hole in an adobe wall, ♀ (*Ckll. & Veer Boyle*). Santa Fé, Aug. 2, at flowers of *Grindelia squarrosa*, ♂ (*Ckll.*). Also in Colorado (Coll. Amer. Ent. Soc.).

I examined the types of *pudicum* in Philadelphia.

Anthidium (Dianthidium) perpictum, Ckll., 1898.

♂.—Marked like the female, but the clypeus entirely yellow. Apex of abdomen yellow, with a rounded median lobe, dusky at end, and on each side a hyaline thorn-like spine. Sides of sixth segment not spined. Last ventral segment pellucid reddish testaceous, emarginate at tip, venter before it with a large black concavity.

Hab. Las Vegas, July 20, 1 ♂ (*W. Porter*); July 31, resting on stems of grass in dull weather, 2 ♂ (*Ckll.*); Aug. 1, at flowers of *Cleome serrulata*, 1 ♂ (*Ckll.*); Aug. 5, at flowers of *Verbesina encelioides*, 1 ♀ (*Ckll.*); Aug. 11, at flowers of *Petalostemon candidus*, 1 ♂, 1 ♀ (*W. Porter*); Aug. 10, at flowers of *Grindelia squarrosa*, 1 ♂ (*Sarah L. Mize*); Aug. 14, also at *Grindelia*, 1 ♀ (*W. Porter*).

Previously known only by the original type and a female collected by Prof. Townsend at flowers of *Erigeron macranthus* on Eagle Creek, N. M., about 8000 feet, Aug. 21.

Anthidium (Dianthidium) gilense, Ckll., 1897.

♂.—Like the female; clypeus entirely yellow; flagellum

black; hind coxæ not spined; apex of abdomen yellow, broadly truncate, the sides of the truncation rounded, the middle depressed, so that the apex is obscurely bilobed; no ventral spine.

Hab. Gallinas River at La Cueva, Aug. 6, 3 ♂ (*Porter & Ckll.*).

Previously known only by the unique type. A close ally of this species, having a supraclypeal mark, the hind tibiæ black except at the ends, the abdominal band on the second segment very broadly interrupted, the third to fifth segments with only a large quadrate yellow mark on each side of the middle, and a small spot at the extreme side, the sixth segment with a broad angular or V-like band on each side, *the apical segment with four little teeth*, is represented by a male collected by Mr. E. M. Ehrhorn in the Mojave Desert, California. The size is small (about 6 millim. long), and the punctures of the scutellum are very dense and irregular instead of being more or less in transverse rows as in *gilense*. The colour of the wings, structure, and general type of markings agree so well with *gilense* that I had no idea it was more than a colour-variety until I saw the quite different apex of the abdomen. For this Mojave Desert species I propose the name *Anthidium Ehrhorni*.

A. Ehrhorni and *A. gilense* of the west, with *A. notatum* and *A. perplexum* of the east, form a compact group of closely allied species.

Anthidium occidentale, Cresson, 1868.

Hab. Sapello Cañon, Aug. 31, 3 ♂, 1 ♀ (*W. Porter*); San Ignacio, Aug. 31 and Sept. 1, 7 ♂, 3 ♀ (*Porter & Ckll.*).

This species will go with *Anthidium* proper for the present, but with *A. larrea* it really falls in a new group, which may hereafter be separated.

The range of *A. occidentale* is considerably extended by a male from Custer, S. Dakota (*L. Bruner*, 18).

Nomada modesta, Cresson, 1863.

Hab. Las Vegas, July 12 (*A. Garlick*), Aug. 1 (*Porter & Ckll.*).

Nomada xanthophila, sp. n.

♂.—Length 11 millim.

Black and yellow; legs ferruginous and yellow; antennæ ferruginous, black above; *apex of abdomen produced, narrowly truncate, entire*. Resembles *N. superba*, Cress., but

differs as follows:—Size smaller; head and thorax bare, with practically no pubescence; no supraclypeal mark; eyes entirely surrounded by a narrow band of yellow; scape ferruginous in front (instead of yellow); antennæ shorter, unusually short for a male; second joint of flagellum barely, if any, longer than the third; scutellum much less bilobate, it and the postscutellum yellow; sides of metathorax with a dull ferruginous mark; pleura with a very large yellow patch in front; behind this and beneath the wings a red spot, surrounded by black; lower part of pleura ferruginous; wings suffused with brownish along the nervures, which are very dark brown; stigma dark ferruginous; second submarginal cell scarcely narrowed above; legs with more ferruginous; hind coxæ mostly ferruginous within and yellow without; abdomen with the whole of the first segment and the anterior margin of the second ferruginous; *abdomen distinctly and very closely punctured*; fifth and sixth segments without any apical black band; venter yellow, ferruginous at base, the hind margins of the segments narrowly testaceous. Tegulæ yellow, as in *superba*.

Hab. Las Vegas, Aug. 11, 1899, at flowers of *Solidago canadensis*, 1 ♂ (*Wilmatte Porter*).

Halictus aquilæ, Ckll., 1898.

♂.—About 9 millim. long.

Very narrow, especially the abdomen; dark olive-green, closely punctured; anterior margin of clypeus broadly, and mandibles except base and apex, lemon-yellow; legs, ventral surface, and sides of abdomen orange-ferruginous; on the first three abdominal segments the ferruginous sends flame-like projections into the green; the third segment has a dark spot at each extreme side; pubescence of vertex and thoracic dorsum ochraceous, of underparts dull white; antennæ long, reaching to base of abdomen, entirely black; wings strongly infuscated, nervures and stigma picuous. A very beautiful insect.

Hab. Beulah, July 26, at flowers of *Ranunculus*, *Aster*, &c., 7 ♀ (*W. Porter*); the first males were taken at Harvey's Ranch, 9600 feet, Aug. 22, 1899 (*Porter & Ckll.*); on Aug. 28 Miss Porter took males at Beulah. The sexes were taken together, and there is no doubt that they belong. Previously known only by the unique type.

Hemihalictus lustrans (Ckll., 1897).

Hab. Las Vegas, July 18, at flowers of *Pyrrhopappus*,
4 ♀ (*A. Garlick*).

Phileremulus nanus, Ckll., 1895.

Hab. Las Vegas, Aug. 7, about a patch of *Chamæsaracha coronopus*, 1 ♀ (*Ckll.*).

Perdita chamæsarachæ, Ckll., 1896.

Hab. Las Vegas, Aug. 7, at flowers of *Chamæsaracha coronopus*, 1 ♂, 1 ♀ (*Ckll.*).

Mesilla Park, New Mexico, U.S.A.,
Feb. 18, 1900.

LV.—On a new *Ostracoderm* (*Euphanerops longævus*) from the Upper Devonian of Scaumenac Bay, Province of Quebec, Canada. By A. SMITH WOODWARD, LL.D., F.L.S.

[Plate X. figs. 1, 1 a, 1 b.]

DR. TRAQUAIR'S recent memoir on new Silurian fishes from Scotland* suggests the correct interpretation of a problematical fish from the Upper Devonian of Canada which has been for some years in the collection of the British Museum. This specimen was obtained by Mr. Jex from the well-known fish-beds of Scaumenac Bay, in the Province of Quebec, associated with species of *Bothriolepis*, *Diplacanthus*, *Cocco-steus*, *Scaumenacia*, *Glyptolepis*, *Eusthenopteron*, and *Cheirolepis*, which have been described by Whiteaves †, Traquair ‡, and myself §. It is preserved in the counterpart halves of a nodule, and the two sides are shown of the natural size in Pl. X. figs. 1, 1 a.

As indicated by the best side of the fossil (fig. 1), the anterior half of the fish is distorted and its precise contour is destroyed, while the caudal region is well preserved in direct

* Trans. Roy. Soc. Edinb. vol. xxxix. no. 32 (Dec. 1899).

† J. F. Whiteaves, Trans. Roy. Soc. Canada, vol. iv. (1887) sect. iv. p. 101, and *ibid.* vol. vi. (1888) sect. iv. p. 77.

‡ R. H. Traquair, Geol. Mag. [3] vol. vii. (1890) p. 307, and *ibid.* vol. x. (1893) p. 262.

§ A. S. Woodward, Geol. Mag. [3] vol. ix. (1892) p. 482.

side-view. The dermo-skeletal covering of the head must have been very slight, for its border cannot be distinguished with certainty. It seems to have consisted merely of small shagreen-like granules, which are not fused into plates. The only clearly distinguishable feature is a pair of small thickened skeletal rings (*o.*), which may probably be interpreted as orbits, but are somewhat further apart than in *Cephalaspis*. The shagreen-like granules are seen within each supposed orbit; but this may be the result of accidental displacement or the crushing of the dorsal shield upon the ventral covering. When viewed in some lights other appearances suggest that more structure might be observable in a better preserved specimen; but a slightly fibrous longitudinal streak apparently beneath the outer granules, extending backwards from the left orbit-like ring, is the only other noteworthy feature.

The abdominal region is probably deepened by the distortion of its dorsal portion, while its dermal covering is nearly as obscure as that of the head. It seems, however, to have been armoured with small, narrow, and deep scales, arranged in straight rows, which incline slightly forwards and downwards instead of backwards and downwards, as is usually the arrangement in fishes. At the anterior end of the ventral border there are obscure traces of two or three slightly larger scales, which may have been placed on the median ventral ridge. The less complete side of the fossil (Pl. X. fig. 1 *a*) shows not only the peculiar squamation, but also certain rod-like remains near the dorsal border of the abdominal region, which are suggestive of calcified neural spines of an endoskeletal axis. The latter structures, however, are not quite clear.

There are no traces of paired fins or their supports.

The slender caudal region is well shown in direct side-view on both halves of the fossil, and terminates in a heterocercal tail. It is completely covered with scales like those of the abdominal region, similarly disposed in straight oblique series inclined forwards and downwards. The scales seem to be rather thick, scarcely if at all overlapping, invested with enamel and marked with a few antero-posteriorly-directed ridges and grooves. One from the middle of the flank is represented diagrammatically of ten times the natural size in fig. 1 *b*. The scales on the sides of the upper caudal lobe seem to be nearly quadrilateral, while its dorsal border is fringed with a single (possibly paired) series of very slender ridge-scales. There is a small remote dorsal fin (*d.*), low and triangular, apparently stiffened by scales like those of the

trunk, but smaller, arranged in rows to simulate fin-rays. The large caudal fin (*c.*), which is slightly excavated behind, is invested with small shagreen-like granules, but also seems to have been stiffened with some stout deeper rays, which are conspicuous through this covering (fig. 1 *a*). Within the lobe at the base of the caudal fin, especially on the side shown in fig. 1 *a*, there are also traces of hour-glass-shaped calcified hamal supports.

On the matrix of the fossil, both above and below the caudal region, there are slight brownish streaks continuing the lines of the squamation. These are doubtless merely mineral stains, produced by the circumstances of fossilization.

Judging by the results of Dr. Traquair's recent researches, to which reference has been made, the fossil now described represents a fish-shaped organism related to *Cephalaspis*, but distinguished from that and all known allied genera by the absence of a continuous head-shield. Dr. Traquair has already shown that the dermal plates both of the Pteraspidiæ and of the Cephalaspidiæ developed originally by the fusion of shagreen granules. The shield now described in the Canadian fossil is therefore of the most primitive nature, apparently only modified by the development of a solid rim round each orbit. For this reason the specimen is of great interest, because it shows that one of the earliest types of Ostracoderm armour survived until the latter part of the Devonian period. It has even further importance as being the first example of an Ostracoderm in which traces of the axial skeleton of the trunk have been detected.

No fragments of armour resembling that displayed by this fossil appear to have been hitherto described. The animal must thus be placed in a new genus, *Euphanerops*, defined by the presence of the stout orbital rims, the regular squamation of small deepened scales, the slenderness of the caudal ridge-scales, and the apparent absence of other well-developed ridge-scales. The species may be named *longævus* and characterized by the proportions of the caudal region and the nature of the scale-ornament. The family of Euphaneropidæ, of which this is the first known genus and species, must be referred either to the Osteostraci or to the Anaspida. It is distinguished from the Ateleaspidæ, Cephalaspidæ, and Tremataspidæ by the non-fusion of the tubercles forming the head-shield. It almost certainly differs from the Birkeniidiæ in the absence of a lateral row of perforations at the hinder end of the branchial chamber, though the actual branchial opening has not yet been seen.

EXPLANATION OF PLATE X. FIGS. 1, 1*a*, 1*b*.

Fig. 1. Euphanerops longævus, gen. et sp. n.; the more complete side of the fossil and its counterpart (1*a*), nat. size, with scale (1*b*) enlarged ten times. — Upper Devonian; Scaumenac Bay, Province of Quebec, Canada. [British Museum.]

c., caudal fin; *d.*, dorsal fin; *o.*, orbits.

LVI.—*On a new Species of Deltodus from the Lower Carboniferous (Yoredale Rocks) of Yorkshire.* By A. SMITH WOODWARD, LL.D., F.L.S.

[Plate X. figs. 2, 2*a*, 2*b*.]

THE dental plates of some of the Palæozoic Cochliodont sharks attain a considerable size, but those referable to the genus *Deltodus*, as defined in the British Museum Catalogue, have not hitherto been remarkable in this respect. A new specimen, presented to the British Museum by the Rev. Addison Crofton, M.A., is therefore of much interest as showing that at least one species of *Deltodus* rivalled the largest species of some allied genera in size. This fossil was discovered by the donor in a dark-coloured limestone of the Yoredale Series on Blackthorn Farm, between Long Preston and Slaiddburn, North Yorkshire. It is shown of three quarters the natural size from the oral and attached faces and from the hinder aspect in Pl. X. figs. 2, 2*a*, 2*b*.

This dental plate is much inrolled at the attenuated outer margin; it is thus of the form commonly assumed to belong to the lower jaw. If it be truly lower, it is the hinder dental plate of the left mandibular ramus. Its curvature is not directly at right angles to the long axis of the ramus, but very oblique, so that the antero-lateral margin (*a.*) is much longer than the postero-lateral margin (*p.*). Its outer inrolled portion is obscured by the matrix, but the inner margin (*i.*) is well preserved and seen to be gently sinuous. Its maximum transverse measurement at the inner margin is 0.06 m. The coronal surface is only gently convex and the small hinder wing of the plate is not sharply defined by any depression or flattening. The upper functional portion is crossed by eight or nine rounded and sinuous furrows, between each two of which the crown is slightly raised into a

blunt nearly median eminence. The lower and more newly formed portion of the dental plate is marked with less distinct transverse furrows, which gradually become more closely approximated near the inner margin. The greater part of the fossil is broken away from the matrix, thus exposing its inner face (fig. 2 *a*). This is roughened by small irregular ridges radiating from the attenuated outer end to the comparatively wide inner margin.

Compared with this new fossil all the European species of *Deltodus* hitherto known are very small and readily distinguished both by the shape of the dental plate and its superficial furrows. Nor do any forms of *Deltodus* from the Carboniferous of North America appear to resemble very closely the specimen now described*. Perhaps *Deltodus propinquus*, from the Coal Measures of Illinois, exhibits most similarity, though this is marked by slight cross-grooves cutting the transverse furrows, while its hinder wing is more distinctly defined. The dental plate from the Yoredale Rocks of North Yorkshire may therefore be regarded as the type of a new species, *Deltodus Croftoni*, named in honour of its discoverer.

EXPLANATION OF PLATE X. FIGS. 2, 2 *a*, 2 *b*.

Fig. 2. *Deltodus Croftoni*, sp. n.; hinder left lower dental plate, oral and attached (2 *a*) faces and postero-lateral margin (2 *b*), three-quarters nat. size.—Lower Carboniferous (Yoredale Rocks); Blackthorn Farm, Long Preston, N. Yorkshire. [British Museum, no. P. 8697.]

a., antero-lateral margin; *i*., inner margin; *p*., postero-lateral margin.

LVII.—*Rhynchotal Notes*.—IV. Heteroptera: Pentatominæ (*part.*). By W. L. DISTANT.

[Concluded from p. 397.]

Genus BRACHYCORIS.

Brachycoris insignis, sp. n.

Head and pronotum black, very coarsely punctate and rugulose; head with two small central spots near base and pronotum with three transverse spots near anterior area ochraceous. Scutellum ochraceous, sparingly but coarsely punctate

* For complete bibliography see Catal. Foss. Fishes Brit. Mus. pt. i. (1889) pp. 195-201.

on basal area, more thickly and brownly punctate on posterior area; a large spot in each basal area, a larger spot on each lateral margin before middle, and a smaller (often obscure) discal spot between them black. Corium ochraceous, broadly black at base, brownish towards apex. Connexivum, body beneath, and legs ochraceous; head and margins of pro- and mesosternum widely black, lateral margins of metasternum widely castaneous; stigmatal abdominal spots fuscous. Antennae brownish ochraceous, the two apical joints piceous. Rostrum brownish ochraceous, its apex piceous.

Anterior lateral angles of the pronotum moderately and subacutely produced; scutellum broad, concavely sinuate before middle, its apex about reaching apex of abdomen, strongly depressed posteriorly.

Long. 5 millim.; exp. pronot. angl. $3\frac{1}{2}$ –4 millim.

Hab. Ceylon (Atkinson Coll. : Brit. Mus.); Pegu (Atkinson Coll. : Brit. Mus.).

Genus PIEZODORUS.

Piezodorus rubrofasciatus.

Cimex rubrofasciatus, Fabr. Mant. Ins. ii. p. 293 (1787).

Rhaphigaster extenuatus, Walk. Cat. Het. ii. p. 371. n. 84 (1867).

Rhaphigaster pallescens, Walk. loc. cit. iii. p. 568 (1868).

Piezodorus punctiventris.

Rhaphigaster punctiventris, Dall. List Hem. i. p. 284. n. 31 (1851).

Antestia punctiventris, Walk. Cat. Het. ii. p. 280. n. 8 (1867).

Piezodorus? inexpertus.

Rhaphigaster inexpertus, Walk. Cat. Het. ii. p. 363. n. 56 (1867).

The type and only specimen of this species upon which Walker founded his description is in bad condition and unfit for exact determination.

Piezodorus incarnatus.

Cimex incarnatus, Germ. Faun. Ins. Eur. iv. p. 23.

Piezodorus incarnatus, Mulsant & Rey, Ann. Soc. Linn. de Lyon, 1867, p. 224.

Rhaphigaster paridis, Walk. Cat. Het. ii. p. 374. n. 95 (1867).

Genus THOREYELLA.

Thoreyella concolor.

Mormidea concolor, Walk. Cat. Het. ii. p. 256. n. 27 (1867).

Genus OCIRRHÖE.

Ocirrhöe unimaculata.

Rhynhocoris unimaculata, Westw. in Hope Cat. i. p. 29 (1837).

Cuspicona fasciata, Dall. List Hem. i. p. 297, pl. x. fig. 3 (1851).

Stål gave the *C. fasciata* of Dallas as a synonym of *Cuspicona jaksoniensis*, Guér., but I have compared it with Westwood's type, and am satisfied as to its identity.

Ocirrhöe inconspicua.

Cuspicona inconspicua, Dall. List Hem. i. p. 297. n. 6 (1851); Leth. & Sev. Cat. Gén. Hémi. t. i. p. 180 (1893).

Ocirrhöe inconspicua, Stål, Öfv. Vet.-Ak. Förh. 1867, p. 521.

Ocirrhöe privata.

Cuspicona privata, Walk. Cat. Het. ii. p. 382. n. 11 (1867).

Ocirrhöe lutescens, sp. n.

Rhaphigaster virescens, Dall. (nec Westw.) List Hem. i. p. 284. n. 30 (1851).

Ochraceous; eyes, fourth joint of antennæ (excluding base), abdomen above (excluding apex and broad lateral areas), and stigmatal spots to abdomen beneath black.

Head, pronotum, and scutellum very coarsely and thickly punctate. Corium thickly and more finely punctate. Antennæ brownish ochraceous, fourth joint black (excluding base), second and fourth joints subequal in length, third a little shorter, fifth joint mutilated.

Long. 9 millim.

Hab. Australia, King George's Sound (Brit. Mus.).

Genus PERIBÆA.

Peribæa fulvescens.

Cuspicona fulvescens, Dall. List Hem. i. p. 299 (1851).

Cuspicona longiceps, Walk. Cat. Het. ii. p. 388. n. 33 (1867).

Stål (En. Hem. v. p. 102, 1876) has placed the *C. longiceps*, Walk., as a synonym of *Peribæa pulchra*, Dall., a course in which he has been followed by Lethierry and Severin (Cat. Gén. Hémi. t. i. p. 180, 1893). This, however, is a mistake, and as a synonym of *C. fulvescens*, Dall., it forms part of a second species of the genus.

P. pulchra, Dall.—Third joint of the antennæ a little longer than the second.

P. fulvescens, Dall.—Second and third joints of the antennæ subequal in length.

Genus MORNIA.

Mornia aggressor.*Cimex aggressor*, Fabr. Syst. Ent. p. 706 (1775).*Hoffmuseggiella? aggressor*, Leth. & Sev. Cat. Gén. Hém. t. i. p. 181 (1893).

(Banksian Coll. : Brit. Mus.)

I possess a specimen from Rockhampton.

UTANA, gen. nov.

Head moderately long, rounded anteriorly, central lobe very slightly produced; eyes moderately large and globose. Antennæ with the second joint a little shorter than the third, fourth longest, fifth mutilated. Pronotum deflected in front from between the posterior angles, which are strongly and acutely produced, the lateral margins concavely sinuate, the anterior angles distinctly dentate. Scutellum subtriangular, deflected towards apical area, apex narrowed and rounded. Apical angles of sixth abdominal segment acute, but not prominently produced. Rostrum reaching the third abdominal segment, its third joint longest. Sternal keel not extending beyond the anterior coxæ, its posterior extremity notched and receiving the apex of the short ventral spine.

This genus differs from *Cuspicona*, to which it is allied, by the length of the third joint of the rostrum, and from *Pugione* by the much shorter rostrum.

Utana suprema.*Cuspicona suprema*, Walk. Cat. Het. ii. p. 380. n. 6 (1867).

Hab. Borneo.

Genus RHYNCHOCORIS.

Rhynchocoris plagiatus.*Cuspicona plagiata*, Walk. Cat. Het. ii. p. 379. n. 2 (1867).*Rhynchocoris taprobanensis*, Berg. Rev. d'Ent. t. x. p. 211 (1891).

Bergroth's description is much the more exact in all parts, save the colour of the abdomen above, which is not altogether "nigro-violaceum," but only the apical area from about apex of scutellum, and which Walker describes as "abdomen with a very large purple apical patch." I have a series from Ceylon and also a specimen collected on the Nilgiri Hills by Sir G. F. Hampson.

Long. 15-17 millim.; exp. pronot. angl. 11-14 millim.

Colour in fresh specimens "viridis," as described by Bergroth; most specimens received are discoloured and more or less "testaceous," as described by Walker.

Genus HOFFMANSEGGIELLA.

Hoffmanseggella defensor.

Cimex defensor, Fabr. Syst. Ent. p. 706 (1775).

Cuspicona vigens, Walk. Cat. Het. ii. p. 385. n. 16 (1867).

Walker's *C. vigens* is a freshly-coloured form of the species described by Fabricius. I possess a series received from near Port Moresby which exactly agree with the type of Fabricius contained in the Banksian collection.

Hoffmanseggella hamata.

Cuspicona hamata, Walk. Cat. Het. ii. p. 383. n. 14 (1867).

Cuspicona contraria, Walk. loc. cit. p. 384. n. 15.

Genus PEGALA.

Pegala metaphæa.

Cuspicona metaphæa, Walk. Cat. Het. ii. p. 381. n. 8 (1867).

Genus VITELLUS.

Vitellus proximus.

Cuspicona proxima, Walk. Cat. Het. iii. p. 570 (1868).

This species has nothing to do with that previously described under the same name by Walker (Cat. Het. ii. p. 382, 1867).

Vitellus forficuloides.

Cuspicona forficuloides, Walk. Cat. Het. ii. p. 379. n. 5 (1867).

Vitellus transversus.

Cuspicona transversa, Walk. Cat. Het. ii. p. 385. n. 17 (1867).

Vitellus strenuus.

Cuspicona strenua, Walk. Cat. Het. iii. p. 570 (1868).

Vitellus propinquus.

Cuspicona propinqua, Walk. Cat. Het. ii. p. 383. n. 13 (1867)

Genus PRIASSUS.

Priassus exemptus.

Prionaca exempta, Walk. Cat. Het. iii. p. 569 (1868).

Priassus carinatus, Horv. Termesz. Füzetek, xii. p. 32 (1889).

Genus AMYNTOR.

Amyntor, Stål, Gefv. Vet.-Ak. Förh. 1867, p. 519 (September).
Bolaca, Walk. Cat. Het. ii. p. 251 (1867) (October).

Amyntor unicolor.

Bolaca unicolor, Walk. Cat. Het. ii. p. 251. n. 1 (1867).
Gestopis terra, Dist. Ann. & Mag. Nat. Hist. (5) iii. p. 48 (1879).
Amyntor terra, Leth. & Sev. Cat. Gén. Héin. t. i. p. 183 (1893).

Genus COMPASTES.

Compastes obtusus.

Pentatoma obtusa, Walk. Cat. Het. iii. p. 560 (1868).
Compastes obtusus, Dist. Ann. & Mag. Nat. Hist. ser. 5, vol. viii. p. 28 (1881).
Homalogonia maculata, Jakowl. Bull. Mosc. 1876, p. 90; Horv. Rev. d'Ent. t. xvii. p. 278 (1898).
Compastes minor, Atkins. J. A. S. Beng. vol. lvii. p. 344 (1889).

Dr. Horvath has already pointed out the identity of *H. maculata*, Jak., with the *P. obtusa*, Walk., which I had previously referred to the genus *Compastes*. The type of *C. minor*, Atkins., is now in the British Museum, and proves to be synonymic with Walker's species.

Genus PRIONOCHILUS.

Prionochilus decempunctatus.

Tropicoris 10-punctatus, Motsch. Bull. Mosc. xxxii. 4, p. 501 (1859).
Lelia porrigens, Walk. Cat. Het. ii. p. 407. n. 1 (1867).

LEOVITIUS, gen. nov.

Head of moderate size, narrowed anteriorly, the lateral lobes scarcely passing the central, but not meeting in front, which is thus obscurely notched. Antennæ five-jointed; first joint not reaching apex of head, second much shorter than either third, fourth, or fifth joints, which are subequal in length. Rostrum reaching the posterior coxæ, second joint much longer than the third, first joint not quite so long as the head. Pronotum deflected anteriorly, the anterior margin strongly concavely emarginate behind the ocelli; a distinct tooth on each anterior angle; lateral margins concavely sinuate, posterior lateral angles prominently, broadly, and obtusely produced. Scutellum broad, the apex rounded. Abdomen extending a little beyond the corium on each side, with a strong basal spine which extends to the base of the head.

Other characters generally as in *Prionochilus*, to which

Leovitius is allied, and from which it may be separated by the lateral lobes of the head not meeting in front, the relative lengths of joints both to the antennae and rostrum, the length of the abdominal spine, &c.

Leovitius macranthus.

Rhaphigaster? *macranthus*, Dall. List Hem. i. p. 289. n. 46 (1851).

Hab. N. India.

Genus PRIONACA.

Prionaca tortuosa.

Prionaca tortuosa, Walk. Cat. Het. ii. p. 375. n. 2 (1867).

Prionaca tauricornis, Walk. loc. cit. n. 3.

Walker writes concerning the last:—"The spines of the thorax are longer than those of the preceding species." I cannot, however, appreciate any essential difference in this respect.

Genus ARADUCTA.

[Walker, Cat. Het. ii. p. 408 (1867).]

Subelongate, head and pronotum anteriorly deflected. Head broad, lobes of equal length, convexly rounded. Antennae with the basal joint thickened and not reaching apex of head, second and third joints subequal in length. Pronotum moderately gibbous at base, deflected towards head, lateral margins obliquely straight, posterior angles either rounded or angularly prominent. Scutellum broad at base, apical half narrowed, apex rounded. Abdomen narrowed towards apex, widest at about centre. Rostrum reaching the intermediate coxae, second joint a little longest. Mesosternum with a distinct keel, narrowed in front, not extending beyond anterior coxae. Metasternum with a central cruciform process not notched posteriorly. Second abdominal segment with a central short, broad, obtuse, spinous tubercle.

Walker erroneously describes a "ventral spine extending to the middle coxae." He has not distinguished between the metasternal process and the small tuberculous ventral spine.

I have placed this genus in the group represented by *Brachystethus*. It here comprises some diverse forms, but I have relied on the character of the sternal processes, and have thus regarded *Araducta* with the same latitude as is applied to the genus *Edessa*.

*Araducta glabrata.**Araducta glabrata*, Walk. Cat. Het. ii. p. 408. n. 1 (1867).*Hab.* Aru, New Guinea.*Araducta sordida.**Rhaphigaster sordida*, Kirby, Journ. Linn. Soc., Zool. xxiv. p. 86 (1892).*Hab.* Ceylon.

Mr. Kirby (*supra*) describes this species as allied to "*Rhaph. flavescens*, Walk., from an unknown locality." This is a slip of the pen for *R. fulvescens*, Dall., which I have placed in the genus *Plexippus*.

Araducta bella, sp. n.

Ochraceous, thickly and coarsely black punctured, the black punctures generally more prominent between the humeral angles of the pronotum, and most prominent on the scutellum, where they form a broad and very irregular longitudinal fascia. Corium with a distinct discal levigate spot a little before apex. Membrane brassy black, its apical margin pale fuscous. Body beneath and legs pale ochraceous; sternum and abdomen broadly laterally punctured with black, these punctures forming a submarginal fascia, preceded by a distinct segmental row of spots, and outwardly margined by small spots at the apices of the incisures, a central spot on the apical segment, and sometimes some spots on basal segments—all these black markings are variable in intensity in different specimens. Legs punctured with black, particularly the femora. Antennæ pale ochraceous.

Long. 8-10 millim. ; exp. pronot. angl. 5-6 millim.

Hab. Ceylon (Atkinson Coll.: Brit. Mus.).

Allied to *A. sordida*, Kirby, from which it differs by a narrower and more elongate form; the presence of the levigate spot to the corium; longer and differently marked scutellum, with its basal angles containing an outwardly transverse foveate black impression; second joint of antennæ much shorter, only about half the length of third.

*Araducta repellens.**Rhaphigaster repellens*, Kirby, Journ. Linn. Soc., Zool. xxiv. p. 86, pl. iv. fig. 9 (1892).

The produced lateral angles of the pronotum represent another section of the genus.

Araducta malayana, sp. n.

Ochraceous, thickly and darkly punctate, the punctures darkest on the head and on centre of anterior margin of pronotum; a central discal spot to pronotum, a central elongate spot at base of scutellum, lineate fasciæ to corium on basal half and whole length of marginal area, and a marginal streak to clavus pale stramineous levigate. Membrane pale ochraceous. Body beneath ochraceous; sternum, trochanters, and femora with large brown punctures; abdomen thickly and finely punctate, the central disk levigate. Antennæ ochraceous, second and third joints subequal in length.

Long. 11 millim.; exp. pronot. angl. 6 millim.

Hab. Pulo Penang (Brit. Mus.).

Size and form of *A. repellens*, Kirby, but with the pronotum punctate, but not rugulose; levigate markings and colour also distinct.

I possess a specimen collected in Perak by Mr. Doherty in which the levigate markings are much less pronounced.

Genus BRACHYSTETHUS.

Brachystethus fulvicornis.

Rhaphigaster fulvicornis, Walk. Cat. Het. ii. p. 361. n. 38 (1867).

Brachystethus biguttatus, Walk. loc. cit. iii. p. 455 (1868).

Brachystethus parvus, Dist. Biol. Centr.-Am., Rhynch. vol. i., Suppl. p. 342, pl. xxxi. f. 23 (1889).

Brachystethus discolor.

Ochlerus discolor, Walk. Cat. Het. i. p. 194. n. 15 (1867).

Brachystethus marginifer, Walk. loc. cit. iii. p. 456. n. 10 (1868).

Genus EDESSA.

Edessa helix.

Edessa helix, Erichson, in Schomb. Reis. iii. p. 610 (1848).

Edessa costalis, Stål, Enum. Hemipt. ii. p. 50 (1872); Dist. Biol. Centr.-Am., Rhynch. vol. i. p. 87, pl. viii. f. 10 (1880).

I have placed these species as synonyms on the authority of a specimen received for the 'Biologia' collection from Dr. Bergroth, identified by him as the *Edessa helix*, Erichs., and localized as from Costa Rica.

Edessa obscura.

Edessa obscura, Dallas, List Hem. i. p. 325. n. 13 (1851).

Edessa humeralis, Walk. Cat. Het. iii. p. 441 (1868).

Edessa binaculata, Walk. loc. cit. p. 442.

Closely allied to *E. jugata*, Westw.

*Edessa suturata.**Edessa suturata*, Dallas, List Hem. i. p. 324. n. 11 (1851).*Edessa inclyta*, Walk. Cat. Het. iii. p. 445. n. 118 (1868).*Edessa inconspicua.**Edessa inconspicua*, Dallas, List Hem. i. p. 327. n. 18 (1851).*Edessa megaspila*, Walk. Cat. Het. iii. p. 435. n. 98 (1868).*Edessa aciculata*, Walk. *loc. cit.* n. 99.*Edessa graminosa.**Edessa graminosa*, Walk. Cat. Het. iii. p. 437. n. 103 (1868).*Edessa melanocera*, Walk. *loc. cit.* p. 444. n. 115.*Edessa cornuta.**Edessa cornuta*, Burm. Handb. ii. 1, p. 356. n. 10 (1835); Dist. Biol. Cent.-Am., Rhynch. vol. i. p. 97. n. 40, pl. ix. fig. 22 (1881).*Edessa albirenis*, Dall. (nec Herr.-Schäff.) List Hem. i. p. 336. n. 8 (1851).*Edessa bifida*, Uhler (nec Say), Proc. Zool. Soc. 1894, p. 176. n. 1.

The true *E. bifida*, Say, = *E. albirennis*, H.-Schäff., is, so far as I am aware, confined to the United States of America or to the Nearctic Region. It differs from *E. cornuta*, judging from typical specimens forwarded from that region, by the broader apex of the scutellum. Mr. Uhler (*supra*) states that *E. bifida*, Say, and *E. cornuta*, Burm., are synonymic; but this seems to be erroneous, and as he returned specimens of *E. cornuta* to the British Museum under both names, he probably did not have true specimens of Say's species before him when he wrote. The two species are certainly closely allied.

*Edessa meditabunda.**Cimex meditabundus*, Fabr. Ent. Syst. iv. p. 113. n. 129 (1794).*Edessa consentanea*, Walk. Cat. Het. iii. p. 450. n. 129 (1868).*Edessa rugulosa*, Uhler, Proc. Zool. Soc. 1894, p. 177.*Edessa carnososa.**Edessa carnososa*, Westw. in Hope Cat. i. p. 29 (1837).*Edessa senilis*, Walk. Cat. Het. iii. p. 459. n. 128 (1868).*Strachia afflicta*, Walk. Cat. Het. ii. p. 332. n. 67 (1867).

I am doubtful as to the generic position of this species. It seems to belong to *Hypparete* or some allied genus; but as I have not been able to examine a representative of Stål's genus and Walker's type is the only specimen of his species,

and one not in the best condition, I must leave its position in abeyance.

In his description Walker has omitted to record two small ochraceous spots at apex of scutellum.

Summarized Disposition of Walker's Genera and Species.*

Pentatominae.

Genera considered valid.

Asyla, Walk. Cat. Het. ii. p. 403 (1867).

Boea, Walk. loc. cit. p. 405.

Araducta, Walk. loc. cit. p. 408.

Genera treated as synonymic.

Bolaca, Walk. Cat. Het. ii. p. 251 (1867), = Gen. *Amyntor*, Stål.

Canoca, Walk. loc. cit. p. 404,

= Gen. *Taurocerus*, Amy. &

Sala, Walk. loc. cit. p. 404,

= Gen. *Afrania*, Stål. [Serv.

Lelia, Walk. loc. cit. p. 406,

= Gen. *Prionochilus*, Dall.

Balsa, Walk. loc. cit. p. 410,

= Gen. *Brachymna*, Stål.

Species considered valid and described under correct Genera.

Euschistus lineatus, Walk. Cat. Het. ii. p. 245. n. 14 (1867).

— *acuminatus*, Walk. loc. cit. p. 246. n. 17.

— *reductus*, Walk. loc. cit.

— *comptus*, Walk. loc. cit. iii. p. 550 (1868).

Mormidea tetra, Walk. loc. cit. p. 551.

— *pulchella*, Walk. loc. cit. p. 552.

Alcimus lineosus, Walk. loc. cit. ii. p. 267. n. 2 (1867).

Eysarcoris convectus, Walk. loc. cit. p. 277. n. 25.

— *decisus*, Walk. loc. cit. n. 26.

— *conterminus*, Walk. loc. cit. p. 278. n. 27.

— *medius*, Walk. loc. cit. n. 28.

— *contentus*, Walk. loc. cit. p. 279. n. 29.

Antestia quadrimaculata, Walk. loc. cit. p. 282. n. 20.

Prionaca tortuosa, Walk. loc. cit. p. 375. n. 2.

Cuspicona ampla, Walk. loc. cit. p. 381. n. 9.

— *proxima*, Walk. loc. cit. p. 382. n. 10.

— *lateralis*, Walk. loc. cit. p. 383. n. 12.

— *simplex*, Walk. loc. cit. p. 388. n. 34.

— *strenuella*, Walk. loc. cit. iii. p. 572 (1868).

Asyla indicatrix, Walk. loc. cit. ii. p. 403 (1867).

Boea purpurascens, Walk. loc. cit. p. 405. n. 1.

— *postica*, Walk. loc. cit. p. 406. n. 2.

— *auriflua*, Walk. loc. cit. n. 3.

Araducta glabrata, Walk. loc. cit. p. 408. n. 1.

All the species of *Edessa* which Walker has described stand, excepting those enumerated below as synonyms. *Aceratodes* is now universally included in the genus *Edessa*.

* This summary refers to the species of Pentatominae in the second and third volumes of Walker's 'Catalogue of Hemiptera Heteroptera.'

Species considered valid, but requiring generic revision.

- Lova nigridens*, Walk. Cat. Het. ii. p. 241. n. 3 (1867), belongs to gen. *Fecelia*.
- Diceræus mutabilis*, Walk. loc. cit. p. 250. n. 4, belongs to gen. *Dichelops*.
 — *pulchricornis*, Walk. loc. cit. n. 5, " "
 — *divisus*, Walk. loc. cit. n. 6, " "
- Bolaca unicolor*, Walk. loc. cit. p. 251. n. 1, " *Amyntor*.
Mormidea brevis, Walk. loc. cit. p. 256. n. 26, " *Euschistus*.
 — *concolor*, Walk. loc. cit. n. 27, " *Thoreyella*.
 — *basalis*, Walk. loc. cit. p. 257. n. 28, " *Euschistus*.
 — *inficita*, Walk. loc. cit. p. 260. n. 50, " *Aspavia*.
 — *socia*, Walk. loc. cit. p. 262. n. 60, " *Carbula*.
 — *lateralis*, Walk. loc. cit. p. 263. n. 61, " "
 — *florens*, Walk. loc. cit. n. 62, " *Hyllus*.
 — *contigua*, Walk. loc. cit. p. 264. n. 63, " *Carbula*.
 — *detersa*, Walk. loc. cit. iii. p. 554 (1868), " *Dictyotus*.
 — *ventralis*, Walk. loc. cit. p. 555, " "
- Hoplistodera insurgens*, Walk. loc. cit. ii. p. 265. n. 5 (1867), belongs to gen. *Eysarcoris*?
 — *anescens*, Walk. loc. cit. p. 266. n. 6, belongs to gen. *Eysarcoris*?
 — *subarmata*, Walk. loc. cit. n. 7, " *Eysarcoris*.
 — *subacta*, Walk. loc. cit. p. 267. n. 8, " *Astyanax*.
Æschrus testudinarius, Walk. loc. cit. p. 268. n. 2, " *Æschrocoris*.
Eysarcoris punctifer, Walk. loc. cit. p. 274. n. 13, " *Mormidea*.
 — *insocius*, Walk. loc. cit. iii. p. 556 (1868), " *Carbula*.
 — *truncatellus*, Walk. loc. cit. p. 558, " *Dictyotus*.
- Antestia leucophæa*, Walk. loc. cit. ii. p. 281. n. 19 (1867), belongs to gen. *Menida*.
 — *annulifera*, Walk. loc. cit. iii. p. 558 (1868), belongs to gen. *Menida*.
 — *megaspila*, Walk. loc. cit. p. 559, " *Menida*?
- Hymenarcys viridicuta*, Walk. loc. cit. ii. p. 283. n. 3 (1867), belongs to gen. *Pentatoma*.
- Pentatoma varicornis*, Walk. loc. cit. p. 291. n. 52, belongs to gen. *Cutaulax*.
 — *placida*, Walk. loc. cit. p. 297. n. 93, belongs to gen. *Tropicorypha*.
 — *heterocera*, Walk. loc. cit. p. 297. n. 94, " *Holcostethus*.
 — *degenera*, Walk. loc. cit. p. 304. n. 132, " *Antestia*.
 — *discolor*, Walk. loc. cit. p. 305. n. 134, " *Plautia*.
 — *protata*, Walk. loc. cit. p. 306. n. 135, " "
 — *marginalis*, Walk. loc. cit. n. 136, " *Eurynome*.
 — *subpunctata*, Walk. loc. cit. p. 307. n. 138, " *Zangis*.
 — *vilis*, Walk. loc. cit. p. 309. n. 147, " *Dictyotus*.
 — *colligata*, Walk. loc. cit. p. 310. n. 149, " *Tholosanus*?
 — *æqualis*, Walk. loc. cit. n. 150, " *Dictyotus*.
 — *obtusa*, Walk. loc. cit. iii. p. 560 (1868), " *Compastes*.
Strachia placens, Walk. loc. cit. ii. p. 316. n. 21 (1867), " *Arocera*.
 — *nigropicta*, Walk. loc. cit. p. 318. n. 34, " "
 — *euopta*, Walk. loc. cit. p. 320. n. 36, " *Ruubia*.
 — *alligata*, Walk. loc. cit. n. 37, " "
 — *gravis*, Walk. loc. cit. p. 322. n. 39, " *Nezara*.
 — *apta*, Walk. loc. cit. p. 323. n. 41, " *Arocera*.
 — *liturifera*, Walk. loc. cit. p. 326. n. 58, " *Eurydema*.
 — *afflicta*, Walk. loc. cit. p. 332. n. 67, apparently near gen. *Hyparete*.
 — *securigera*, Walk. loc. cit. p. 334. n. 73, belongs to gen. *Antestia*.
 — *partita*, Walk. loc. cit. n. 74, " "
 — *polyspila*, Walk. loc. cit. p. 336. n. 77, " "

- Strachia insignata*, Walk. *loc. cit.* p. 343. n. 88, belongs to gen. *Stenozygum*.
 — *calliphoroides*, Walk. *loc. cit.* p. 345. n. 91, " *Compsoprepes*.
 — *callideoides*, Walk. *loc. cit.* n. 92, " "
 — *gemmea*, Walk. *loc. cit.* p. 346. n. 93, " *Stenozygum*.
 — *persignata*, Walk. *loc. cit.* p. 347. n. 96, " "
 — *lætabilis*, Walk. *loc. cit.* iii. p. 563 (1868), " "
Bathycaelia chlorospila, Walk. *loc. cit.* ii. p. 350. n. 6 (1867), belongs to gen. *Jurtina*.
Rhaphigaster imbutus, Walk. *loc. cit.* p. 358. n. 16, belongs to gen. *Banasa*.
 — *inopinatus*, Walk. *loc. cit.* n. 18, " "
 — *fulvicornis*, Walk. *loc. cit.* p. 361. n. 38, belongs to gen. "*Brachystethus*".
 — *rubriplaga*, Walk. *loc. cit.* p. 365. n. 64, " *Menida*.
 — *bisignatus*, Walk. *loc. cit.* p. 366. n. 65, " "
 — *continuus*, Walk. *loc. cit.* p. 368. n. 76, " "
 — *biplaga*, Walk. *loc. cit.* p. 373. n. 94, " *Brachynema*.
 — *impar*, Walk. *loc. cit.* p. 374. n. 96, " *Zangis*.
 — *indecorus*, Walk. *loc. cit.* iii. p. 568 (1868), " *Menida*.
 — *discoidalis*, Walk. *loc. cit.*, " "
Prionaca exempta, Walk. *loc. cit.* p. 569, " *Priassus*.
Cuspicona plagiata, Walk. *loc. cit.* ii. p. 379. n. 2 (1867), belongs to gen. *Rhynchocoris*.
 — *forficuloides*, Walk. *loc. cit.* n. 5, belongs to gen. *Vitellus*.
 — *suprema*, Walk. *loc. cit.* p. 380. n. 6, belongs to gen. *Utana*, nov.
 — *metaphœa*, Walk. *loc. cit.* p. 381. n. 8, " *Pegala*.
 — *privata*, Walk. *loc. cit.* p. 382. n. 11, " *Ocyrrhoë*.
 — *propinqua*, Walk. *loc. cit.* p. 383. n. 13, " *Vitellus*.
 — *hamata*, Walk. *loc. cit.* n. 14, " *Hoffmanseggjella*.
 — *transversa*, Walk. *loc. cit.* p. 385. n. 17, " *Vitellus*.
 — *leucospila*, Walk. *loc. cit.* p. 387. n. 32, " *Morna*.
 — *florens*, Walk. *loc. cit.* p. 389. n. 36, " "
 — *strenua*, Walk. *loc. cit.* iii. p. 570 (1868), " *Vitellus*.
 — *proxima*, Walk. *loc. cit.*, " "
Canaca abrupta, Walk. *loc. cit.* ii. p. 404. n. 1 (1867), belongs to gen. *Taurocerus*.
Sala exigua, Walk. *loc. cit.* iii. p. 575 (1868), belongs to gen. *Afrania*.

Species treated as synonymic.

- Lora invaria*, Walk. Cat. Het. ii. p. 242. n. 7 (1867), = *Lora affinis*, Dall.
 — *deducta*, Walk. *loc. cit.* n. 8, = *Lora flavicollis*, Dru.
Euschistus fasciatus, Walk. *loc. cit.* p. 245. n. 12, = *Thyanta perditor*, Fabr.
 — *conterminus*, Walk. *loc. cit.* p. 248. n. 38, = *Euschistus crenator*, Fabr.
 — *adjunctor*, Walk. *loc. cit.* p. 249. n. 39, = *Thyanta perditor*, Fabr.
Mormidea compta, Walk. *loc. cit.* p. 255. n. 24, = *Mormidea croceipes*, Herr.-Sch.
 — ? *ventralis*, Walk. *loc. cit.* p. 260. n. 51, = *Aspavia hustator*, Fabr.
 — ? *unsignata*, Walk. *loc. cit.* p. 261. n. 53, = *Ilerda punctata*, Pal. Beauv.
 — *ductor*, Walk. *loc. cit.* p. 264. n. 64, = *Subæus spinosus*, Dall.
 — *melanocantha*, Walk. *loc. cit.* iii. p. 552 (1868), = *Euschistus crenator*, Fabr.
 — *basalis*, Walk. *loc. cit.* p. 553, = *Tibraca limbiventris*, Stål.
Pentatoma marginalis, Walk. *loc. cit.* ii. p. 288. n. 34 (1867), = *Pentatoma ligata*, Say.
 — *diffusa*, Walk. *loc. cit.* p. 290. n. 49, = *Pallantia macula*, Dall.
 — *subrufescens*, Walk. *loc. cit.* n. 50, = *Banasa varians*, Stål.

- Pentatoma basalis*, Walk. loc. cit. p. 291. n. 51, = *Banasa varians*, Stål.
 — *aspersa*, Walk. loc. cit. p. 292. n. 53, = *Nezara stictica*, Dall.
 — *mentiens*, Walk. loc. cit. p. 296. n. 92, = *Nezara chloris*, Westw.
 — *confinis*, Walk. loc. cit. p. 298. n. 95, = *Holcostethus apicalis*, Herr.-Sch.
 — *lateralis*, Walk. loc. cit. p. 301. n. 118, = *Niphe subferruginea*, Westw.
 — *inconcisa*, Walk. loc. cit. n. 119, = *Dolycoris baccarum*, Linn.
 — *trispila*, Walk. loc. cit. p. 302. n. 120, = *Tolummia latipes*, Dall.
 — *contingens*, Walk. loc. cit. n. 121, = *Tolummia latipes*, Dall., var.
 — *vicaria*, Walk. loc. cit. p. 303. n. 122, = *Nezara viridula*, Linn.
 — *inobrussa*, Walk. loc. cit. p. 305. n. 133, = *Tolummia basalis*, Dall., var.
 — *circumdata*, Walk. loc. cit. p. 307. n. 137, = *Eurynome inconspicua*, Montr.
 — *laticeps*, Walk. loc. cit. p. 308. n. 146, = *Tholosanus proximus*, Dall.
 — *tibialis*, Walk. loc. cit. p. 309. n. 148, = *Dictyotus vilis*, Walk.
 — *truncatula*, Walk. loc. cit. p. 311. n. 151, = *Dictyotus similis*, Dall.
 — *brevittata*, Walk. loc. cit. p. 312. n. 155, = *Adria parvula*, Dall.
 — *immunis*, Walk. loc. cit. iii. p. 560 (1868), = *Tropicorypha placida*, Walk.
Strachia eucosma, Walk. loc. cit. ii. p. 319. n. 35 (1867), = *Rumbia perspicua*, Fabr.
 — *notabilis*, Walk. loc. cit. p. 321. n. 38, = *Paryphia pulchella*, Dru.
 — *olivacea*, Walk. loc. cit. p. 322. n. 40, = *Nezara marginalis*, Herr.-Sch.
 — *pentatomoides*, Walk. loc. cit. p. 325. n. 51, = *Antestia variegata*, Thunb., var.
 — *anescens*, Walk. loc. cit. n. 52, = *Ismegistus fimbriatus*, Thunb.
 — *designata*, Walk. loc. cit. p. 327. n. 59, = *Eurydema pulchra*, Westw.
 — *signata*, Walk. loc. cit. p. 328. n. 60, = *Eurydema rugosa*, Motsch.
 — *marginifera*, Walk. loc. cit. n. 61, =
 — *velata*, Walk. loc. cit. p. 329. n. 62, = *Antestia cruciata*, Fabr.
 — *subacta*, Walk. loc. cit. n. 63, =
 — *pardalis*, Walk. loc. cit. p. 330. n. 64, = *Antestia anchora*, Thunb.
 — *heterospila*, Walk. loc. cit. p. 331. n. 65, = *Antestia pulchra*, Dall.
 — *inornata*, Walk. loc. cit. n. 66, = *Stenozygum speciosum*, Dall.
 — *tetragona*, Walk. loc. cit. p. 332. n. 71, = *Agonoscelis rutila*, Fabr.
 — *aspersa*, Walk. loc. cit. p. 333. n. 72, = *Agonoscelis rutila*, Fabr., var.
 — *subcostalis*, Walk. loc. cit. p. 335. n. 75, = *Antestia partita*, Walk.
 — *semiviridis*, Walk. loc. cit. p. 336. n. 76, =
 — *platyspila*, Walk. loc. cit. p. 337. n. 78, = *Antestia anchora*, Thunb.
 — *pentaspila*, Walk. loc. cit. n. 79, = *Antestia Chambereti*, Le Guil.
 — *marginalis*, Walk. loc. cit. p. 343. n. 89, = *Stenozygum insignata*, Walk.
 — *strangulata*, Walk. loc. cit. p. 344. n. 90, = *Strachia crucifera*, Hahn, var.
 — *lepidu*, Walk. loc. cit. p. 347. n. 94, = *Stenozygum gemmea*, Walk.
 — *minuscula*, Walk. loc. cit. p. 348. n. 98, = *Eurydema dominula*, Scop.
Catantia centralis, Walk. loc. cit. iii. p. 556 (1868), = *Dinocoris tripterus*, Fabr.
Vulsirea transducta, Walk. loc. cit. ii. p. 352. n. 3 (1867), = *Pharypia nitidiventris*, Stål.
 — *laticentris*, Walk. loc. cit. p. 353. n. 4, = *Vulsirea violacea*, Fabr., var.
 — *superba*, Walk. loc. cit. p. 354. n. 9, = *Vulsirea violacea*, Fabr.
Rhaphigaster derivatus, Walk. loc. cit. p. 361. n. 37, = *Banasa varians*, Stål.
 — *rufoviridis*, Walk. loc. cit. p. 364. n. 57, = *Plautia fimbriata*, Fabr.
 — *strachioides*, Walk. loc. cit. p. 365. n. 63, = *Menida histrio*, Fabr.
 — *nigrifascia*, Walk. loc. cit. p. 367. n. 75, = *Hyrmine sexpunctata*, Linn., var.

- Rhaphigaster interruptus*, Walk. loc. cit. p. 369. n. 77, = *Menida continuus*, Walk., var.
 — *extenuatus*, Walk. loc. cit. p. 371. n. 84, = *Piezodorus rubrofasciatus*, Fabr.
 — *parilis*, Walk. loc. cit. p. 374. n. 95, = *Piezodorus incarnatus*, Germ.
 — *pallescens*, Walk. loc. cit. iii. p. 568 (1868), = *Piezodorus rubrofasciatus*, Fabr.
Prionaca tauricornis, Walk. loc. cit. ii. p. 375. n. 3, = *Prionaca tortuosa*, Walk.
Cuspicona smaragdina, Walk. loc. cit. p. 380. n. 7, = *Sabæus humeralis*, Walk.
 — *contraria*, Walk. loc. cit. p. 384. n. 15, = *Hoffmanseggiiella hamata*, Walk.
 — *vigens*, Walk. loc. cit. p. 385. n. 16, = *Hoffmanseggiiella defensor*, Fabr.
 — *longiceps*, Walk. loc. cit. p. 388. n. 33, = *Peribœa fulvescens*, Dall.
 — *xanthochlora*, Walk. loc. cit. p. 389. n. 35, = *Cuspicona thoracica*, Westw.
Taurocerus divergens, Walk. loc. cit. p. 392. n. 4, = *Taurocerus achilles*, Stål.
Sala colorata, Walk. loc. cit. p. 405. n. 1, = *Afrania Wahlbergi*, Stål.
Lelia porrigens, Walk. loc. cit. p. 407. n. 1, = *Prionochilus decempunctatus*, Motsch.
Balsa extenuata, Walk. loc. cit. p. 410. n. 1, = *Brachymna tenuis*, Stål.
Edessa lineosa, Walk. loc. cit. iii. p. 422. n. 21 (1868), = *Edessa reticulata*, Dall.
 — *euchroma*, Walk. loc. cit. n. 22, = *Edessa olivacea*, Stål.
 — *megaspila*, Walk. loc. cit. p. 435. n. 98, = *Edessa inconspicua*, Dall.
 — *aciculata*, Walk. loc. cit. n. 99, =
 — *humeralis*, Walk. loc. cit. p. 441. n. 110, = *Edessa "obscura"*, Dall.
 — *bimaculata*, Walk. loc. cit. p. 442. n. 111, =
 — *melanocera*, Walk. loc. cit. p. 444. n. 115, = *Edessa "graminosa"*, Walk.
 — *inlyta*, Walk. loc. cit. p. 445. n. 118, = *Edessa saturata*, Dall.
 — *senilis*, Walk. loc. cit. p. 450. n. 128, = *Edessa carnosa*, Westw.
 — *consentanea*, Walk. loc. cit. n. 129, = *Edessa meditataunda*, Fabr.
Brachystethus biguttatus, Walk. loc. cit. p. 455. n. 8, = *Brachystethus fulvicornis*, Walk.
 — *marginifer*, Walk. loc. cit. p. 456. n. 9, = *Brachystethus discolor*, Walk.

To be treated as non-existent.

Species the types of which are not now to be found in the British Museum.

Mormidea? *pedestris*, Walk. Cat. Het. ii. p. 261. n. 52 (1867).

Eysarcoris rugulosus, Walk. loc. cit. p. 276. n. 21.

— *megaspilus*, Walk. loc. cit. p. 276. n. 20.

Strachia erythromela, Walk. loc. cit. p. 339. n. 81.

— *præcipua*, Walk. loc. cit. n. 82.

— *pyrophila*, Walk. loc. cit. p. 340. n. 83.

— *postica*, Walk. loc. cit. iii. p. 562 (1868).

Cataulax subvittatus, Walk. loc. cit. p. 565.

Rhaphigaster patulus, Walk. loc. cit. ii. p. 366. n. 66 (1867).

Arvelius mormideoides, Walk. loc. cit. iii. p. 573 (1868).

Types mutilated.

- Eysarcoris alienus*, Walk. Cat. Het. ii. p. 275. n. 15 (1867). As far as condition allows examination, this species apparently belongs to the genus *Brachystethus*.
Strachia angularis, Walk. loc. cit. p. 315. n. 14.
Rhaphigaster inexpertus, Walk. loc. cit. p. 363. n. 56. Probably a species of *Piezodorus*.

Species the types of which are supposed to be in Australia.

- Diceræus piceus*, Walk. Cat. Het. iii. p. 550 (1868). National Museum, Melbourne.
Mormidea nigriceps, Walk. loc. cit. p. 554. National Museum, Melbourne.
Eysarcoris latus, Walk. loc. cit. p. 557. " " "
 — *pustulatus*, Walk. loc. cit. " " "
Pentatoma latifrons, Walk. loc. cit. p. 561. " " "
Strachia humeralis, Walk. loc. cit. p. 563. " " "
Catantax punctipes, Walk. loc. cit. p. 565. " " "
Rhaphigaster viridipes, Walk. loc. cit. ii. p. 371. n. 82. National Museum, Melbourne.
 — *venustus*, Walk. loc. cit. p. 372. n. 85. National Museum, Melbourne.
 — *obliquus*, Walk. loc. cit. n. 86. National Museum, Melbourne.
 — *quinquemaculatus*, Walk. loc. cit. iii. p. 567 (1868). National Museum, Melbourne.
Cuspicona auricornis, Walk. loc. cit. ii. p. 387. n. 31 (1867). National Museum, Melbourne.
 — *rufolinea*, Walk. loc. cit. p. 390. n. 37. National Museum, Melbourne.
 — *uninotata*, Walk. loc. cit. iii. p. 571 (1868). National Museum, Melbourne.
 — *intacta*, Walk. loc. cit. National Museum, Melbourne.

Incorrectly included in the Pentatominae.

- Mormidea decora*, Walk. Cat. Het. ii. p. 256. n. 25 (1867), is a species of Asopinae.
 — *semialba*, Walk. loc. cit. iii. p. 553 (1868), is a species of Asopinae.
 — *erythrospila*, Walk. loc. cit. p. 555, is a species of Acanthosominae.
Strachia triangularis, Walk. loc. cit. ii. p. 323. n. 42 (1867), is a species of Asopinae.
 — *frontalis*, Walk. loc. cit. p. 338. n. 80, is a species of Asopinae.
 — *reciproca*, Walk. loc. cit. p. 340. n. 84, " "
 — *megaspila*, Walk. loc. cit. p. 341. n. 85, " "
 — *hamata*, Walk. loc. cit. p. 342. n. 86, " "
 — *saturata*, Walk. loc. cit. n. 87, " "
Ealda minax, Walk. loc. cit. p. 409. n. 1, " "
Rhaphigaster aggressor, Walk. loc. cit. p. 359. n. 19, " "
 — *pentatomoides*, Walk. loc. cit. p. 370. n. 81, " "
 — *perfectus*, Walk. loc. cit. p. 371. n. 83, " "
 — *perornatus*, Walk. loc. cit. iii. p. 567 (1868), " "
Cuspicona firmata, Walk. loc. cit. p. 569, is a species of Acanthosominae.

LVIII.—*On the Variation of the Weasel* (*Putorius nivalis*, Linn.). By Dr. EINAR LÖNNBERG.

IN the 'Annals' for January last, Mr. G. E. H. Barrett-Hamilton communicated an interesting "Note on the Weasel, *Putorius (Ictis) nivalis*, Linn., and some of its Subspecies," in which he seems inclined to subdivide the species in question into a number of "subspecies." I do not dispute the fact that some of these may be found to be valid and distinct enough to deserve subspecific rank, but I believe this can hardly be the case with all of them. Of course, the idea as to the meaning of a subspecies varies somewhat with different authors. I suppose, however, that even in a subspecies the distinguishing characteristics (although they are of less importance than specific ones) must be constant to a certain degree and inherited from one generation to another; in the opposite case it is only an individual variety. Such independent individual varieties must not be called subspecies, in my opinion, even if they are numerous and dominate in some region. In his introduction Mr. Barrett-Hamilton says: "In the far north, as is well known, the weasel regularly turns white in winter, and this character is in itself sufficient to warrant the subspecific separation of those individuals whose winter coat is white from those which, as in England, do not undergo such a seasonal change of colour." I am not inclined to accept this statement under present circumstances for reasons given below.

Mr. Barrett-Hamilton recognizes as the first "subspecies" "*Putorius nivalis typicus*, Linnæus: type locality, Upsala, Sweden"; and the second is "*Putorius nivalis vulgaris*, Erxleben: type locality, Leipzig." The difference between these subspecies appears to be that the former turns white in winter, the latter does not. If any sharp geographical boundary-lines could be drawn between these forms, the probability for their separation would increase. Such, however, is not the case. In the northern and middle parts of Sweden the weasel regularly turns white in winter. In Scania, the most southern province, on the other hand, all weasels are brown during the winter. This has already been pointed out by Sven Nilsson in his various memoirs on Swedish mammals, but he says he does not know the northern limit of those weasels which are brown in winter. Later authors, as, for instance, Lilljeborg, do not add anything to our knowledge on this subject. According to the literature,

the Scanian weasels should, then, belong to the subspecies "*Putorius nivalis vulgaris*," but the weasels inhabiting other parts of Sweden should be termed "*P. n. typicus*."

The subject, however, is not so simple. I have before me now a male specimen killed on the 10th of January this year in the neighbourhood of Jönköping in the province of Småland. This is brown above and white beneath. The line of demarcation between the colours is well defined, but wavy. The white colour extends over the upper lips nearly to the ears, but behind the angle of the mouth is a brown spot in the white. The inner side of the legs is white, the outer side brown. The hind feet have only a few white hairs at the tip of the toes, but the fore feet have white toes. The white colour of the belly does not reach the anus. On the flanks some brown-coloured spots are nearly detached and surrounded by white. Length of head and body 210 mm., of tail 55, of hind foot (without claws) 30 mm. I think this specimen should be regarded as an example of "*Putorius nivalis vulgaris*." I remember also very distinctly that some years ago I saw a weasel in brown winter-coat killed still further north, at a place called Vallsnäs, not far from the town of Linköping, in the province of Östergötland. In reply to a question on this subject, Dr. A. Stuxberg informs me that the Museum of Gothenburg possesses not less than three specimens of weasel with brown winter-coat, namely: (1) a specimen from Mölnlycke, a little south of Gothenburg, killed 15th Jan., 1899; (2) a specimen from Hemsjö in Vestergötland, near the town of Alingsås, killed 5th Feb., 1899; and (3) a specimen from the neighbourhood of Gothenburg, killed 16th March, 1897. From all these statements the conclusion can be drawn that the "*vulgaris*" form occurs together with the "*typicus*" form in the provinces of Öster- and Vestergötland and Småland, so far as the colour of the winter-coat is concerned. This becomes more interesting because it forms a parallel to the occurrence of the "bluish-grey" ("*canescens*," Nilsson) and the white variety of the northern hare. In Scania the "*canescens*" variety dominates. In Småland, Öster- and Vestergötland both forms occur mixed, but in Upland and the northern provinces, on the other hand, the white variety dominates. The occurrence also of the brown weasel and the "blue" hare seems to correspond to the time during which the ground is covered with snow. In Scania where the ground is covered with snow only 45-48 days each winter, the white forms are absent or extremely scarce, and it is at least questionable whether a white coat would be of pro-

tective value in such a case, when more than half the winter a white coat would be exposed against a dark background. In northern Vestergötland the ground is covered with snow for about 72 days, and in Östergötland for about 85 days. In those provinces the white coat is certainly more beneficial, although not to such a degree as in Upland, with 103 days of snow-covered ground, and still more further north (Lapland, with 189 days). The climate seems, therefore, to afford an explanation why in the north all weasels turn white, in the south none do so, while in an intermediate region they occasionally turn white, and sometimes remain brown during the winter. But when there is no sharp limit, neither geographical nor climatological, and the brown and white weasels occur mixed in the intermediate tracts, I cannot regard the establishing of a subspecific distinction on the difference in colour well founded. With regard to size, the weasels, as is well known, are subject to very great variation. This is shown in the most evident manner by Hensel's valuable paper* "*Craniologische Studien.*" As regards the present species, this author informs us that the basal length of skulls of male weasels varies from 39·8 to 32·4 mm., and their breadth over the zygomatic arches from 25 to 18·1 mm. The great variation in size of the skull of the weasel becomes evident from the following table:—

	Number of specimens.	Cranial length.		Breadth.		
		max.	min.	max.	min.	
"vulgans."	English weasels (<i>Barrett-Hamilton</i>) }	16 ♂ 8 ♀	41 34	36·5 31	25 19	21·5 16·5
	German weasels (<i>Hensel</i>) . }	48 ♂ 15 ♀	39·8 32·7	32·4 27·4	25·1 18·4	18·1 15·0
	Scanian weasels (in the Museum of Lund according to a communication from Dr. O. Holmquist).	2 (sex unknown).	36	31	20	15
"typicus."	Uplandic weasels (in the Museum of Upsala, <i>Lönn- bery</i>) }	6 (sex unknown).	32·5	26	18·5	15

This seems to indicate that the English weasels are perhaps rather larger than those of the Continent, and that

* Nov. Act. Acad. Leop.-Carol. Nat. Cur. t. xlii. (Halle, 1881).

towards the north the size diminishes. The maximum of one group, however, surpasses the minimum of another group. When such is the case, the variation in size seems also to form a continuous series, which, I am sure, will prove still more continuous when further material is obtained.

Although the distinguishing characteristics derived from size also are thus rendered unimportant, the variation of the weasel certainly does not lack significance, because intermediate stages occur which unite the extreme forms.

LIX.—*New Species of Mollusca of the Genera Voluta, Conus, Siphonalia, and Euthria.* By G. B. SOWERBY, F.L.S.

[Plate XI.]

THE types are in the British Museum (Natural History).

1. *Voluta uniplicata*, sp. n. (Pl. XI. fig. 1.)

Testa fusiformis, tenuis, pallida, utrinque acuminata, in medio convexa; spira pyramidata, mediocriter longa; sutura anguste canaliculata; anfractus (5-6?), supra breviter concavo-depressi, deinde convexi, undique longitudinaliter filo-striati, spiraliter dense decussatim striati, plicis longitudinalibus numerosis, in ultimo subobsoletis instructi; anfractus ultimus oblongus spiram multo superans, supra obtusissime angulatus, supra angulum subplanato declivis, infra convexus, basim versus attenuatus; apertura ampla, fauce nitens, rufo-carnea; labrum tenue vix reflexum; columella tenuis, plica unica alba lentissime contorta instructa; area polita columellari late effusa, rufo-aurantia.

Long. (circ.) 200, maj. diam. 82 mm.

Hab. Japan.

I have seen only one shell of this remarkable species; the apex is unfortunately broken off, so that the description is necessarily incomplete, although the shell is otherwise in perfect condition. It is of a light structure, sculptured with close spiral striæ, which are more prominent on the upper part of the whorls; the whorls of the spire are closely and regularly longitudinally plicate, but the plicæ become irregular and almost obsolete on the body-whorl. The whole interior, including the lip, is lustrous pinkish red, and a thin shining enamel of orange-red covering the columella is spread half across the whorl. The columella is furnished with a single well-defined plait, which is long, narrow, and but

slightly arched. The form of the shell resembles that of *Voluta Lamberti* of the English Crag.

2. *Voluta (Lyria) Grangeri*, sp. n. (Pl. XI. fig. 2.)

Testa subovata, solidiuscula, straminea, maculis nigro-fuscis diversiformibus triseriatim dispositis ornata; spira conica, acutiuscula, mediocriter longa, apice obtuso; sutura anguste canaliculata; anfractus $5\frac{1}{2}$, convexi, obtusissime angulati, primi 2 læves, sequentes longitudinaliter plicati, plicis numerosis confertis planulatis, in anfractu ultimo evanidis; anfractus ultimus ovatus; apertura mediocriter lata, intus lævis; labrum arcuatum, vix reflexum; columella triplicata, callo tenui induta, superne tuberculo crassiusculo instructa.

Long. 40, diam. 21 mm.

Hab. — ?

This shell has much the form of *V. deliciosa* (Montr.), but larger. The dark brown blotches forming the central zone are very conspicuous; the whorls of the spire are slightly angular, and the plicæ being slightly more prominent at the angle give them a semi-coronated appearance; the longitudinal plicæ are close-set and flattened, being broken up into striate ridges towards the aperture.

A dead colourless specimen of this species has been in my possession many years; it measures 45 millim. in length. Excepting for its larger size and want of colour it agrees in every respect with the type, which I discovered without indication of locality in the collection of Monsieur Granger, of Bordeaux.

3. *Siphonalia Pfefferi*, sp. n. (Pl. XI. fig. 3.)

Testa breviter fusiformis, crassa, straminea, griseo tineta, maculis parvis fuscis profuse ornata, ubique spiralter lirata; spira acute conica; anfractus 7, rotunde convexi, superiores longitudinaliter plicati, plicis rotundatis; anfractus ultimus ventricosus, antice constrictus, breviter curvi-rostratus; apertura subovata, antice in canalem oblique recurvum producta, postice brevissime canaliculata, intus lirata, fusco tineta; labrum arcuatum, acutum, leviter serratum; columella leviter sinuosa, callo crasso induta.

Long. 45, diam. 25 mm.

Hab. Shikoku, Japan.

A pretty species brought to my notice by Dr. Pfeffer, of the Hamburg Museum, after whom I have pleasure in naming it. In form it somewhat resembles *S. trochulus*, Reeve, but it has a longer spire, and the spiral ridges are much broader and profusely spotted with brown.

4. *Euthria interrupta*, sp. n. (Pl. XI. fig. 4.)

Testa acuminato-fusiformis, solidiuscula, luteo-fusca, atro-fusco interruptim lineata; spira acuminata, acutiuscula; anfractus 8, convexiusculi, supra breviter canaliculati, ubique liris fuscis (hic illic plus minusve albo articulatis) angustis vix elevatis (in anfr. penult. 4, in anfr. ult. 13) ornati, sutura angustissime canaliculata sejuncti; anfractus ultimus spiram superans, ad basim constrictus vix productus: apertura oblongo-ovata, intus purpureo-fusco late trifasciata, canali lato brevissimo; columella in medio areuata, infra callosa, leviter recurva.

Long. 28, diam. 14 mm.

Hab. Satsuma, Japan.

Compared with *E. plumbei*, Phil. (= *viridula*, Dkr., and *jerrea*, Reeve), this species has a much longer body-whorl and shorter spire. The articulated linear liræ and the three broad purplish bands shown in the aperture are characteristic.

5. *Conus Grangeri*, sp. n. (Pl. XI. fig. 5.)

Testa elongato-turbinata, albida, luteo late fasciata, et promiscue picta, liris transversis numerosis rugosis subplanulatis instructa; spira conica, mediocriter elevata; anfractus 9, concavo-declives, spiraliter dense grano-lirati, striis obliquis decussati, carina acutiusecula leviter nodulosa marginati; apertura mediocriter lata, alba.

Long. 45, diam. 22 mm.

Hab. Unknown.

Compared with *C. granulatus*, Linn., this species is less cylindrical in form, and the whorls of the spire are quite different, being distinctly concave and bordered by a sharp ridge, which on the upper whorls is slightly nodulose. The spire is more like that of *C. sulcatus*, Brug., from which species the form of the shell is entirely different.

LX.—*A List of the Species of Cyaniris, a well-known Group of the Family Lycænidae.* By A. G. BUTLER, Ph.D., F.L.S., F.Z.S., &c.

So many Lycænidae have been described under the general terms *Lycæna*, *Plebeius*, and *Cupido* by those who ignore structural characters in this family which they allow in other families of butterflies, that one can never be absolutely certain of having recognized all the waifs and strays; but, so

far as I have been able to ascertain, the following seems to represent a complete list.

The genus *Cyaniris* is characterized among the smooth-eyed genera without tails by having the costal vein of the primaries united by a short frenum (or cross-vein) to the first subcostal branch; in its neuration therefore it nearly approaches *Pepliphorus* (*P. hylas*, Cramer, and allies), a genus of tailed Lycænidæ with densely hairy eyes.

This cross-vein in *Cyaniris* distinguishes it at once from *Lycænopis*, just as the cross-vein of *Pepliphorus* separates it from *Lampides*, to which, in spite of its more *Thysanotis*-like colouring, it is undoubtedly nearly related.

From the variable character of some of the males in *Cyaniris* it is not easy to split it up into groups, but De Nicéville has separated the earlier species by the broad dark costal border.

1. *Cyaniris Pryeri*.

Lycæna Pryeri, Murray, Ent. Month. Mag. x. p. 126 (1873).

Japan. B. M.

2. *Cyaniris akasa*.

♀. *Polyommatus akasa*, Horsfield, Cat. Lep. E. I. Co. p. 67, pl. i. figs. 1, 1 a (1828).

Java. Type, B. M.

3. *Cyaniris vardhana*.

Polyommatus vardhana, Moore, P. Z. S. 1874, p. 572, pl. lxvi. fig. 5.

Western India. B. M.

4. *Cyaniris victoria*.

Cyaniris victoria, Swinhoe, Trans. Ent. Soc. 1893, p. 293.

Shillong. Type, B. M.

5. *Cyaniris marginata*.

♂. *Cyaniris marginata*, De Nicéville, Journ. A. S. B. vol. lii. p. 70, pl. i. fig. 9 (1883).

N. India, Burma. B. M.

6. *Cyaniris cossæa*.

Cyaniris cossæa, De Nicéville, Journ. Bomb. N. H. S. ix. p. 271, pl. O. figs. 14, 15 (1895).

N.E. Sumatra.

Belongs to the group with blackish costal area to the primaries, and should probably stand next to *C. melæna*.

7. *Cyaniris melana*.

Cyaniris melana, Doherty, J. A. S. B. Iviii. p. 434, pl. xxiii. fig. 13 (1889).

Lower Tenasserim.

Broad border and dark costa, but no white patch.

8. *Cyaniris albocæruleus*.

Polyommatus albocæruleus, Moore, P. Z. S. 1879, p. 139; not Leech, Butt. China, pl. xxxi. fig. 13 (1893).

Sikkim and Bhotan. B. M.

9. *Cyaniris transpectus*.

Polyommatus transpectus, Moore, P. Z. S. 1879, p. 139.

Cyaniris latimargo, Moore, P. Z. S. 1883, p. 523, pl. xlviii.

Sikkim, Tenasserim, Burma. B. M.

10. *Cyaniris puspa*.

Polyommatus puspa, Horsfield, Cat. Lep. E. I. Co. p. 67 (1828); ♀. De Nicéville, J. A. S. B. lii. pl. i. fig. 5 a (1883).

Var. ♂. *Polyommatus lavendularis*, Moore, Ann. & Mag. Nat. Hist. (4) xx. p. 341 (1877).

Cyaniris puspa, var. *lilacea*, Hampson, J. A. S. B. Ivii. p. 356 (1889).

Cyaniris crissa, De Nicéville, l. c. lxiii. p. 31, pl. ii. fig. 12 (1895).

India, Burma, Ceylon, Java. B. M.

11. *Cyaniris plauta*.

Cyaniris plauta, H. H. Druce, P. Z. S. 1895, p. 574, pl. xxxii. figs. 8, 9.

Borneo.

Male somewhat like *C. puspa*, var. *crissa*; female much more white.

12. *Cyaniris sonchus*.

Cyaniris sonchus, H. H. Druce, P. Z. S. 1896, p. 655, pl. xxix. fig. 4.

Borneo.

A very broad-bordered form, with no white patches on upper surface and distinctly marked under surface.

13. *Cyaniris timorensis*, sp. n.

♂. Nearly allied to *C. puspa*; differing in the much greater width of the black-brown border on upper surface of primaries; on the under surface the spots of the discal series of primaries are large, but those of secondaries small in proportion. In the type the white patch on the primaries is

small and trifid, that on the secondaries represented by a single longitudinal streak; but these characters are probably variable, as in *C. puspa*.

Expanse of wings 33 millim.

Timor. Type, B. M.

14. *Cyaniris dammæ*.

Cyaniris dammæ, Heron, Ann. & Mag. Nat. Hist. (6) xiv. p. 104 (1894).

Damma Island, Wetter. Type, B. M.

15. *Cyaniris splendens*, sp. n.

♂. Allied to *C. puspa*, of a much deeper and more brilliant blue; the black border considerably broader, especially at apex of primaries; a bifid oblique white streak on the primaries (divided by the second median branch), a double streak on the secondaries divided by the second subcostal branch; spots on the under surface very large; the costal area of primaries widely suffused with brown.

Expanse of wings 34 millim.

Larut Hills, Perak (*S. S. Flower*). Type, B. M.

16. *Cyaniris Kühni*.

Plebeius Kühni, Röber, C. B. Iris, 1886, p. 60, pl. iv. fig. 29.

Ké Island and E. Celebes; near Macassar. B. M.

17. *Cyaniris carna*.

♂. *Cyaniris carna*, De Nicéville, J. Bomb. N. H. S. ix. p. 274, pl. O. fig. 18 (1895).

N.E. Sumatra.

Near to *C. albidisca*, but with larger white patches on the wings.

18. *Cyaniris albidisca*.

♂. *Cyaniris albidisca*, Moore, P. Z. S. 1883, p. 524, pl. xlvi. fig. 7.

S. India, Nilgiris. B. M.

19. *Cyaniris imperatrix*, sp. n.

♂. Brilliant ultramarine-blue: the primaries with the costal margin brown; outer border widely black-brown on costa, narrowing very regularly to submedian vein, where (including the fringe) it measures $1\frac{1}{2}$ millim.: secondaries with dark brown costal border widening at apex, where it

joins a narrower outer border of blackish brown: wings below white; markings as in *C. puspa*, but the submarginal line and spots well defined.

Expanse of wings 35 millim.

Siam (*Bowring*). Type, B. M.

20. *Cyaniris cajaya*.

Lycæna cajaya, Felder, Reise der Nov., Lep. ii. p. 278, pl. xxxiv. figs. 11-13 (1865).

"Luzon." Id. ?; ♂, Malacca; ♀, Salangor. B. M.

The species from Malacca shows a rather wider border to the primaries of the male and to all the wings of the female than in Felder's figures; but otherwise it is very similar. *C. placida* appears to me to be abundantly distinct.

21. *Cyaniris cinctuta*.

Cyaniris cinctuta, Grose-Smith, Novit. Zool. ii. p. 506 (1895).

"Ternate, Batchian, Gilolo." Ternate, Amboina. B. M.

22. *Cyaniris jynteana*.

Cyaniris jynteana, De Nicéville, Journ. A. S. B. lii. p. 69, pl. i. figs. 7, 7 a (1883).

♂. *Cyaniris sikkima*, Moore, P. Z. S. 1883, p. 524, pl. xlvi. fig. 11.

Sikkim. B. M.

23. *Cyaniris placidula*.

Cyaniris placidula, H. H. Druce, P. Z. S. 1895, p. 572, pl. xxxii. figs. 6, 7.

Borneo.

Near *C. jynteana*; front-wing border narrower.

24. *Cyaniris cyanescens*.

Cyaniris cyanescens, De Nicéville, Butt. Ind. iii. p. 103, frontisp. fig. 129 (1890).

Nicobars

Allied to *C. jynteana*; bluer, with narrower black border; under surface yellowish stone-colour.

25. *Cyaniris strophis*.

Cyaniris strophis, H. H. Druce, P. Z. S. 1895, p. 573, pl. xxxii. fig. 4.

Borneo.

Near to *C. cyanescens*.

26. *Cyaniris ripte*.

♂. *Cyaniris ripte*, H. H. Druce, P. Z. S. 1895, p. 574, pl. xxxii. fig. 11.
Borneo.

Above like *C. musina*, brighter; below clouded with brown.

27. *Cyaniris camene*.

Cyaniris camene, De Nicéville, J. Bomb. N. H. S. ix. p. 278, pl. O. fig. 22 (1895).

"Perak." Id.; ? var., Perak. B. M.

28. *Cyaniris lyce*.

Cyaniris lyce, Grose-Smith, Novit. Zool. ii. p. 506 (1895).

S. Celebes.

Compared with *C. puspa* and *C. Kühni*, but apparently nearer to *C. camene*, the blue being dull and the borders narrow.

29. *Cyaniris lyseas*.

Cyaniris lyseas, Grose-Smith, Novit. Zool. ii. p. 507 (1895).

Batchian.

Nearly related to *C. lyce*, but more lilacine; only two dark subanal spots between the veins on the secondaries; the submarginal lines below less zigzag: wings rounder in outline.

30. *Cyaniris philippina*.

Cyaniris philippina, Semper, Reisen Philipp. ii. v. p. 168, pl. xxxii. figs. 14-18 (1889).

Philippines.

Seems allied to *C. musina*, but the figures are so poor that they may perhaps be misleading.

31. *Cyaniris musina*.

Cyaniris musina (Snellen), De Nicéville, J. Bomb. N. H. S. ix. p. 275, pl. O. fig. 19 (1895).

Burmah. B. M.

32. *Cyaniris Chennellii*.

♂. *Cyaniris Chennellii*, De Nicéville, Journ. A. S. B. lii. p. 72, pl. i. fig. 10 (1883).

Shillong. B. M.

33. *Cyaniris lugra*.

Cyaniris lugra, H. H. Druce, P. Z. S. 1895, p. 573, pl. xxxii. fig. 5.

Borneo.

Near to *C. puspinus*, darker and rather larger.

34. *Cyaniris puspinus*.

Plebeius puspinus, Kheil, Rhop. Ins. Nias, p. 30, pl. v. figs. 37-39 (1884).

Nias. B. M.

35. *Cyaniris phuste*.

Cyaniris phuste, H. H. Druce, P. Z. S. 1895, p. 573, pl. xxxiv. fig. 17.

Dili.

Nearly allied to *C. puspinus*.

36. *Cyaniris selma*.

Cyaniris selma, H. H. Druce, P. Z. S. 1895, p. 573, pl. xxxii. fig. 10.

Borneo.

Near to *C. puspinus*.

37. *Cyaniris nedda*.

Cyaniris nedda, Grose-Smith, Novit. Zool. i. p. 572 (1894).

"Batchian, Ternate, Dutch New Guinea, Dorey, Celebes." Dorey. B. M.

According to Grose-Smith, this species differs from *C. cardia* in its more violet-blue colour, shorter and rounder wings, rather wider outer marginal band on secondaries with complete submarginal series of spots; the under surface dusky brownish grey instead of silvery greyish white. Our example from Dorey, however, shows the latter colouring below.

38. *Cyaniris cardia*.

Lycæna cardia, Felder, Sitz. Akad. Wiss. Wien, math.-nat. Cl. xl. p. 459 (1860).

"Amboina."

Allied to *C. nedda*.

39. *Cyaniris rona*.

Cyaniris rona, Grose-Smith, Novit. Zool. i. p. 572 (1894).

Dutch New Guinea.

Near to *C. nedda*; darker above, with narrower black margins and no submarginal black spots on secondaries.

40. *Cyaniris placida*.

♂. *Cyaniris placida*, De Nicéville, Journ. A. S. B. lii. p. 68, pl. i. fig. 8 (1883).

Sikkim, Calcutta, Silhet, Tenasserim. B. M.

41. *Cyaniris caelestina*.

Lycæna caelestina, Kollar, Hügel's Kasehmir, iv. p. 423 (1848).

Cyaniris Kollari, Westwood, Gen. Diurn. Lep. ii. p. 491 (1850).

♂. *Polyommatus kasmira*, Moore, P. Z. S. 1865, p. 503, pl. xxxi. fig. 1.

Western India, Ladakh. B. M.

42. *Cyaniris limbatus*.

Polyommatus limbatus, Moore, P. Z. S. 1879, p. 139.

Nilgiris, Mysore, Ceylon. B. M.

43. *Cyaniris ladonides*.

Lycæna ladonides, de l'Orza, Léop. Jap. p. 20 (1867).

Japan generally. B. M.

The female of this species approaches that sex of *C. limbatus*, there being a distinct indication of white scaling on the primaries above; the discal markings below are small or obsolete.

44. *Cyaniris oreas*.

Cyaniris oreas, Leech, Butt. China, p. 321, pl. xxxi. figs. 12, 15 (1893).

"China." Chusan Island and Foo Chow. B. M.

Very probably only a form of *C. ladonides*.

45. *Cyaniris argiolus*.

Papilio argiolus, Linnæus, Syst. Nat. x. p. 483 (1758).

Papilio cleobis, Sulzer, Gesch. Ins. pl. xviii. figs. 13, 14 (1776).

Papilio thersanon, Bergstrasser, Nomencl. iii. pl. liv. figs. 5, 6 (1779).

Papilio argyrophontes, id. t. c. pl. xlix. figs. 5, 6.

Papilio argalus, id. t. c. pl. lviii. figs. 5, 6, pl. lx. figs. 4, 5.

Papilio marginatus, Retz. Gen. Ins. p. 30 (1783).

Europe. B. M.

46. *Cyaniris Levettii*.

Lycæna Levettii, Butler, Ann. & Mag. Nat. Hist. (5) xi. p. 111 (1883).

Western Corea. Type, B. M.

I cannot admit the identity of this species with the European *C. argiolus*. The male above resembles *C. limbatus* ♂; the female is much more broadly bordered and duller in colouring than any example of *C. argiolus*. Its nearest ally is certainly *C. lanka*.

47. *Cyaniris lanka*.

Polyommatus lanka, Moore, Ann. & Mag. Nat. Hist. (4) xx. p. 342 (1877).

♂. *Cyaniris lanka*, Moore, Lep. Ceylon, i. p. 76, pl. xxxv. figs. 2, 2a (1881).

Ceylon. B. M.

48. *Cyaniris singalensis*.

Lycæna singalensis, Felder, Verh. zool.-bot. Gesellsch. Wien, xviii. p. 282 (1868).

♂. *Cyaniris singalensis*, Moore, Lep. Ceylon, i. p. 76, pl. xxxv. figs. 1, 1a (1881).

Ceylon. B. M.

49. *Cyaniris Huegelii*.

Cyaniris Huegelii, Moore, P. Z. S. 1882, p. 244.

Western Himalayas. B. M.

We have a male from the Chitral which appears to me to be a dry form of this species; in colouring it is somewhat bluer than the typical form, but so is a dry form of the female from Rawul Pindi.

50. *Cyaniris nebulosa*.

Cyaniris nebulosa, Leech, Entomologist, xxiii. p. 43 (1890); Butt. China, p. 322, pl. xxxi. fig. 18 (1893).

China.

A species with very broad borders, apparently nearest to *C. Hügelii*.

51. *Cyaniris ladon*.

Papilio ladon, Cramer, Pap. Exot. iii. pl. cclxx. D, E (1782).

Argus pseudargiolus, Boisduval & Leconte, Lep. Am. Sept. p. 118, pl. xxxvi. figs. 1-5 (1833).

Lycæna lucia, Kirby, Fauna Bor.-Am. iv. p. 299, pl. iii. figs. 8, 9 (1837).

Lycæna violacea, W. H. Edwards, Proc. Ent. Soc. Phil. vi. p. 201 (1866); Butt. N. Am. i., *Lyc.* pl. i. figs. 1-4 (1868) (*L. nigra*, pl. xlix.).

Lycæna neglecta, W. H. Edwards, Proc. Ac. Nat. Sci. Phil. 1862, p. 57; Butt. N. Am. i., *Lyc.* pl. ii. (1870).

Var. *Lycæna cinerea*, W. H. Edwards, *Papilio*, iii. p. 8 (1883).

Pacific form:—

Lycæna piusius, Boisduval, Lep. Calif. p. 299 (1852).

Var. *Lycæna echo*, Edwards, Proc. Ent. Soc. Phil. ii. p. 506 (1864).

United States. B. M.

Mr. Leech's statement that *C. ladon* "is a species from the Cape of Good Hope" is based upon the incorrect locality

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given by Cramer. Mr. Trimen does not include it in his 'South-African Butterflies,' being evidently satisfied that it never came from the Old World.

52. *Cyaniris dilectus*.

Polyommatus dilectus, Moore, P. Z. S. 1879, p. 139.

♂. *Cyaniris dilectus*, De Nicéville, Journ. A. S. B. vol. lii. p. 68, pl. i. fig. 5 (1883).

Nepal, Sikkim, Silhet, Assam. B. M.

53. *Cyaniris dilectissima*.

Cyaniris dilectissima, H. H. Druce, P. Z. S. 1895, p. 571, pl. xxxii. figs. 2, 3.

Borneo.

Very close to *C. dilectus*.

54. *Cyaniris coalita*.

Cyaniris coalita, De Nicéville, J. Bomb. N. H. S. vi. p. 363, pl. F. figs. 12, 13 (1891).

Java.

Seems to me remarkably close to some examples of *C. dilectus* in both sexes; but Mr. De Nicéville points out that the series of discal spots on underside of primaries runs into the submarginal series, whereas in *C. dilectus* the two series are separate.

55. *Cyaniris corythus*.

Cyaniris corythus, De Nicéville, J. Bomb. N. H. S. ix. p. 273, pl. O. figs. 16, 17 (1895).

N.E. Sumatra. B. M.

56. *Cyaniris ceyx*.

Cyaniris ceyx, De Nicéville, J. Bomb. N. H. S. vii. p. 328, pl. H. figs. 6, 7 (1892).

"Java." Foo Chow. B. M.

This is the *C. albocæruleus* of Leech's 'Butterflies of China,' but not of Moore. Beyond the fact that the Chinese examples are rather larger than those from Java appear to be, I see no difference likely to be constant.

57. *Cyaniris hersilia*.

♀. *Cyaniris hersilia*, Leech, Butt. China, p. 319, pl. xxxi. fig. 16 (1893).

China.

An unusually white female, reminding one somewhat of that sex of *Lampides conferenda* = *pura*.

SPECIES INCERTÆ SEDIS.

58. *Cyaniris? catreus*.

Cyaniris catreus, De Nicéville, J. Bomb. N. H. S. ix. p. 276, pl. O. figs. 20, 21 (1895).

W. Java.

This species appears to me to be a *Lycænopsis*, in which genus the costal and first subcostal veins are not united by a frenum. If I am wrong, it will have to stand near *C. dammæ* and allies; but the under surface is far more like *Lycænopsis haraldus*.

59. *Cyaniris? deliciosa*.

Cupido deliciosa, Pagenstecher, Ent. Nachr. xxii. p. 50 (1896); Abh. Senck. Ges. xxiii. p. 416, pl. xx. fig. 8 (1897).

Celebes.

Appears to me to be a *Lycænopsis*.

60. *Cyaniris? cara*.

Cyaniris cara, De Nicéville, Journ. Bomb. N. H. S. xii. p. 143, pl. Z. figs. 19, 20 (1898).

Celebes.

Mr. De Nicéville knows his genera of Lycænidæ; otherwise I should certainly have supposed this to be a *Lycænesthes* near to *L. Turneri*.

LXI.—ASIATIC TORTRICIDÆ.

By the Rt. Hon. LORD WALSHINGHAM, M.A., LL.D., F.R.S.

[Continued from p. 386.]

TORTRIX, L.

715 (1). *Tortrix dumetana*, Tr.

Tortrix (Pandemis) dumetana, Stgr. & Wk. Cat. Lp. Eur. 236. No. 702 (1871). *Tortrix dumetana*, Meyr. HB. Br. Lp. p. 538 (1895).

Hab. EUROPE. COREA—Gensan, VI. 1886 (*Leech*). JAPAN—Yesso—Hakodate, VIII. 1886 (*Leech*). KASHMIR—Scinde Valley, 7000 feet, VI. 1887 (*Leech*).

716. *Tortrix ochreana*, Hb.

Tortrix (*Lophoderus*) *ochreana*, Stgr. & Wk. Cat. Lp. Eur. 237. No. 716 (1871).

Hab. EUROPE. ASIATIC TURKEY—*HALEB*—Shar Devesy, 21 V., 4 VII. 1890 (*Native Coll.*).

727 (1). *Tortrix ditinctana*, sp. n.

Antennæ pale cinereous, slightly annulated. *Palpi*, terminal joint somewhat concealed by the scales projecting beneath the median joint; pale cinereous. *Head* pale cinereous. *Thorax* mixed pale ochreous and rich reddish brown. *Fore wings* pale yellowish ochreous, almost entirely suffused with rich reddish ferruginous, and shaded with umber-brown on the apical third; four transverse fasciæ of brightly shining chalybeous scales, the first slightly curved outwards from the middle near the base; the second also curved outwards and partially interrupted with ferruginous before the middle; the third also curved outwards and slightly interrupted immediately after the middle; the fourth assuming the form of two outwardly curved chains of spots, the first of which from the costa at three-fourths from the base reaches downwards to about vein 6, the second commencing opposite to and beyond its apex curves outwards to the termen, and reverts along the margin towards the tornus; beyond these at the apex are two strong chalybeous spots; the only part of the wing on which the pale yellowish ochreous ground-colour is clear and unsuffused, and therefore noticeable, is on the upper half between the second and third fasciæ; cilia pale yellowish ochreous, touched with fuscous at the tornus. *Exp. al.* 16-17 mm. *Hind wings* dark brownish fuscous; cilia pale cinereous, shaded with greyish fuscous at the apex and flexus, and with a greyish fuscous shade along their base. *Abdomen* brownish fuscous. *Legs* brownish fuscous, hind tarsal joints with patches of pale cinereous.

Type, ♂ (70437) Mus. Wlsm.

Hab. JAPAN (*Pryer*, 1886). Two specimens.

This species is nearly allied to *Conwayana*, F., but is distinguished by the strong and less interrupted chalybeous fasciæ, by the absence of a pale dorsal patch, and the presence of a very conspicuous pale costal patch.

727 (2). *Tortrix tigricolor*, sp. n.

Antenna cinereous, reddish ochreous at the base. *Palpi* short, with projecting scales above and below the median

joint, terminal joint short, exposed; brownish ochreous. *Head* and *thorax* brownish ochreous. *Fore wings* deep reddish ochreous, almost red-brown, with shining greyish chalybeous fasciæ; the first near the base, occupying the basal portion of the costa, is slightly angulated outwards on the fold; the second, at one-third, is slightly curved outwards and reaches the dorsum before the middle; the third, from beyond the middle of the costa, curving outwards is interrupted at the lower edge of the cell, but is continued from a point opposite to and before its lower extremity to the dorsum beyond the middle; the last, from the costa before the apex to the tornus, is sometimes interrupted and deflected at a point below the middle of the termen; a few shining greyish chalybeous scales at the apex; cilia brownish ochreous. *Exp. al.* 15 mm. *Hind wings* dark greyish fuscous; cilia pale greyish fuscous. *Abdomen* greyish fuscous. *Legs* cinereous.

Type, ♀ (70439); ♂ (70440) Mus. Wism.

Hab. JAPAN (*Pryer*, 1886). Three specimens.

In the male type the third fascia is continued to the tornus, a short half-fascia from behind the middle of the dorsum lying on its inner side; moreover the fourth fascia is not interrupted, but ends on the termen above the tornus. The species therefore seems to be somewhat variable.

727 (3). *Tortrix conchyloides*, sp. n.

Antennæ whitish ochreous, annulated with brown. *Palpi*, median joint thickly and somewhat loosely clothed above and below, terminal joint moderate, exposed; whitish ochreous. *Head* whitish ochreous. *Thorax* greyish brown. *Fore wings* whitish ochreous, much overspread with greyish brown, which occupies the whole of the base and is extended outwards above the fold reaching to below the middle of a central oblique greyish brown fascia from before the middle of the costa to the outer half of the dorsum; this fascia is more or less blended on its outer side with a third fasciaform shade from the costa before the apex to the tornus; on the dark shading are streaks and patches of shining leaden grey, with several tufts of raised black scales, two on the outer edge of the basal patch, one above the other below the fold, five or six along the inner edge of the central fascia, and a sinuous slender line of similar raised black scales within the outer brown shade; about the apex the pale wing-surface is slightly reticulated with brown; cilia pale whitish ochreous. *Exp. al.* 17 mm. *Hind wings* greyish fuscous cilia greyish

cinereous, with a dark shade along their basal half. *Abdomen* brownish fuscous. *Legs* whitish ochreous, slightly shaded with brownish fuscous.

Type, ♂ (60256, Chang Yang) Mus. Wlsm.

Hab. CHINA—Chang Yang (*Pratt*). JAPAN—YESSO (*Pryer*, 1882). Two specimens.

727 (4). *Tortrix Leechi*, sp. n.

Antennæ pale canary-yellow, not annulated, but shaded with brownish beneath. *Palpi* projecting about the length of the head beyond it, median joint with projecting scales above and beneath (more closely packed than in *Christophana*), terminal joint very short, exposed; pale canary-yellow. *Head* and *thorax* pale canary-yellow. *Fore wings* pale canary-yellow, with a yellowish-brown shade at the base, often running through the middle of the wing above the fold and overspreading the apical half with the exception of the apex and termen; at the base, on the brown shade, is a shining rosy-grey metallic band; a rather broad, slightly oblique fascia of a similar metallic hue crosses from the costa, within the basal third, to before the middle of the dorsum, sometimes terminated on reaching the fold; another fascia of the same colour from beyond the middle of the costa nearly reaches the tornus, this is somewhat sinuate on its inner side; before the termen is a narrower band of the same colour, usually enclosing the outer edge of the dark shade, and reaching from the costa before the apex to the termen above the tornus; between this outer shining band and the shining fascia which precedes it is a series of about four minute black dots of raised scales on the outer half of the dark shade, two above and two below the middle of the wing; in some specimens there is also a spot of raised blackish scales at the outer third of the fold; cilia pale canary-yellow, touched with brownish at the tornus. *Exp. al.* 17–18 mm. *Hind wings* brownish fuscous; cilia on their outer half whitish cinereous. *Abdomen* greyish brown, anal tuft ochreous. *Legs* whitish ochreous.

Type, ♀ (60255, Yokohama); ♂ (70429, Yesso) Mus. Wlsm.

Hab. JAPAN—YESSO (*Pryer*, 1882). HONDO—Yokohama (*Manley*, 1888). COREA—Gensan, VI. 1886 (*Leech*). Five specimens.

A pale variety from Gensan (60031, ♀) is almost entirely without the brown shading, and is pale canary-yellow, with the metallic fasciæ of a more rosy pink, due to the absence of brown scales. The same variation of colouring occurs in the

allied *Loeflingiana*, L., but this species has the apex of the wing more pointed and the markings are quite different.

727 (5). *Tortrix Christophana*, sp. n.

Antennæ pale yellowish, not annulate, but faintly dotted above with greyish. *Palpi*, median joint loosely clothed with long scales, projecting above and beneath, terminal joint rather long, naked; pale yellow. *Head* pale yellowish. *Thorax* bright yellow. *Fore wings* bright yellow at the base and narrowly along the costa and termen, the remainder of the wing rich red-brown, chestnut-brown, or pale chocolate-brown in different varieties; the darker colour has therefore the appearance of a large quadrate patch overflowing the wing from the dorsum, the whole of which it occupies from near the base to the tornus, its anterior margin tending obliquely outwards towards the costa and its upper and outer margins running parallel with the outline of the wing, one or two small streaks connecting it above with the costa; throughout this patch are a great number of shining metallic steel-grey spots, having in some varieties a rosy tinge; one or two spots are also visible on the pale basal portion of the wing and also along the termen; scattered between and among those on the dark patch are several tufts of raised scales of the same colour as the patch itself, of which one conspicuous series is arranged in an irregular oblique fascia tending outwards from the costa to the dorsum; cilia bright yellow, tinted at the tornus with the colour of the dark patch. *Exp. al.* 17 mm. *Hind wings* varying in colour according to the tint of the darker portion of the fore wings, which they closely resemble, and shading to pale cinereous at the base; cilia pale cinereous, with a slight ochreous tinge along their base. *Abdomen* and *legs* pale cinereous.

Type, ♀ (70433); ♂ (70434) Mus. Wlsm.

Hab. JAPAN (*Pryer*, 1886). HONDO—Yokohama (*Mantley*, 1888); Tsuruga, VII. 1886 (*Leech*); Fushiki, VII. 1887 (*Leech*). Nine specimens.

727 (6). *Tortrix Joannisi*, sp. n.

Antennæ sulphur-yellow. *Palpi* projecting twice the length of the head beyond it; median joint clothed with rough scales projecting further beneath than above—these are pale yellow, brownish towards their tips; terminal joint protruding to the length of the lower tuft, smooth. *Head* and *thorax* pale yellow. *Fore wings* pale yellow, reticulated on the basal

half with brownish ochreous, clouded across the outer half with smoky brown and sprinkled throughout with small spots of steel-grey metallic scales; the broad smoky brown shade is broken by a pale yellow patch at the end of the cell and contains a few patches of raised brown scales in addition to the metallic sprinkling; it does not extend to the termen, a slender brownish ochreous line dividing the pale yellow marginal space; cilia pale yellow. *Exp. al.* 17 mm. *Hind wings* tawny brown; cilia whitish, slightly tinged with brown on their basal half. *Abdomen* (missing,—probably brown). *Legs* brownish white.

Type, ♀ (13329) Mus. Wlsm. *Paratype* (854, Wlsm. 1894) Mus. J. de Joannis.

Hab. CHINA—Zo-ci. Two specimens.

Named after M. l'abbé de Joannis, to whom I am indebted for the specimen.

727 (7). *Tortrix exuberans*, sp. n.

Antennæ pale yellow. *Palpi* pale yellow, the median joint roughly clothed above and beneath, the terminal joint erect, slender, naked. *Head* and *thorax* pale yellow, the tips of the tegulæ reddish ochreous. *Fore wings* bright yellow, profusely mottled with bright reddish ochreous, the mottling on the outer half tending to confluence transversely; each of the many bright reddish ochreous patches is centred with shining pinkish-lilac metallic scales, and there are a few raised tufts scattered about their surface in which are mixed a few very dark brown scales; cilia bright yellow. *Exp. al.* 16 mm. *Hind wings* rosy brownish. *Abdomen* rosy brownish. *Legs* pale brownish cinereous.

Type, ♂ (60033) Mus. Wlsm.

Hab. COREA—Gensan, VI. 1886 (*Leech*). Unique.

728 (1). *Tortrix striatulana*, sp. n.

Antennæ slightly ciliate in the male; pale ochreous. *Palpi* long, projecting twice the length of the head beyond it, median joint clothed with projecting hairs, which conceal the terminal joint; pale ochreous, touched with fuscous at the base and apex externally. *Head* pale ochreous. *Thorax* pale ochreous, banded with fuscous across the front. *Fore wings* with the costa very slightly arched, apex slightly rounded, termen very oblique; pale ochreous, speckled and striated minutely with fuscous and shaded with brownish ochreous and olive-brown; an outwardly curved line of

fuscous scales at about one-fourth indicates the outer edge of the basal patch; an oblique line of fuscous scaling from the middle of the costa to the tornus; a series of short fuscous costal streaks alternating on the outer half of the wing with oblique shining ochreous streaks longer than themselves; the apical portion of the wing is shaded with olive-brown and contains a curved steel-grey line from a little beyond the upper end of the transverse fascia to the middle of the termen, whence it is diffused downwards towards the tornus; a few steel-grey scales mixed with fuscous scales above the tornus; a slender black line along the termen; cilia whitish ochreous. *Exp. al.* ♂ 15, ♀ 17 mm. *Hind wings*, apex rounded, termen impressed below the apex; pale brownish grey; cilia whitish ochreous in the male, brownish cinereous in the female. *Abdomen* brownish grey. *Legs* whitish ochreous; hind tarsal joints touched with fuscous.

Type, ♂ (60026); ♀ (60368), Chang Yang, Mus. Wism.

Hab. CHINA—Chang Yang, 4000-6000 feet (*Pratt*). JAPAN (*Pryer*, 1886). Five specimens.

729. *Tortrix Loefflingiana*, L.

Tortrix (Heterognomon) Loefflingiana, Stgr. & Wk. Cat. Lp. Eur. 238. No. 729 (1871).

Hab. EUROPE. ASIATIC TURKEY—HALEB—Shar Devesy, 1890 (*Native Coll.*).

730. *Tortrix viridana*, L.

Tortrix (Heterognomon) viridana, Stgr. & Wk. Cat. Lp. Eur. 238. No. 730 (1871).

Hab. EUROPE. ASIATIC TURKEY—HALEB—Shar Devesy, 23 VI. 1890 (*Native Coll.*).

731. *Tortrix pronubana*, Hb.

Tortrix (Heterognomon) pronubana, Stgr. & Wk. Cat. Lp. Eur. 238. No. 731 (1871).

Hab. EUROPE. ALGERIA—Constantine, 10 V. 1895; 10 X. 1894 (*Eaton*); Bône, 23 III.; 5 V. 1896 (*Eaton*). ASIATIC TURKEY—HALEB—Shar Devesy, 1893 (*Native Coll.*).

731 (1). *Tortrix soriana*, Kennel.

Tortrix (Heterognomon) soriana, Kennel, Ent. Zts. Iris, XII. 6-7. No. 4, Pl. I. 4 (1899)¹.

Hab. ASIATIC TURKEY—HALEB—Shar Devesy, 1893

(Native Coll.). SYRIA, Beyrout¹; III. 1886 (Pratt). PALESTINE (Tristram).

736. *Tortrix aurichalcana*, Brem.

Lazotania aurichalcana, Brem. Mém. Ac. Imp. Sc. St. Pétersb. (7 s.)

VIII. (1) 89-90. No. 438, Pl. VII. 22 (1864)¹.

Tortrix (*Heterogomon*) *aurichalcana*, Stgr. & Wk. Cat. Lp. Eur. 238. No. 736 (1871)².

Hab. E. SIBERIA²—'von der Mündung des Noor bis oberhalb der Ema,' VI.-VII.¹ JAPAN—Yesso (Pryer, 1882); Hakodate, VIII. 1886 (Leech). HONDO—Tsuruga, VII. 1886 (Leech). CHINA—Chang Yang, 4000-6000 feet (Pratt).

This species appears to be extremely variable; in a long series some forms are so much darkened as to almost entirely lose the yellow tint and become brown or greyish brown. In one variety the markings are entirely lost, except that the waved metallic lines can be traced across the unicolorous shining ochreous brown wings; other varieties are almost entirely pale yellow, with a sprinkling of pale grey-brown scales.

736 (1). *Tortrix sinapina*, Btl.

Pandemis sinapina, Btl. Ill. Typ. Lp. Het. B. M. III. 78, Pl. LX. 3 (1879)¹.

Hab. JAPAN. HONDO—Yokohama¹; (Manley, 1888).

736 (2). *Tortrix pulchra*, Btl.

Ariola pulchra, Btl. Ill. Typ. Lp. Het. B. M. III. 19, Pl. XLV. 6 (1879)¹.

Antennæ fuscous, basal joint chestnut-brown mixed with pale ochreous. *Palpi* chestnut-brown. *Head* pale greyish ochreous. *Thorax* chestnut-brown, tegulæ with a bluish tinge. *Fore wings* chestnut-brown, narrowly pale ochreous along the extreme costa and dorsum, with four shining metallic chalybeous streaks running longitudinally; the first immediately below the costa tapers outwards from the base to two-thirds the length of the wing; the second from the middle of the base along the lower margin of the cell is deflected at the end of the cell to the tornus; the third from the base below the fold to the outer extremity of the fold near the tornus; the fourth commencing narrowly at about one-fourth from the base, between the costal and middle streaks, is widened outwards attaining the apex, and is thence deflected along the termen, where it is bordered on each side

by three or four purplish fuscous spots; cilia bright ochreous. *Exp. al.* 21-24 mm. *Hind wings* brownish fuscous; cilia pale cinereous. *Abdomen* brownish fuscous. *Legs* pale cinereous; hind tibiae thickly clothed above.

Hab. JAPAN (*Pryer*, 1886). HONDO—Yokohama¹.

739 (1). *Tortrix nigricaudana*, sp. n.

Antenna pale brownish. *Palpi* brownish cinereous. *Head* and *thorax* pale brownish grey. *Fore wings* brownish testaceous, with a slight tawny gloss, a pale chestnut-brown central fascia and central reticulations; the fascia commences narrowly on the costa before the middle, and slants obliquely to the dorsum before the tornus; its inner margin is clearly defined and angulated inward a little above the fold, its outer side is widened and diffused, extending to the end of the cell and to the tornus; there is a narrow costal blotch of the same colour before the apex, the space before and behind the fascia being reticulated with narrow sinuous lines crossing the veins; cilia shining pale brownish grey. *Exp. al.* 26 mm. *Hind wings* greyish brown, cilia shining pale grey. *Abdomen* brownish grey, anal tuft dense and black. *Legs* pale brownish ochraceous.

Type, ♂ (60060) Mus. Wlsm.

Hab. COREA—Gensan, VI. 1886 (*Leech*) ♂♂. [? JAPAN (*Pryer*, 1886) ♀.]

A single female from Japan (70397) perhaps belongs to this species; but as males only were taken at Gensan, it would be at present unsafe to determine it.

745. *Tortrix imperfectana*, Ld.

Tortrix imperfectana, Ld. Wien. Ent. Mts. II. 150-1, Pl. IV. 8 (1858)¹.

Tortrix (*Heterognomon*) *imperfectana*, Stgr. & Wk. Cat. Lp. Eur. 239. No. 745 (1871)².

Hab. SYRIA—Libanon¹; Galilee, IV. 1886 (*Pratt*); Palestine (*Tristram*).

[*CNEPHASIA*, Crt., = *SCIAPHILA*, Tr.]

767 (1). *Tortrix vetulana*, Chr.

Sciaphila vetulana, Chr. Bull. Soc. Imp. Nat. Mosc. LVI. 72-3. No. 105 (1881)¹; *sep.* 160-1 (1882)¹.

Hab. E. SIBERIA—Wladiwostok, VI.¹ COREA—Gensan, VI. 1886 (*Leech*). JAPAN (*Pryer*, 1886).

770. *Tortrix argentana*, Cl.

Sciaphila (*Ablabia*) *argentana*, Stgr. & Wk. Cat. Lp. Eur. 240. No. 770 (1871)¹. *Sciaphila argentana*, Fern. Tr. Am. Ent. Soc. X. 16-17. No. 67 (1882)².

Hab. EUROPE¹. KASHMIR—Scinde Valley, 7000 feet, VII. 1887 (*Leech*); Deosai Plains, 13,000 feet, VIII. 1887 (*Leech*). JAPAN—Yesso (*Pryer*, 1882). UNITED STATES—California², Nevada², Colorado (Loveland, 5000-10,000 feet, VII. 1891, *W. G. Smith*).

771 (1). *Tortrix virginana*, Kennel.

Sciaphila virginana, Kennel, Ent. Zts. Iris, XII. 12-13. No. 10, Pl. I. 10 (1889)¹.

Hab. ASIATIC TURKEY—HALEB—Shar Devesy (*Native Coll.* 1892). DIARBEKR—Mardin¹.

776 (1). *Tortrix sedana*, Cnst.

Sciaphila sedana, Cnst. Ann. Soc. Ent. Fr. (6 s.) IV. 211-2, Pl. IX. 8 (1884)¹.

Hab. FRANCE, VII.-VIII.¹ ASIATIC TURKEY—HALEB—Shar Devesy (*Native Coll.* 1893).

777 (1). *Tortrix Tristrami*, sp. n.

Antennæ dirty white. *Palpi* and *head* dull white. *Thorax* white. *Fore wings* white, at about one-fourth from the base an outwardly curved nut-brown fascia, sometimes angulated above the fold at its outer edge, passes from costa to dorsum (or in some specimens is separated from the dorsum by a short space), this fascia is less wide than the space intervening between it and the base; about the middle of the costa a rather wider fascia of the same colour reaches the dorsum before the tornus, its inner margin slightly concave, its outer margin sometimes angulated outward about the middle; a costal patch before the apex is slightly broken on the costa, its lower margin not connected with a narrow sub-terminal shade beneath it; all these markings are clearly defined and are speckled with black along their edges, the intermediate pale spaces being also sometimes very slightly speckled with brown on the costa and dorsum; cilia white. *Exp. al.* 16-18 mm. *Hind wings* pale brownish grey; cilia rather paler, with a shade-line running through them near their base. *Abdomen* and *legs* pale brownish grey.

Type, ♂ (13507); ♀ (13508) Mus. Wlsm.

Hab. PALESTINE (*Tristram*). Four specimens.

Allied to *octomaculana*, Dblld., some varieties of which it greatly resembles in pattern and colour; but it is a much smaller insect, and, so far as one can judge from the possession of only four specimens, is more consistent in its markings.

I name this species after the Rev. Canon Tristram, who nearly thirty years ago greatly encouraged my early studies of the Microlepidoptera by giving me numerous specimens from Palestine, including the species described by the late H. T. Stainton.

779. *Tortrix chrysanthemana*, Dp. (H.-S.).

Sciaphila† chrysantheana, Stgr. & Wk. Cat. Lp. Eur. 240. No. 779 (1871).

Hab. EUROPE. JAPAN (*Pryer*, 1886).

780 (2). *Tortrix barbarana*, sp. n.

Antennæ, palpi, and *head* pale brownish cinereous. *Thorax* brownish fuscous. *Fore wings* pale brownish cinereous, with a brownish fuscous basal patch extending to one-third, angulated outward a little above the fold and inward on the fold itself, this patch is slightly mottled with the paler ground-colour, a few darker fuscous scales being scattered along its margin; across the middle of the wing a slightly oblique brownish fuscous fascia reaches the dorsum before the tornus, its outer edge is also slightly angulated outward about the middle, but it is not connected with a somewhat triangular costal patch of the same colour before the apex, the intermediate space between these dark markings being very thinly bestrewn or reticulated with brownish fuscous scales, becoming somewhat confluent only a little before the middle of the termen; cilia brownish grey, a rather darker line along their base. *Exp. al.* 14-16 mm. *Hind wings* brownish grey; cilia the same, with a darker shade-line running through them near their base, which is rather paler than their outer half. *Abdomen* and *legs* brownish cinereous.

Type, ♂ (61564); ♀ (61565) Mus. Wlsm.

Hab. ASIATIC TURKEY—HALEB—Shar Devesy (*Native Coll.* 1893). * Eleven specimens.

This species greatly resembles in appearance dark specimens of *Isotrias hybridana*, Hb., and especially the variety (?) known as *castiliana*, Rag.; but from this it can at once be separated by the neuration of the hind wings, in which veins

6 and 7 are not remote at origin as in *Isotrias*. In *castiliana* the costal mark before the apex is produced downward and usually reaches the termen above the tornus, whereas in *barbarana* it does not extend downward even so far as the middle of the wing-width, and is separated from the slight ante-marginal shade which sometimes occurs below it. It closely approaches *Tortrix minusculana*, Z. + *incertana*, Tr., in size and markings, but the absence throughout my series of the marked projection on the outer edge of the basal patch which occurs in every one of the very numerous specimens in the Zeller collection serves to distinguish it; it has, moreover, shorter and more obtuse fore wings.

DOLOPLOCA, Hb.

789 (2). *Doloploca lineata*, sp. n.

Antennæ brownish cinereous. *Pulpi* and *head* pale brownish cinereous. *Thorax* brownish cinereous. *Fore wings* with the apex rounded, the termen much more oblique than is usual in the *Cnephasia* group of *Tortrix*; brownish cinereous, with scattered dusting of slightly raised blackish scale-spots, especially on the outer half; a faintly indicated reddish-brown band arises from the dorsum before the tornus, and reaches to the upper angle of the cell, but does not attain to the costa; this is preceded and followed in some specimens by detached patches of faint mottling of the same colour; the veins throughout the wing are indicated by slightly paler lines, the cilia corresponding in colour with these, but having a clear slender reduplicated line running through them around the apex and termen. *Exp. al.* 20 mm. *Hind wings* brownish grey; cilia rather paler, with a reduplicated brownish grey shade-line running through them; the lines are much wider than those in the cilia of the fore wings. *Abdomen* brownish cinereous. *Legs* pale cinereous.

Type, ♂ (13511) Mus. Wlsm.

Hab. PALESTINE (*Tristram*). Four specimens.

I can find nothing described which corresponds to the unusual shape and colouring of this species. It is much smaller than the two known species of *Doloploca*, but in form and structure it agrees better with this genus than with the *Cnephasia* group of *Tortrix*.

109 (1). *CRYPTASPASMA*, gen. nov.

(κρυπτός = hidden; ἄσπασμα = the thing embraced.)

Type *Penthina*? *lugubris*, F. & R.

Antennæ (♂) less than half the length of the fore wings,

very shortly pubescent. *Palpi* short, appressed to the face; median joint short and densely clothed, terminal joint short, almost entirely concealed. *Head* slightly rough above. *Thorax* not tufted. *Fore wings* elongate, narrow at the base, widened outwardly; costal margin straight, male with a narrow elongate costal fold; apex rounded, termen oblique, tornus rounded, dorsum straight, limbus not abruptly defined. *Neuration*, 12 veins, all separate; 2 from middle third of cell; 3 and 4 approximate at origin; 6 and 7 separate, but closely approximate at upper angle of cell, 7 to termen. *Hind wings* broader than the fore wings, with the termen and dorsum rounded. *Neuration*, 8 veins; 3 and 4 connate, 5 slightly bent over towards origin of 4; 6 and 7 stalked or almost coincident towards their base. *Abdomen* (δ) slender, genital segments concealed within a circular shield or pouch, having an aperture of scarcely more than half its size posteriorly; uncus present within the pouch.

794 (1). *Cryptasasma lugubre*, F. & R.

Penthina? *lugubris*, F. & R. Reise Nov. Lp. V. Pl. CXXXVIII. 32 (1875)¹.

Antennæ fuscous. *Palpi* dark fuscous. *Head* dark brownish fuscous. *Thorax* grey, sprinkled with fuscous. *Fore wings* dark grey, streaked, mottled, and sprinkled with fuscous and brownish fuscous; costa dark fuscous on the basal half along the fold, spotted with large and small fuscous spots beyond; an irregular dark fuscous streak runs along the lower margin of the cell from the base, extending upwards from the end of the cell, where it contains a small yellow-ochreous spot, and dilated downwards across the fold towards the dorsum about its middle; the outer extremity of this streak is depressed and unites with a sinuous dark brownish fuscous band which crosses the wing from the costa to the dorsum; this is bowed outwards on its upper half and inwards on its lower half, and lies at about one-fifth from the termen; beyond it the grey colouring of the wing is reticulated with brownish fuscous, the extreme margin being narrowly brownish fuscous; cilia brownish cinereous, darker on their basal half. *Exp. al.* δ 17-25, ♀ 20-25 mm. *Hind wings* brownish grey, slightly iridescent; cilia pale cinereous, slightly darker along their base. *Abdomen* brownish grey, with a strong and thick cinereous anal tuft concealing the upper edge of the genital pouch. *Legs* cinereous; hind tarsal joints faintly spotted.

Hab. N. BENGAL — Darjiling, 26 VII. 1886 (*Elwes*).

SIKKIM (*Müller*, 1887). ASSAM—Mao (N. Manipur), 5000–7000 feet, VIII. 1889 (*Doherty*). PERAK—Gunong Hijan, 4000–4900 feet (*Doherty*, 1891). BATIAN—Mt. Sibela, 3000–5000 feet (*Doherty*, 1892).

Felder and Rogenhofer record their type of *Penthina? lugubris* from “fl. Amazonas (*Bates*).” The specimen is labelled “276” and “B. in cop.” It is on a long iron pin, whereas Bates used short English pins, and the evidence is very strong that this is another of the very numerous mistakes in locality-labels which pervade the collection ostensibly made by the ‘Novara’ expedition, but which was obviously put together by purchase and otherwise from many widely scattered sources. The specimens labelled Bates Coll. could have been obtained in no other manner, as Mr. Bates did certainly not accompany the expedition.

109 (2). BRACHYGONIA, gen. nov.

(βραχύς=short; γωνία=an angle.)

Type (♂) *Brachygonia angulicostana*, Wlsm.

Antennæ less than half the length of the fore wings; ♂ stout, scarcely pubescent; basal joint somewhat enlarged. *Palpi* short, appressed to the face; median joint moderately clothed with appressed scales; terminal joint slightly exposed. *Head* slightly rough above. *Thorax* smooth. *Fore wings* elongate, slightly widened outwards; costa shortly angulated at the extreme base, straight beyond, male without a fold, apex rounded; termen oblique, slightly convex, tornus rounded. *Neuration*, 12 veins, all separate; 2 from middle third of cell; 3 slightly recurved and closely approximate to 4 at its origin; 7 to termen. *Hind wings* rather triangular, apex rounded, termen slightly rounded. *Neuration*, 8 veins; 3 and 4 connate; 5 bent over towards origin of 4; 6 and 7 almost coincident towards their base. *Abdomen* somewhat stout; genital segments (♂) concealed in a circular chitinous pouch; uncus present. *Legs* smooth.

This genus, which agrees in neuration with *Tortrix*, L., differs in the short abrupt angle at the base of the fore wings and in the almost even width of the wings. The very short antennæ and the unusual form of the anal appendages seem to justify the creation of a new genus for its reception.

794 (2). *Brachygonia angulicostana*, sp. n.

Antennæ, *palpi*, and *head* dark brownish fuscous. *Thorax* dark brownish fuscous, sprinkled with brownish cinereous

posteriorly. *Fore wings* dark brownish fuscous at the base, thence somewhat sprinkled with brownish cinereous, giving them a paler appearance outwardly; with a small pale ochreous spot at the end of the cell, a dark brownish fuscous patch on the fold below the middle of the wing, and a fascia-form band of dark brownish fuscous running parallel with the outer margin to within the tornus; this is sometimes broken up into two or more patches; the termen and costa are indistinctly blotched with dark brownish fuscous; cilia brownish cinereous, darker along their base. *Exp. al.* 19 mm. *Hind wings* dull brown, dark brownish fuscous inclining to purplish fuscous at the base; cilia pale cinereous, with a brownish cinereous shade running through them near their base. *Abdomen* cinereous, clouded with purplish fuscous above on the middle. *Legs* pale cinereous.

Type, ♂ (70553); ♀ (70573) Mus. Wlsm.

Hab. JAPAN (*Pryer*, 1886). Three specimens.

109 (3). MICROCORSES, gen. nov.

(μικρός=little; κόρησς=one who wears his hair short.)

Type (♂) *Microcorses marginifasciatus*, Wlsm.

Antennæ less than half the length of the fore wings; (♂) stout, slightly pubescent. *Palpi* short, porrect, projecting but little beyond the head; median joint closely clothed; terminal joint not very distinct. *Head* moderately smooth. *Thorax* stout, not tufted. *Fore wings* elongate, narrow at the base, widened outwardly; costa straight, ♂ without a fold, apex rounded; termen oblique, straight; dorsum moderately straight, slightly convex towards the base. *Neuration*, 12 veins, all separate; 7 to termen. *Hind wings* broader than the fore wings, termen slightly excavate below the apex, thence evenly rounded; ♂ with a small but distinct thickening or brush of scales above the base of vein 1, covered by a small fold or flap. *Neuration*, 8 veins; 3 and 4 connate; 5 bent over towards origin of 4; 6 and 7 separate, but closely approximate at the extreme base. *Abdomen* stout. *Legs*, posterior tibiæ slightly hairy above.

The type has somewhat the appearance of a *Cnephasia*; it is, however, coarsely and roughly clothed. The antennæ are much shorter and stouter, and it is apparently allied to *Brachygonia*, Wlsm., which differs in the angle at the base of the fore wings and in the absence of the tuft and flap of the hind wings.

794 (3). *Microcorses marginifasciatus*, sp. n.

Antennæ and *palpi* tawny brown. *Head* and *thorax* dark tawny brown, the latter brownish cinereous posteriorly. *Fore wings* brownish cinereous, shaded and speckled with tawny brown throughout; with some brownish fuscous mottlings along the costa and termen, a faintly indicated short brownish fuscous basal patch, an irregular reddish brown blotch or group of spots at the middle of the wing, at the outer edge of which is a small yellowish ochreous spot at the upper angle of the cell and a darkly mottled narrow reddish brown fasciaform band running parallel with the termen from near the apex to behind the tornus; cilia brownish cinereous. *Exp. al.* 19 mm. *Hind wings* pale greyish brown, with a small tuft of brown scales covered by a pale shining cinereous flap above the base of vein 1; cilia pale cinereous. *Abdomen* pale greyish brown. *Legs* pale cinereous; hind tarsal joints banded with pale fuscous.

Type, ♂ (70592) Mus. Wlsm.

Hab. JAPAN (*Pryer*, 1886). Three specimens.

GENECTRA, Gn.

752. *Enectra pilleriana*, Schiff.

Enectra pilleriana, Stgr. & Wk. Cat. Lp. Eur. 239. No. 752 (1871)¹; Fern. Tr. Am. Ent. Soc. X. 19. No. 88 (1882)².

Hab. EUROPE¹. CHINA—Chang Yang, 4000–6000 feet (*Pratt*, 1886). JAPAN—HONDO—Oiwake (*Pryer*, 1885). UNITED STATES—California², Texas².

LEONTOCHROMA, gen. nov.

(λέων = a lion; χρώμα = colour.)

Type *Leontochroma aurantiacum*, Wlsm.

Antennæ (♂) strongly ciliated (not notched). *Palpi* short, projecting less than the length of the head beyond it, closely clothed, terminal joint exposed, rather short. *Head* moderately rough. *Thorax* smooth, or slightly tufted posteriorly. *Fore wings* elongate, narrow at the base, widened outwards; costa gently arched towards the base; ♂ with a short and very narrow costal fold at the base (easily overlooked); apex slightly produced; termen slightly excavate below the apex, scarcely oblique; tornus rounded; dorsum straight. *Neuration*, 12 veins; 3 and 4 stalked; 7 and 8 stalked, 7 to the termen. *Hind wings* rather triangular, slightly excavate

below the rounded apex, thence convex. *Neuration*, 8 veins; 3 and 4 from a short stalk; 5 approximate at base to 3+4; 6 and 7 separate, but very closely approximate and parallel towards their base. *Abdomen* moderate, anal tuft well-developed. *Legs* smooth, without projecting scales.

749 (1). *Leontochroma aurantiacum*, sp. n.

Antennæ (broken) tawny reddish at the base. *Palpi* pale tawny reddish. *Head* and *thorax* tawny reddish. *Fore wings* tawny reddish, the lines of the veins and a few transverse reticulations delicately marked with tawny fuscous; a basal patch, curved on its outer side, an oblique central fascia before the middle reaches the dorsum scarcely beyond the middle, and a subapical band, all tawny reddish brown more or less outlined with tawny fuscous; cilia tawny fuscous, with a slender pale line along their base. *Exp. al.* ♂ 21, ♀ 22 mm. *Hind wings* pale greyish cinereous, blending to bright orange-ochreous beyond the middle, with one or two transverse reticulations from the costa near the apex; cilia greyish cinereous. *Abdomen* greyish cinereous, anal tuft ochreous. *Legs* reddish ochreous.

Type, ♂ (9129) Mus. Wlsm.

Hab. SIKKIM, X. 1889 (*Elwes*). Two specimens.

749 (2). *Leontochroma suppurpuratum*, sp. n.

Antennæ, *palpi*, and *head* reddish fuscous. *Thorax* pale reddish fuscous with a strong lilac sheen, a dark reddish brown tuft posteriorly. *Fore wings* shining pale lilac, suffused with reddish brown from near the base of the dorsum to the tornus, this shade extends obliquely from the base to the upper edge of the cell and is so far clearly defined, blending into the delicate lilac ground-colour above and beyond the middle of the wing; the apical half of the wing and some part of the middle is thickly speckled with reddish brown dots; a slight reddish brown shade about the middle of the costa, and a stronger ferruginous shade along the outer third of the costa reaching nearly to the apex; the termen is narrowly shining rosy steel-grey; cilia pale ferruginous, with a narrow reddish brown line along their base, their extreme apex touched with fuscous. Underside cinereous, with a strong reddish ferruginous tinge along the costa and termen, the extreme apex purplish fuscous and there is some greenish shading beneath the costa. *Exp. al.* ♂ 22, ♀ 27 mm. *Hind wings* rufo-cinereous at the base, shading outwards to

pale reddish ferruginous; cilia pale ferruginous, greyish fuscous at their apex. Underside cinereous, with a strong reddish ferruginous tinge along the costa and termen, the extreme apex purplish fuscous and there is some greenish shading along the costa. *Abdomen* greyish fuscous, anal tuft ferruginous. *Legs* reddish ferruginous.

Type, ♂ (9131); ♀ (9132) Mus. Wlsm.

Hab. SIKKIM—Tonglo, 10,000 feet, VII. 1886 (*Elwes*).
Four specimens.

749 (3). *Leontochroma viridochraceum*, sp. n.

Antennæ, *palpi*, and *head* reddish brown. *Thorax* pale reddish brown. *Fore wings* shining greenish yellow, suffused on the outer third with reddish brown, and with a large ill-defined reddish brown dorsal patch reaching from near the base of the dorsum to the tornus; this dorsal patch is of a somewhat triangular shape with its apex somewhat curved outwards towards the middle of the wing, its outer edge is more clearly defined than its inner edge, except on the dorsum; the overclouding of the apical third of the wing is less intense in colour than the dorsal patch, except in the case of two patches lying about the end of the cell and an elongate costal shade attaining the apex; between these markings is a shining paler space, but of a rather rosy tint, in which the greenish yellow ground-colour does not enter; cilia reddish ochreous. Underside shining pale yellowish ochreous, costa and termen reddish ochreous. *Exp. al.* 31 mm. *Hind wings* pale shining greyish cinereous, blending to æneous on their outer half; cilia pale shining cinereous with an æneous tinge. Underside shining pale yellowish ochreous, costal and apical margins reddish ochreous, apex strongly reticulated with deep rich reddish ochreous (almost reddish brown). *Abdomen* ochreous. *Legs* very pale ochreous, touched on their undersides with reddish ochreous.

Type, ♀ (9135) Mus. Wlsm.

Hab. SIKKIM—Tonglo, 10,000 feet, VII. 1886 (*Elwes*).
Unique.

If this is only a form of *suppurpuratum*, Wlsm., it is widely distinct not only in the ground-colour of the wing but also in the position of the markings, and deserves at least a varietal name.

749 (4). *Leontochroma lebetanum*, sp. n.

Antennæ ochreous. *Palpi* tawny brown. *Head* and *thorax* tawny reddish brown. *Fore wings* pale tawny, with a

transverse oblique median band of dark tawny reddish brown from the middle of the costa to the dorsum before the tornus, this is met by a diffused shade of a scarcely paler tint coming from the base and overflowing the dorsal half of the wing; there is also a costal shade on the outer third reaching to the apex; cilia tawny. *Exp. al.* 20 mm. *Hind wings* greyish, with a tawny suffusion on their outer half above the middle; cilia greyish. Underside of both wings with the costal and terminal portions overspread with tawny reddish ochreous, somewhat reticulated, the remainder being grey. *Abdomen* brownish grey. *Legs* greyish ochreous.

Type, ♂ (61145) Mus. Wlsm.

Hab. E. CHINA—Omei Shan, VI.–VII. Unique.

[To be continued.]

LXII.—*Some new or little-known Neotropical Scorpions in the British Museum.* By R. I. POCOCK.

Family **Buthidæ**.

Genus **TITYUS**, C. Koch.

Tityus Simonsi, sp. n.

Differing from *T. ecuadorensis typicus*, which also occurs at Loja, in having the upperside of the trunk a uniform blackish brown, without yellow bands, the legs not variegated, but yellow at the base, and becoming lightly infuscate upon the femora and patellæ, and the whole hand blackish or brownish red, the finger-tips only being yellow; tail with segments 1–3 pale above, black along the middle line below and posteriorly on each side, much as in *T. ecuadorensis*; fourth and fifth segments and vesicle blackish; sterna uniformly pale.

Trunk granular and crested above, as in *T. ecuadorensis*: sterna of abdomen coriaceous, the first and second without large punctures; fourth and fifth finely granular, the former with a pair of weak keels, the latter with four granular keels, the external abbreviated posteriorly.

Tail granular and crested practically as in *T. ecuadorensis*; *vesicle* wider than brachium, furnished with a spine which is much smaller and closer to the base of the aculeus than in *T. ecuadorensis*, much resembling, in fact, the spine of *T. insignis* or *T. obtusus*.

Chelæ granular and crested as in *T. ecuadorensis*; hand wider than brachium; movable finger with 14 rows of teeth.

Pectinal teeth 17-18

Total length 65 millim., carapace 6, tail 37.

Loc. Loja, 2000 m. (*P. O. Simons*).

Family Chactidæ.

Genus MEGACORMUS, Karsch.

Megacormus segmentatus, sp. n.

Colour a tolerably uniform reddish brown; terga with traces of three pale spots, one median and one at each lateral angle; legs yellow, variegated with deep brown.

Closely allied to *M. granosus*, but differing in having the shaft of the pectines very distinctly segmented, consisting of an apical, a median, and two large basal sclerites.

Pectinal teeth 4.

Total length 33 millim.

Loc. Atoyac in Vera Cruz (*A. Duges*).

Genus PLESIOCHACTAS, nov.

Allied to *Megacormus*, Karsch, but with the carapace broad and squarely truncate in front; the stigmata elongate and slit-like, not with the ends strongly curled round as in *Megacormus*, and with distinct "fulcra" on the pectines.

Type *P. Dugesi*, sp. n.

Plesiochactas Dugesi, sp. n.

Colour nearly black, varied with yellowish red; terga with a pair of large yellow spots on the posterior border; coxæ and legs yellowish red, the coxæ clouded, the legs strongly ringed with black.

Carapace as long as caudal segment 1+2+½ of 3, a little longer than fifth, coarsely granular; terga coarsely granular, the posterior terga finely and closely granular as well; sterna and coxæ completely smooth, densely punctured, the last sterna only weakly granular, with a median and a pair of lateral abbreviated crests.

Tail with crests evenly and coarsely granular, the intervening spaces sparsely granular, except on the upperside, which has a densely granular median patch; vesicle granular, fusiform, elongate.

Chelæ with strongly granular crests, intervening spaces sparsely but rather coarsely granular; brachium with a few

strong teeth in front and a row of 12 setal pores below; hand a little wider than brachium, its width about two thirds the length of the underhand; hand with 7 granular crests; the external finger-keel strong; *fingers* long, slender, in contact, the movable quite as long as the carapace and considerably longer than the underhand.

Pectinal teeth 8-9.

Measurements in millimetres.—Total length 44; length of carapace 6; tail 14; underhand 4.5; movable finger 6.5; width of hand 3.

Loc. Atoyac in Vera Cruz, Mexico.

One specimen of this interesting new species kindly sent to the British Museum by Dr. A. Dugès.

Genus CHACTAS, Gerv.

Chactas Simonsi, sp. n.

Colour entirely black throughout, except for the tarsi, vesicle, lower side of cephalothorax, and middle of first three abdominal sterna, which are brown.

Carapace almost granular throughout, smooth and punctured round the median eyes and on the summit of the tubercle; frontal lobes rounded; lateral eyes but little prominent, median eyes rather more than a diameter apart.

Terga sparsely covered in their posterior half with coarse scattered granules, more thickly granular at the sides.

Sterna smooth, pitted with a few coarse punctures and obsoletely punctulate.

Tail tolerably thick; third segment as wide as long, fifth only a little more than twice as long as wide; first and second segments quite smooth and polished below, third roughened with weak granulation, fourth granular throughout but without median keels, fifth also coarsely granular and normally keeled below; inferior and superior lateral keels strong and subdentate, inferior lateral keel distinct on third and fourth, just traceable on second segment; lateral and superior surface of tail with a few coarse granules, upperside of fifth segment finely granular; vesicle granular below, wider than fifth caudal segment and wider than high.

Chelæ: humerus granular above; brachium roughened above, with low squamiform granules, coarsely granular posteriorly, furnished below with a series of 5 setal pores; hand as wide as the length of the underhand, its width about four fifths the length of the movable digit, smooth in the middle above, but sculptured with a punctured network, becoming coarsely granular externally and internally, inner surface coarsely granular,

especially in its upper half; biting-edge of immovable finger more than twice as long as basal width of the finger, armed on its basal portion with a spiniform tooth, which fits into a shallow excavation occupying nearly the basal half of the movable digit and emphasized in front by a low lobe.

Legs with femora granular above and below anteriorly (externally), smooth, except for a few granules on the femur of the fourth.

Pectinal teeth 7.

Measurements in millimetres.—Total length 68; carapace 9.5; tail 36; width of hand 7; length of movable digit 8.8.

Loc. Rio Amboke in Ecuador (*P. O. Simons*).

Allied to *C. Rosenbergi*, Poc., from Chimbo, but with the legs black, the terga not finely and closely granular, the tail more granular, especially on the lower surface of the third segment, &c.

Chactas lojanus, sp. n.

♀.—*Colour* as in *C. Rosenbergi*, but with the legs darker brown, although considerably paler than in *C. Simonsi*; vesicle ferruginous.

Carapace with anterior border more truncate than in *C. Rosenbergi*, the frontal lobes scarcely rounded and separated by a very narrow notch.

Terga more granular than in *C. Rosenbergi*, being mostly covered with granules, which are especially fine and close-set in the median impression and at the sides.

Tail much as in *C. Rosenbergi*, but more granular, the sides of the first and second segments granular down to the position of the inferior lateral keel, and the lower surface of the third also more granular and obsoletely keeled in the middle; third caudal segment longer than wide, fifth nearly three times as long as wide.

Chelæ very similar to those of *C. Rosenbergi*, but smooth, the fingers longer and more like those of *C. Simonsi*, the basal width of the immovable being less than half the length of its biting-edge.

Spines on *tarsi* long.

Pectinal teeth 7.

Male much like the female, but with upperside of trunk and tail dull, being closely covered with granules, the eminence on the carapace alone shining. *Chelæ* not longer than in female, but with the hand stouter.

Measurements in millimetres.—

	Total length.	Carapace.	Tail.	Underhand.	Movable finger.	Width of hand.
♀ ..	66	9.5	34	7.3	9	6.3
♂ ..	66	9	36	7.2	8.4	7.3

Loc. Loja, 2000 m., in Ecuador (*P. O. Simons*).

Genus TEUTHRAUSTES, Simon.

Teuthraustes oculatus, sp. n.

♀.—Colour black, vesicle and tarsi ferruginous.

Carapace with anterior border transverse, but distinctly notched in the middle line; frontal area very sparsely granular, mesially grooved, ocular tubercle high; three distinct lateral eyes; ocular tubercle, posterior portion of carapace on each side of the median groove, and area round tubercle smooth.

Anterior five *terga* quite smooth in the middle, sparsely granular laterally, without trace of enlarged tubercle on each side on the posterior margin.

Sterna and *tail* as in *T. nitescens*, but the superior caudal keels a little more coarsely granular.

Chela as in *T. nitescens*, but the brachium and hand not visibly crested, the latter almost entirely smooth and very obsoletely sculptured.

♂.—Differs from the male of *T. latimanus* in being much more finely granular throughout, with larger ocular tubercle; hand much narrower, its width much less than length of fifth caudal segment; fingers longer, immovable considerably longer than its basal width.

Measurements in millimetres.—

	Total length.	Carapace.	Tail.	Width of hand.	Length of underhand.	Length of movable finger.
♀ ..	59	8.5	32	6.5	6	8
♂ ..	46	7	28	6	5.2	6

Loc. Sinche and Riobamba, 3000-4000 m. (*P. O. Simons*).

Since describing the species known as *T. latimanus* and *T. monticola*, the former from Corazon, 12,000 feet, the latter from Machachi, 9000-10,000 feet, I have seen several representatives of both forms from Machachi (*E. Whymper*), which convinces me that the differences are merely sexual. *T. nitescens* is probably only a subspecific form.

Family Vejovidæ.

Genus HADRUIDES, Pocock.

Dr. Kraepelin, in the 'Tierreich,' admits only one species for this genus, giving the following list of synonyms:—*H. lunatus*, L. Koch, = *maculatus*, Thor., *parvulus*, Karsch, *charcasus*, Karsch, *Puaschi*, Karsch, and *robustus*, Boeris.

Although I have had no opportunity of examining the types of any of the forms bearing the names given above, I do not doubt that Kraepelin has confused at least two species, and very possibly more, under the name *H. lunatus*. One of these is the true *H. lunatus*, which, judging by L. Koch's admirable description, is represented by several Peruvian specimens in the British Museum. A second is what may be provisionally called *H. charcasus*; *H. maculatus* is probably a third.

Hadruioides lunatus, L. Koch.

Telegonus lunatus, L. Koch, Verh. z.-b. Wien, 1867, p. 235.

Hadruioides lunatus, Kraepelin, Das Tierr., Scorp. p. 188 (1899) (in part).

♀.—Colour yellow; carapace and terga lined with black, each tergal plate marked with four black spots, one narrow on each side of the middle line and one broader near the lateral margin. Closely allied in structural features to the species described by Kraepelin as *H. lunatus* of L. Koch, but considerably smaller, with the inferior lateral keel of the fourth caudal segment smooth; the hand entirely smooth and narrower, its width in the adult being only equal to half the length of the carapace; the fingers when closed are distinctly separated at the base by an excavation on the immovable finger. Pectinal teeth 11–12.

♂.—Smaller than female, with frontal area and abdominal sterna finely and closely granular, pectinal teeth 14–15, and a considerably larger notch and lobe on the base of the immovable finger.

Measurements in millimetres.—♀. Total length 45; length of carapace 6, of tail 25. ♂. Total length 37; length of carapace 5, of tail 23.

Loc. Peru (without further history); two adult males and four adult females. Also a single female from Callao.

Kraepelin appears to have mistaken this species for the young of the form described as *H. charcasus* by Karsch. *H. maculatus*, Thorell, can scarcely be synonymous with this form, since Thorell expressly says:—"segmentum ventrale ultimum costis duabus tenuibus utrinque munitum." And

again, speaking of the tail, "carinæ mediæ inferiores læves, in segmento quarto obsoletæ." Kraepelin completely ignores these statements. *H. parvulus* is compared by Karsch with *maculatus*, and is probably a synonym of it.

Hadruioides charcasus, Karsch.

Hadrurus charcasus, Karsch, MT. Münch. ent. Ver. iii. p. 138 (1879).

Hadrurus Paaschi, id. Berl. ent. Zeit. xxv. p. 290 (1881).

Hadrurus robustus, Boeris, Atti Soc. Modena, viii. p. 135.

Hadruioides charcasus, Pocock, Ann. & Mag. Nat. Hist. (6) xii. p. 329 (1893).

Hadruioides lunatus, Kraepelin, Tierr., Scorp. p. 188 (1899) (in part.).

Differing from *H. lunatus* in its much larger size, very thick hand, of which the inner surface is granular, and large number of pectinal teeth. The largest specimen in the British Museum is a male, and measures 78 millim.

The pectinal teeth vary from 16-19 in ♀ and from 18-22 in ♂.

The British Museum has specimens from the following localities:—Paita (*Hamb. Mus.*), Eten and Bafios (*P. O. Simons*), in Peru; Bolivia (*Keyserling coll.*).

Hadruioides maculatus, Thorell.

Hadrurus maculatus, Thorell, Atti Soc. Ital. Sci. Nat. xix. p. 186 (1877).

? *Hadrurus parvulus*, Karsch, MT. Münch. ent. Ver. 1879, p. 135.

Loc. Callao (Peru).

According to Thorell's description this species differs from *H. lunatus* in having four keels on the underside of the last abdominal sternum and of the first, second, and third caudal segments. From Karsch's description it may be inferred that *H. parvulus* presents similar features.

Hadruioides carinatus, sp. n.

♀.—*Colour* yellowish brown, the terga sometimes showing traces of four narrow black bands; chelæ, legs, and tail paler yellow, variegated with small black spots.

Upperside of body, except on the frontal area, which is smooth, covered with fine close-set granules, finer and closer than in *H. lunatus*.

Sterna smooth, impressed with coarse scattered punctures, the last granular at the sides and furnished with four strong but weakly granular keels.

Tail strong, the lateral surface of the anterior segments more granular than in *H. lunatus*, the inferior median

keels obsolete only on the fourth, strong on the first and second, weaker on the third, finely granular on the first; inferior lateral keels weakly granular on segments 1-4; superior lateral keel of fifth smooth, not granular; vesicle nearly smooth, finely and closely granular below, not so wide as in *H. lunatus*.

Chelæ much as in the latter, but the hand smaller and quite smooth; immovable finger lightly excavated at base; width of hand exceeding that of brachium, a little less than length of underhand, the latter about two thirds the length of the movable finger.

Pectinal teeth about 18.

Femora and patellæ of third and fourth *legs* distinctly granular.

♂.—Like the female, but with the sterna finely coriaceous, the tail a little longer relatively, and the vesicle more lengthened; *chelæ* with hand at most a little shorter than in female, but the immovable finger with strong lobe and basal excavation, so that when closed a distinct wide space is left between the base of the fingers.

Pectinal teeth 19-21.

Measurements in millimetres.—

	Total length.	Carapace.	Tail.	Width of hand.	Length of movable finger.
♀ ..	56	7	33	3	6
♂ ..	52	6.5	34	3	6

Loc. Baños, 3000 m., near Cajamarca, in Peru (*P. O. Simons*).

Apparently allied to *H. maculatus*, Thor. (*Atti Soc. Ital. Sci. Nat.* xix. p. 186, 1876), from Callao, which also has the median keels present on the last abdominal sternum and on the first three caudal segments, but differing in having the upper edges of the fifth caudal segment smooth and not densely granular.

Hadruioides leopardus, sp. n.

(Typical lowland form.)

♀.—*Colour* yellow, spotted and banded with black; sides of carapace banded with black; frontal area with median stripe; terga yellow, marked with four black spots and a black lateral margin; sterna pale, the last only with two dark lines on the keels, last marbled with black at the sides, spotted below; legs and *chelæ* spotted with black.

Trunk finely granular above, frontal area smooth; sterna smooth, the last granular laterally and furnished with a pair of lateral granular keels.

Tail with the median keels on segments 1-4 absent, as in *H. lunatus*; the inferior-lateral keels distinct and finely granular, the superior and superior-lateral keels and the spaces between them distinctly granular; superior edges, lateral and inferior surface of fifth caudal segment, and vesicle granular.

Chelæ: humerus with superior and anterior granular crests; brachium smooth, punctured, without distinct crests, the inferior crests on the anterior side alone being weakly granular; hand smooth, narrow, barely as wide as brachium, its width less than length of underhand and a little less than half the length of the movable finger; fingers in contact throughout, neither lobate nor sinuate.

Pectinal teeth 12-15.

♂.—Like the female, but with the upperside of the trunk more granular; the frontal area only smooth in the middle; sterna also finely shagreened throughout. Chelæ as in female.

Pectinal teeth 15-17.

♀.—Total length 36 millim., carapace 4.5, tail 19.

Loc. Eten (sea-level), Peru (*P. O. Simons*). Several adult males and females.

Subspecies *vittatus*, nov.

(Mountain form.)

Nearly allied to the typical form, but much blacker, the terga being black and marked with five longitudinal yellow bands, the black patches being much larger than in *H. leopardus*. The inferior-lateral crests of the tail are smoother than in the typical form and the tail more robust. Male unknown.

Pectinal teeth 14-16.

Total length 40 millim., carapace 5, tail 25.

Loc. Baños, 3000 m., near Cajamarca in Peru (*P. O. Simons*).

Synopsis of the Species.

- a. Last abdominal segment and anterior three caudal segments furnished below with *four* keels.
 - a¹. Superior-lateral edges of fifth caudal segment smooth. *carinatus.*
 - b¹. Superior-lateral edges of fifth caudal segment granular. *maculatus.*
- b. Last abdominal sternum and anterior three caudal segments with median keels absent.
 - a². Brachium without crests above, not wider than hand; fingers in contact throughout in the adults of both sexes, neither sinuate nor lobate. *leopardus.*
 - b². Brachium strongly crested, narrower than hand; fingers lightly or strongly sinuate.
 - a³. Small, 30-40 mm. in adult: pectinal teeth 11-15 (♂ ♀); hand not granular, fingers more strongly lobate; width of hand in adult only about half the length of the carapace. *lunatus.*

- b*³. Large, 60-80 mm. in adult: pectinal teeth 16-22 (♂ ♀); hand granular internally, fingers weakly lobate; width of hand in adult much exceeding half the length of the carapace *charcasus*.

Note.—Mr. P. O. Simons also collected two species of Bothriuridæ, namely *Brachistosterus Ehrenbergi*, at Eten in Peru, and *Bothriurus coriaceus*, Pocock, at Baños.

With regard to Kraepelin's determination of the species of the genus *Bothriurus*, it may be remarked that there is no justification for the retention of the name *chilensis*, Molina, for the species I have described as *B. signatus*. The name *Scorpio chilensis* of Molina may have been founded upon a species of *Hadruroides*, or *Caraboctonus*, or *Bothriurus*, or, indeed, upon almost any of the species of Bothriuridæ or Vejovidæ that occur in Chili. The fact that Karsch identified a particular species as probably referable to the *Scorpio chilensis* of Molina has little or no value in settling what *chilensis* really is. Hence, since it is more than doubtful that *B. signatus*, Pocock, = *Scorpio chilensis*, Mol., it is indefensible to assign the latter name to the former species.

BIBLIOGRAPHICAL NOTICE.

Die Lepidopterenfauna des Bismarck-Archipels. Mit Berücksichtigung der thiergeographischen und biologischen Verhältnisse systematisch dargestellt. Von Dr. ARNOLD PAGENSTECHER, Wiesbaden. Zweiter Theil: *Die Nachtfalter.* Mit 2 col. Tafeln. (*Zoologica*, Heft 29.) Stuttgart, 1900.

THIS is the second and concluding part of a work of which we had the pleasure of noticing the first part, which contained the Butterflies, a few months ago. Some pages of general observations are prefixed to the second part, in which the author remarks that the fauna of the Bismarck Archipelago is most nearly related to that of New Guinea and the Moluccas to the west, and to that of the Solomon Islands to the east, and of Australia to the south. These countries contain a great number of moths of identical or representative species, especially among the Pyralidæ, a group remarkable for the vast range of many of the species which it includes. The systematic part of the book will be chiefly interesting to specialists, and the descriptions and remarks of previous authors are freely utilized to complete the subject so far as it is known. After this we find a detailed analysis of the distribution of the various families belonging to the fauna in other parts of the world, alphabetical indices of genera and species, supplementary notes to the first part of the book; &c.

PROCEEDINGS OF LEARNED SOCIETIES.

GEOLOGICAL SOCIETY.

November 22nd, 1899.—W. Whitaker, B.A., F.R.S.,
President, in the Chair.

The following communication was read:—

‘On some Remarkable Calcsponges from the Eocene Tertiary Strata of Victoria (Australia).’ By George Jennings Hinde, Ph.D., F.R.S., F.G.S.

The greater number of the sponges described were discovered by Mr. T. S. Hall, M.A., of Melbourne University, in incoherent detrital beds of Eocene age, in the southern part of Victoria; a few were picked out of some washings of fragmental polyzoa from the same district and horizon, by Mr. B. W. Priest. Some of the specimens are in an extremely perfect condition, and their structural details are as distinctly shown as in recent sponges. They are also of more than local interest in that they are the first fossil forms described of a group of calcsponges, the Lithonina, characterized by the peculiar aberrant forms of some of the spicules, and the mode in which they are closely fitted and organically fused together to form the skeletal mesh. This structure has, so far, only been recognized in one recent species, *Petrostroma Schulzei*, Döderlein, from the Japanese Sea.

The sponges are small, unattached, with a glassy, firm, resistant skeleton, calling to mind that of siliceous Lithistida. They are built up of a great variety of spicular forms, some are simple rods, with three- and four-rayed spicules, similar to those in recent calcsponges; but the majority are aberrant four-rayed forms, with three of the rays curved and with obtuse or expanded ends which are clasped, and fused as well, to the surfaces of adjacent spicules. The connected spicules form continuous anastomosing or radial fibres resembling those in the fossil Pharetrones, to which they are in some other respects similar, and it is probable that the spicules in the fibres of some members of this family were likewise organically cemented together. The common *Porosphaera* from the Upper Chalk, generally regarded as Hydrocorallines allied to the recent *Millepora*, are also closely related to the above sponges, and the Author hopes shortly to publish the evidence for their affinity to this group.

The Victorian sponges are placed in four new species, belonging to three genera: two of these are new, the other, *Bactronella*, Hinde, was founded on some peculiar calcsponges of Jurassic Age, now known to be Lithonine in character.

December 6th, 1899.—W. Whitaker, B.A., F.R.S.,
President, in the Chair.

The following communication was read:—

‘On the Geology and Fossil Corals and Echinids of Somaliland.’ By Dr. J. W. Gregory, F.G.S.

British Somaliland consists of a high plateau, of which the northern scarp is separated from the Gulf of Aden by a belt of low hills and plains known as the Guban. The southern plateau

consists of Archæan gneisses, quartzites, amphibolite-schists, chloritic schists, and pegmatites. It is capped by purple grits, red sandstones, and conglomerates, which are covered by limestones of Neocomian, Turonian (? Cenomanian), and Eocene ages. The Neocomian limestone, which may be correlated with that of Singeli described by Rochebrune, occurs at Dobar in the Guban; while a Jurassic limestone, probably of Bathonian date, occurs at Bihendula in the Guban. Fossils collected from these limestones and from raised reefs of Pleistocene age, by Mr. and Mrs. Lort Phillips, Miss Gillet, Mr. G. P. V. Aylmer, Capt. E. T. Marshall, and Mr. F. B. Parkinson, have been examined by the author, who tabulates a list of corals and echinids. One new genus and fourteen new species of corals are described, belonging to the genera *Stylophora*, *Stylina*, *Columnastræa*, *Prionastræa*, *Favia*, *Metethmos*, *Cyclolites*, and *Litharæa*, and one new species of *Pseudodiadema*. The evidence of the collections is sufficient to show that a Neocomian limestone occurs both on the summit of the Somali plateau and on the floor of the Guban, and that some marine limestones of Lower Tertiary age (probably Eocene) also occur on the plateau. It is therefore evident that the foundering of the Aden Gulf is post-Eocene in age.

MISCELLANEOUS.

A Question of Nomenclature.

To the Editors of the Annals and Magazine of Natural History.

GENTLEMEN,—I greatly regret to have again to intrude on your space with regard to a question of nomenclature.

I learn to my regret that this island is not the only part of Europe that harbours the pious priority-purist; a German ornithologist has, I am informed, proposed to apply the word *Apus* to the Swift!

What justification he can find in the numerous tomes that have been written about birds I know not, and do not seek to know.

I have, however, to submit that *Apus*, both by law and prescription, belongs to the freshwater crustacean that has for a century and a half been known by that name: for it was called *ἄπους* by Frisch in 1732; this was adopted in 1756 by Schäfer, who, on p. 131 of his 'Krebsartige Kiefenfüsse,' speaks of *Apus pisciformis*. I submit that Schäfer's generic name stands on an equality with those of Brisson or Artedi, which are expressly named in the note to law 2 of the British Association rules.

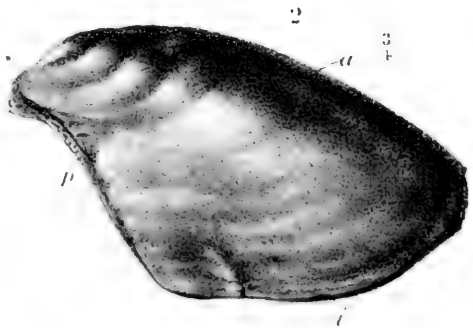
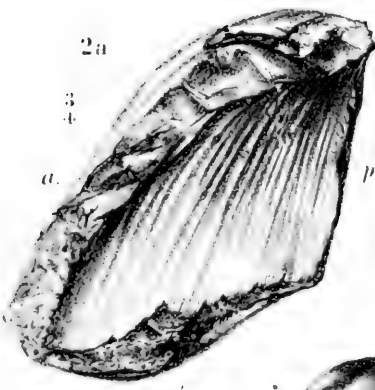
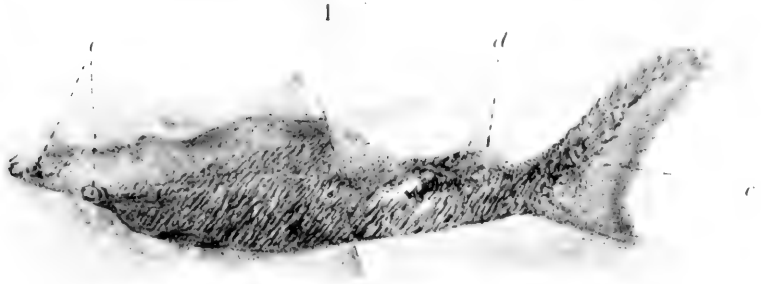
But I should like to go further. A law or a process which leads to the changing of so well-known a name is an abuse to good sense, and serves to bring our science into disrepute.

Your faithful Servant,

F. JEFFREY BELL.

April 11, 1900.

P.S.—I am reminded that Scopoli (Introd. Hist. Nat. 1777, p. 404) speaks of the genus *Apos* for *Monoculus apus*, Linn., and on p. 453 of *Apus* for *Hirundo apus*, Linn. That after the knowledge of this obvious misprint a priority-purist should continue to insist that the name of the Swift is *Apus* makes me regret my epithet of pious, and inclines me to one of a very different significance.







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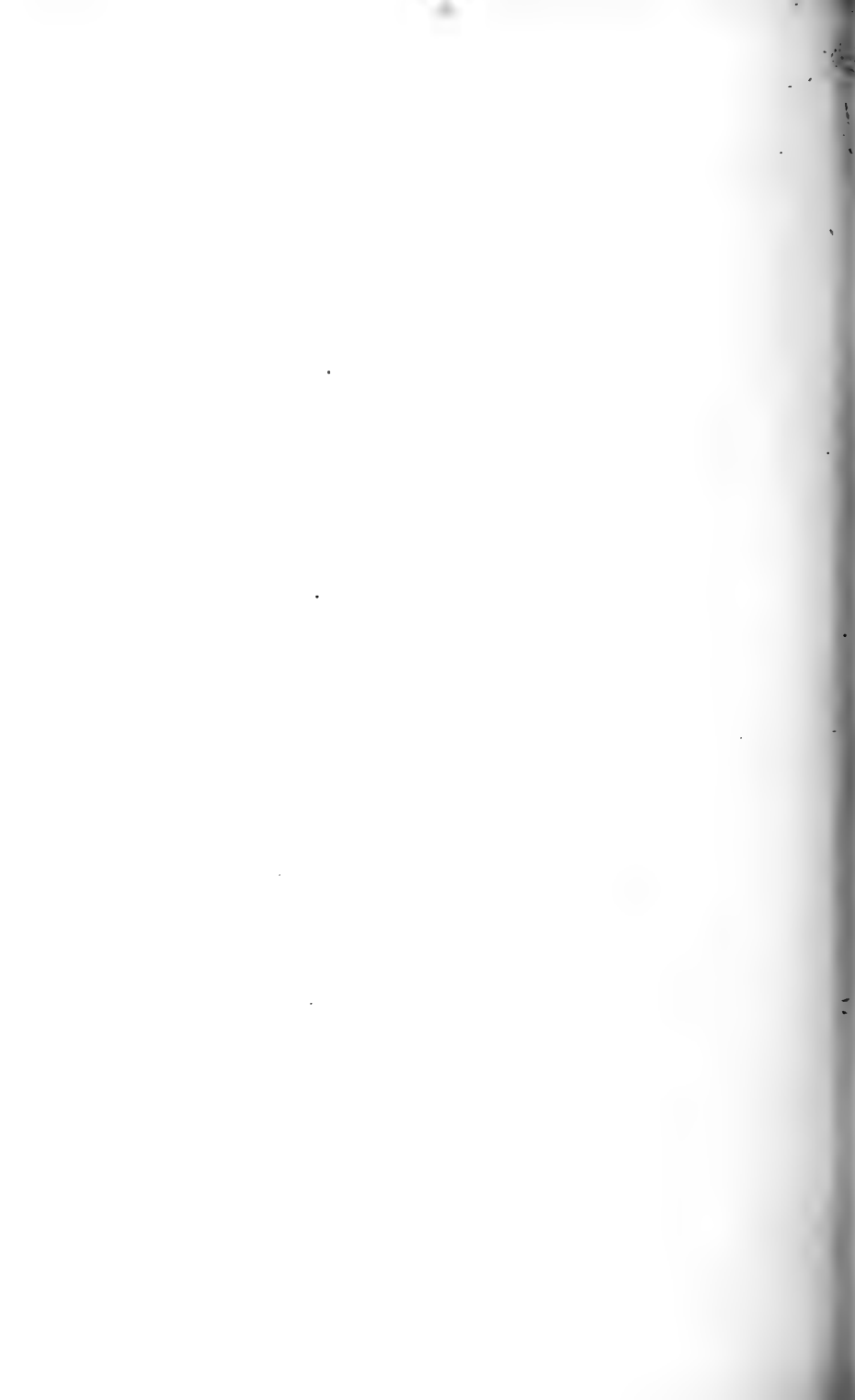
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THE ANNALS

AND

MAGAZINE OF NATURAL HISTORY.

[SEVENTH SERIES.]

No. 30. JUNE 1900.

LXIII.—ASIATIC *TORTRICIDÆ*.

By the Rt. Hon. LORD WALSHINGHAM, M.A., LL.D., F.R.S.

[Continued from p. 469.]

ADOXOPHYES, Meyr.

ADOXOPHYES, Meyr. Pr. Lin. Soc. N.S.W. VI. 429 (1881): Tr. N.Z. Inst. XV. 39-40 (1883).

749 (5). *Adoxophyes privatana*, Wkr.

n. syn. = *cyrtosema*, Meyr.

Dichelia privatana, Wkr. Cat. Lp. Ins. B. M. XXVIII. 320 (1863)¹.
Adoxophyes cyrtosema, Meyr. Tr. Ent. Soc. Lond. 1886, 276². *Dichelia privatana*, Swinh. & Cotes, Cat. Moths Ind. 697. No. 4752 (1889)³; Swinh. Tr. Ent. Soc. Lond. 1890, 294⁴.

Hab. JAPAN—HONDO—Fushiki, VII. 1887 (*Leech*); KITSU—Nagasaki, VI. 1886 (*Leech*). COREA—Gensan, VI. 1886 (*Leech*). CHINA—Skip-y-Shan. ASSAM—Margherita (*Doherty*, 1889); Kohima (Naga Hills), 4700 feet, VI. 1889 (*Doherty*); Golaghat (Naga Hills) (*Doherty*, 1890). MADRAS—Ganjam, X. 1882 (*Minchin*). CEYLON—Paradeniya (*Thwaites*). BURMAH—†Moulmein (=†*Hindustan*¹)⁴. S.W. SUMATRA—Liwa, 3000-4500 feet, VII.-VIII. 1890 (*Doherty*); Padang Rengas (*Doherty*, 1891). S.E. BORNEO—Riam Kiwa, 500-1000 feet (*Doherty*, 1891). S. CELEBES

—Macassar, 500 feet (*Doherty*, 1891). AMBOYNA (*Doherty*, 1892). BATIAN (*Doherty*, 1892). TENIMBER (*Doherty*, 1892). TERNATE (*Doherty*, 1892). TALAUT (*Doherty*, 1892). FIJI². TONGA².

749 (6). *Adoxophyes fasciata*, sp. n.

Antennæ cinereous, dotted with brownish fuscous above. *Palpi*, *head*, and *thorax* pale reddish brown. *Fore wings* pale reddish brown, with three transverse oblique darker red-brown fasciæ having inconspicuous transverse waved lines of whitish ochreous between them; the first fascia, from the middle of the lower edge of the costal fold to the dorsum at one-third, is sometimes interrupted on the fold, the space between it and the base of the wing is also spotted or reticulated with red-brown; the second fascia, from the outer end of the costal fold to the dorsum before the tornus, is of approximately equal width throughout, and projects slightly inwards where it crosses the fold; the third fascia, from the outer third of the costa, dying out before the lower half of the termen; there is sometimes a short half-fascia rising from the tornus and bent back towards the middle of the central fascia; about the apex are some slender streaks of the darker shade of reddish brown; cilia whitish ochreous, touched with pale reddish brown. (In the female, which is usually larger than the male, the transverse fasciæ are frequently obliterated, but the wings have a somewhat more reticulated appearance on their outer half and in some specimens the ground-colour is darker, inclining to tawny.) *Exp. al.* ♂ 15–16, ♀ 15–21 mm. *Hind wings* shining pale rosy cinereous; cilia shining whitish cinereous. *Abdomen* greyish, anal tuft inclining to ochreous. *Legs* pale whitish ochreous.

Type, ♂ (70052); ♀ (70053) Mus. Wlsm.

Hab. JAPAN (*Pryer*, 1886)—HONDO—Yokohama (*Manley*, 1888); KIVSU (*Leech*). KASHMIR—Scinde Valley, 7000 feet, VI. 1887 (*Leech*). Twelve specimens.

CAPUA, Stph.

= *BATODES*, Gn.

Capua menciiana, Wkr.

Pandemis menciiana, Wkr. Cat. Lp. Ins. B. M. XXVIII. 310 (1863)¹.

Hab. JAPAN (*Pryer*, 1886)—HONDO—Gity (*Pryer*, 1886); Yokohama (*Manley*, 1888); KIVSU—Nagasaki, V.–VI. 1886 (*Leech*). SHANGHAI¹. SIKKIM, 4700 feet, I. 1889;

X. 1889 (*Möller*). KHASIAS—Cherrapunji (*Nat. Coll.* 1894). ASSAM—Golaghat (Naga Hills) (*Doherty*, 1892). S.E. BORNEO—Riam Kiwa, 500–1000 feet (*Doherty*, 1891); Pulo Laut Id. (*Doherty*, 1891). S. CELEBES—Macassar, 500 feet (*Doherty*, 1891). TIMUR (Portuguese) (*Doherty*, 1892). BATIAN (*Doherty*, 1892).

EPAGOGÆ, Hb.

= *DICHELLA*, Gn.

755. *Epagoge Grotiana*, F.

Tortrix (*Dichelia*) *Grotiana*, Stgr. & Wk. Cat. Lp. Eur. 239. No. 756 (1871).

Hab. EUROPE. JAPAN (*Pryer*, 1886). COREA—Fusan, 24 VI. 1886 (*Leech*). CHINA—Chang Yang, 4000–6000 feet (*Pratt*, 1886).

756. *Epagoge gnomana*, Cl.

Dichelia gnomana, Stgr. & Wk. Cat. Lp. Eur. 239. No. 756 (1871).

EUROPE. ASIATIC TURKEY—HALEB—Shar Devesy (*Nat. Coll.* 1893).

756 (1). *Epagoge retractana*, Wkr.

Dichelia retractana, Wkr. Cat. Lp. Ins. B. M. XXVIII. 322–3 (1863)¹; Meyr. Pr. Lin. Soc. N.S.W. VI. 474–5, 703 (1881)²; Wlsm. Pr. Z. Soc. Lond. 1885, 881 (1886)³; Moore, Lp. Ceyl. III. 492–3, Pl. 208. 11 (1887)⁴; Swinh. & Cotes, Cat. Moths Ind. 697. No. 4753 (1889)⁵.

Hab. N.E. CHINA—Ningpo, IV.; VII. 1886 (*Leech*). KASHMIR—Goorais Valley, 7000 feet, VIII. 1887 (*Leech*). PUNJAB—Dharmasala (*Hocking*). SIKKIM—Tonglo, 10,000 feet, VII. 1886 (*Elwes*). ASSAM—Margherita (*Doherty*, 1889); Golaghat (Naga Hills) (*Doherty*, 1890); Kohima (Naga Hills), 4700 feet, VI. 1889 (*Doherty*); Mao (N. Manipur), 5000–7000 feet, VIII. 1889 (*Doherty*). BOMBAY, X. 1888 (*Swinhoe*). S. INDIA—Bangalore, X. 1888 (*Minchin*). CEYLON⁶ (=† *Australia*¹; Wlsm.)—Peradeniya (*Thwaites*); Pundaloya, 4000 feet, II., IV. 1890 (*Green*); Dikoya (*Green*, 1890); Nawalapitiya, 2500 feet (*Pole*, 1890). W. SUMATRA—Padang Rengas (*Doherty*, 1891).

Walker recorded this species from Australia, but the register-number of his type is “52/52” = Ceylon (*Templeton*).

756 (2). *Epagoge angustilineata*, sp. n.

Antennæ fawn-ochreous, spotted above with fuscous. *Palpi* perfect, reaching about the length of the head beyond it, terminal joint somewhat concealed; pale fawn-brown. *Head* and *thorax* pale fawn-brown. *Fore wings* elongate, somewhat ovate; costa rounded, apex rounded, termen oblique, not impressed, tornus rounded; pale fawn-brown with a slight tinge of reddish grey, much reticulated with brown and reddish grey; a greyish fuscous spot on the costa at a little beyond one-third gives out a reddish brown line running obliquely to the dorsum at two-thirds of the wing-length; at two-thirds from the base on the costa a second oblique line runs to the termen above the tornus, a small space on the costa beyond it is tinged with greyish fuscous; before and between these oblique lines, as well as on the apical portion of the wing, are numerous reticulations of a similar colour, those on the costa inclining to greyish fuscous; cilia pale fawn, a reddish grey line running throughout them. *Exp. al.* 16 mm. *Hind wings* brownish grey; cilia pale cinereous, a slender dark shade running through them near their base. *Abdomen* [missing]. *Legs* whitish cinereous, hind tarsal joints faintly spotted.

Type, ♂ (60179); ♀ (60050) Mus. Wlsm.

Hab. JAPAN—KITSU—Satsuma, V. 1886 (*Leech*); Nagasaki, V.-VI. 1886 (*Leech*). Five specimens.

756 (3). *Epagoge minuta*, sp. n.

Antennæ pale ochreous. *Palpi* projecting more than the length of the head beyond it, slightly depressed and pointed; white, touched with brownish ochreous at the sides. *Head* white. *Thorax* white, shaded with brownish ochreous. *Fore wings* silvery white, much clouded with brownish ochreous; from a small dark spot near the base of the dorsum proceeds obliquely upwards and outwards a brownish ochreous streak, blending with a pale brownish ochreous basal shade; beyond it is a silvery white dorsal patch reaching to beyond the middle of the dorsum; a corresponding smaller silvery white costal patch above it; beyond this costal patch halfway to the apex is an elongate, triangular, silvery white oblique streak pointing to above the middle of the termen; the whole apical portion of the wing is shaded with brownish ochreous; there is also a small greyish fuscous spot at the end of the cell and some greyish fuscous scaling along the lower half of the termen; cilia white, a slender broken greyish fuscous line

running through them near their base, their tips ochreous at the apex and on the middle of the margin, but greyish fuscous at the tornus. *Exp. al.* 11·5 mm. *Hind wings* white, apex shaded with greyish fuscous; cilia shining white, with a slender pale greyish fuscous line running through them near their base on the outer half of the margin. *Abdomen* pale greyish fuscous. *Legs* white.

Type, ♂ (70115) Mus. Wlsm.

Hab. JAPAN (*Pryer*, 1886). Five specimens.

756 (4). *Epagoge* (?) *calvicaput*, sp. n.

Antennæ very short and stout, cylindrical; cinereous. *Palpi* rather conical, extending more than the length of the head beyond it; pure white. *Head* pure white. *Fore wings* dull reddish brown, mottled with pale cinereous on the basal third; with two costal spots at the base and one dorsal near the base, shining pale metallic steel-grey; immediately beyond the basal third a fasciaform band of three elongate pale shining steel-grey spots crosses the wing; on the apical third are two similar oblique costal spots, and near the tornus a group of three similar spots, two adjacent to the margin and one within it; these are surrounded by a shading of black scales; along the termen from the apex to above the tornus is a chain of connected very pale rosy steel-grey metallic spots; cilia pale cinereous, brownish ochreous along their base. *Exp. al.* 11 mm. *Hind wings* greyish fuscous; cilia pale cinereous. *Abdomen* greyish fuscous.

Type, ♀ (70432) Mus. Wlsm.

Hab. JAPAN (*Pryer*, 1886). Unique.

I place this in the genus *Epagoge*, having regard to its neuration; but the single specimen before me, although evidently distinct from any known species, has been somewhat injured, and I cannot be certain that it is a true *Epagoge*.

PHALONIA, Hb.

811 (1). *Phalonia respirantana*, Stgr.

Cochylis respirantana, Stgr. Hor. Soc. Ent. Ross. XV. 246 (1879)¹;
Rag. Ent. Mo. Mag. XVII. 232 (1881)²; Ann. Soc. Ent. Fr. LXIII.
191 (1894)³.

Hab. PORTUGAL—Silves, 16 V.⁴ ANDALUSIA—Chiclana². ASIATIC TURKEY—Sivas—Amasia, V., VII.¹;
HALEB—Shar Devesy (*Native Coll.* 1893).

855. *Phalonia badiana*, Hb.

Cochylis badiana, Stgr. & Wk. Cat. Lp. Eur. 244. No. 855 (1871).

Hab. EUROPE. JAPAN (Pryer, 1886).

885. *Phalonia ostrinana*, Gn.

Cochylis ostrinana, Stgr. & Wk. Cat. Lp. Eur. 245. No. 885 (1871).

Cochylis purpuratana, Stgr. & Wk. Cat. Lp. Eur. 245. No. 887 (1871).

Hab. EUROPE. ASIATIC TURKEY—*HALEB*—Shar Devesy (Native Coll. 1893).

886. *Phalonia roseofasciana*, Mn.

Cochylis roseofasciana, Stgr. & Wk. Cat. Lp. Eur. 245. No. 886 (1871).

Hab. EUROPE. ASIATIC TURKEY—*HALEB*—Shar Devesy (Native Coll. 1893).

899. *Phalonia hybridella*, Hb.

Cochylis hybridella, Stgr. & Wk. Cat. Lp. Eur. 245. No. 899 (1871).

Hab. EUROPE. ASIATIC TURKEY—*HALEB*—Shar Devesy, 8 VI. 1890 (Native Coll.). INDIA—*PUNJAB*—Dharmasala (Hocking).

899 (1). *Phalonia centaureana*, Stgr.

Cochylis centaureana, Stgr. Hor. Soc. Ent. Ross. XV. 247-8 (1879)¹.

Hab. S.E. RUSSIA—Sarepta, 15 VIII.¹ TURKEY—Macedonia¹. ASIATIC TURKEY—*SIVAS*—Kerasdere, V.-VII.¹ Larva *Centaurea divergens*¹: *HALEB*—Shar Devesy (Native Coll. 1893).

CHLIDONIA, Hb.

850 (1). *Chlidonia excellentana*, Chr.

Conchylis excellentana, Chr. Bull. Soc. Imp. Nat. Mosc. LVI. 74-5. No. 107 (1861)¹: sep. 162-3 (1882)¹.

Hab. AMUR—Raddefka¹; Wladiwostok¹, VI.¹ JAPAN—*Yesso* (Pryer, 1882).

852. *Chlidonia Hartmanniana*, Cl.

Cochylis Hartmanniana, Stgr. & Wk. Cat. Lp. Eur. 244. No. 852 (1871).

Hab. EUROPE. ASIATIC TURKEY—*HALEB*—Shar Devesy, 18 VI. 1890 (Native Coll.).

831 (1). *Chlidonia jaculana*, Snell.

Conchylis jaculana, Snell. Tijds. v. Ent. XXVI. 195-6, Pl. XI. 8, 8 a (1883)¹.

Hab. E. SIBERIA — Suifun¹. JAPAN — YESSO (Pryer, 1882). HONDO—Tsuruga, VII. 1886 (Leech).

PHTHEOCHROA, Stph.

Phtheochroa (?) *albiscutellum*, sp. n.

Antennæ simple, or very slightly ciliate towards apex; whitish cinereous, basal joint cream-white. *Palpi* and *head* cream-white. *Thorax* cream-white; tegulæ with a black spot at their base. *Fore wings* cream-white; with a short basal patch of mixed black, cream-white, olive-brown, and some ferruginous scales, the black being arranged in two or three costal spots, with one above the fold and one beneath it; beyond the basal patch, on the costa, are two olive-brown quadrate spots containing some blackish dots, and between and below these two, but not touching them, is the apex of a transverse band arising from the middle of the dorsum and consisting of numerous tufts of raised steel-grey scales, margined outwardly with black, the whole fading into pale olive-brown before the dorsum, with which it is connected by three blackish marginal dots, forming part of a more complete dorsal series; on the apical fourth of the wing are two very faint olive-ochreous bands, with silvery white lines between and around them, containing one or two tufts of mixed shining white and silvery grey scales; these are separated from the apex, first by a narrow band of shining white, and then by a streak of ferruginous brown mixed with blackish scales which crosses the wing from before the apex to the middle of the termen; beyond it the apex and termen are olive-brown shaded with greyish fuscous; cilia olive-ochreous, touched with greyish fuscous towards their apex. *Exp. al.* 21 mm. *Hind wings* pale brownish; cilia whitish, with a slender pale brownish shade along their base. *Abdomen* pale brownish. *Legs* cream-white; hind tarsal joints spotted above with pale brown.

Type, ♀ (40522) Mus. Wlsm.

Hab. JAPAN (Pryer, 1886). Six specimens.

In the hind wings this species differs from *rugosana*, Hb., in having veins 3 and 4 separated at their origin by a very small space.

CLYSIA, Hb.

825. *Clysia ambiguella*, Hb.

Cochylis ambiguella, Stgr. & Wk. Cat. Lp. Eur. 243. No. 825 (1871).

Hab. EUROPE. JAPAN (*Pryer*, 1886). ASSAM—Cherrapunji, VIII. 1894 (*Native Coll.*); Mao (N. Manipur), 5000–7000 feet, VIII. 1889 (*Doherty*); Golaghat (Naga Hills) (*Doherty*, 1890). PEGU—Thandsung (Karen Hills), 4000 feet (*Doherty*, 1890). W. SUMATRA—Padang Rengas, low country (*Doherty*, 1891).

PHARMACIS, Hb.

= *EUXANTHIS*, Hb., = *XANTHOSSETIA*, Stph.

795 (1). *Pharmacis dives*, Btl.

Conchylis dives, Btl. Ill. Typ. Lp. Het. B. M. II. 61–2, Pl. XL. 7 (1878)¹.

Hab. JAPAN. HONDO—Yokohama¹. AMUR (*Stgr.*). E. CHINA—Foochou, IV. 1886 (*Leech*).

800. *Pharmacis defectana*, Ld.

Cochylis defectana, Stgr. & Wk. Cat. Lp. Eur. 242. No. 800 (1871).

Hab. TRANSCAUCASIA. ASIATIC TURKEY—HALEB—Shar Devesy (*Native Coll.* 1893).

800 (1). *Pharmacis innotatana*, Wrn.

Xanthosetia innotatana, Wrn. Pr. Z. Soc. Lond. 1888, 337¹.

Xanthosetia innotana, Swinh. & Cotes, Cat. Moths Ind. 697. No. 4754 (1889)².

Hab. PUNJAB—Kala Pani, V.¹ KASHMIR—Dras Ladak, 7000 feet, 20 VI. 1887 (*Leech*).

827. *Pharmacis straminea*, Hw.

Cochylis straminea, Stgr. & Wk. Cat. Lp. Eur. 243. No. 827 (1871)¹.

Hab. EUROPE. ARMENIA¹. PALESTINE (*Tristram*).

841 (6). *Pharmacis palpana*, Rag.

Conchylis palpana, Rag. Ann. Soc. Ent. Fr. LXIII. (1894) 194–5. No. 841 g (1894)¹.

Hab. ASIATIC TURKEY—ADANA—Hadjin¹; HALEB—Shar Devesy, 26–27 V. 1890 (*Native Coll.*).

In this species veins 6 and 7 of the hind wings are not actually stalked; they run close together, and are almost coincident for one-third their length.

844. *Pharmacis pallorana*, Ld.

Cochylis pallorana, Stgr. & Wk. Cat. Lp. Eur. 244. No. 844 (1871).

Hab. TRANSCAUCASIA. ASIATIC TURKEY—*Haleb*—Shar Devesy (*Native Coll.* 1893).

846 (1). *Pharmacis apicana*, sp. n.

Antennæ (♂) strongly biciliate. *Palpi* porrected more than the length of the head beyond it, terminal joint somewhat exposed; whitish ochreous. *Head* whitish ochreous. *Thorax* whitish ochreous, fading to white posteriorly, tegulæ slightly tinged with brown posteriorly. *Fore wings* whitish ochreous, with wavy cross-lines and streaks of shining straw-white; a narrow costal shade from the base to beyond the middle is dark umber-brown, edged with ferruginous and crossed by lines of shining pale steel-grey; a triangular oblique dorsal patch before the middle, of mixed umber-brown and ferruginous, with some shining pale steel-grey intermixed; a small blackish spot at the end of the cell; the termen is broadly dark umber-brown, mixed with ferruginous, with wavy lines and spots of pale steel-grey; cilia greyish fuscous, with a few pale ochreous scales running through them. *Exp. al.* 20-22 mm. *Hind wings* and cilia brownish cinereous. *Abdomen* brownish cinereous. *Legs* brownish cinereous; hind tarsal joints with some paler spots.

Type, ♂ (70502); ♀ (70505) Mus. Wlsm.

Hab. JAPAN (*Pryer*, 1886)—*Yesso*—Hakodate, VIII. 1886 (*Leech*). Seven specimens.

HYSTEROSIA, Stph.

707. *Hysterosia inopiana*, Hw.

Tortrix (Idiographis) inopiana, Stgr. & Wk. Cat. Lp. Eur. 236. No. 707 (1871)¹.

Idiographis inopiana, Fern. Tr. Am. Ent. Soc. X. 23. No. 119 (1882)²; Mrtf. Can. Ent. XXIII. 168 (1891)³.

Hab. EUROPE¹. JAPAN (*Pryer*, 1886)—*Hondo*—Fushiki, VII. 1887 (*Leech*). CANADA³. UNITED STATES—Maine²; New York²; California².

111 (1). CARPOSINA, H.-S.

912 (1). *Carposina berberidella*, H.-S.

Carposina berberidella, Stgr. & Wk. Cat. Lp. Eur. 304. No. 2186 (1871).

Hab. EUROPE. ASIATIC TURKEY—*HALEB*—Shar Devesy (Native Coll. 1890).

[To be continued.]

LXIV.—*On the Squirrels of the Ratufa* (*Sciurus*) *bicolor*
Group. By J. LEWIS BONHOTE.

IN writing another paper dealing with various subspecies of squirrels, I should like to make a few remarks on what appear to me the advantages and necessity of recognizing these subspecific differences.

In former days, when a few skins roughly labelled and undated were the only material with which the systematist had to work, he was of necessity compelled to place under one name the various nearly allied forms which came into his hands; many of them had been described by the collector, who on getting a specimen he had not before seen, straightway described it, having no means at hand of ascertaining whether it had been previously named or not, and possibly not realizing the confusion he was storing up for the workers of the next generation. Gradually, then, as these types accumulated in large museums and were compared with each other—isolated specimens from isolated localities—the first obvious inference was that they all belonged to one species, and under one name they were accordingly placed, forms showing the most striking differences being allowed to rank as separate species. Of late years, however, large series carefully collected and with full data have been received, from which we are able to see that many of these old types referred to above are typical examples of well-defined races constant to themselves and the localities from which they come. To call these races species is misleading, as their points of difference are not sufficiently great for specific characters, and most of them would probably, if placed under conditions identical with those of another race, lose in a few generations their own

characteristics and assume those of the race into whose territory they had been imported*.

What, then, should we do? Are we to ignore these differences altogether? That could hardly be done without acknowledging our incompetence as systematists, besides which it should be borne in mind that many of these forms are in reality incipient species, and, in time to come, to have them all carefully described and enumerated will surely throw considerable light on the causes affecting variation, the period required to fix a variety, and questions such as these, about which at present we know hardly the rudimental facts, owing to our absolute lack of reliable descriptions and data of specimens collected so recently as fifty or sixty years ago.

It seems to me therefore that such forms should be noticed wherever they occur, and the chief question is, in what manner should they be designated? This at once leads us to the vexed question of trinomials, which subject I have neither the ability or knowledge to dilate upon: personally I use trinomials, as being the shortest, simplest, and most concise way of dealing with varieties due to geographical or climatic causes; it is used with great success by Americans, who in the study and classification of mammals are certainly ahead of the naturalists of most countries.

As Mr. Blanford remarks in his paper on *Sciurus indicus* †, trinomials are doubtless used for variations induced by many other causes; but one reason I would venture to put forward for the restriction of trinomials to geographical or climatic races is that when these forms become sufficiently differentiated to be regarded as *true* species no change of nomenclature need be made.

The evolution of the species must of necessity be a slow process, and a stage of evolution must sooner or later be reached in which the characteristics which would entitle it to specific rank will become very precarious and opinions will differ as to its correct designation, some authorities calling it a variety of a well-known species, while others will give it a specific name, and confusion is bound to result. Admit trinomials, and he who considers it a species will simply omit the

* This has been proved by experiment (chiefly with regard to hot and cold forms) with insects, and possibly similar results, though hardly as striking, could be arrived at with squirrels; the subject is one which it would be impossible to demonstrate by actual experiment—it might take two generations or it might take thirty. One is, however, justified in judging by analogy.

† Journ. Bombay N. H. Soc. vol. xi. p. 300.

second name, but the third name will be that by which it is known whether as species or subspecies.

My attention having been called to this group while working on some specimens from Siam, I have gone carefully through the large series in the British Museum, with the following results.

These squirrels may be readily divided into four distinct species and several subspecies or geographical races. The true habitat of all these forms is clearly defined, though from lack of material the exact limits of their range in one or two cases is still doubtful.

The species are as follows :—

- (1) *Ratufa* * *gigantea*.—Ranging from the Himalayas, Nepal, and Sikkim to Siam and the Malay Peninsula.
- (2) *Ratufa bicolor*.—From Java, Sumatra, the Malay Peninsula, and probably Borneo.
- (3) *Ratufa affinis*.—Inhabiting the southern portion of the Malay Peninsula.
- (4) *Ratufa ephippium*.—From Borneo and the Natunas.

The study of the group has been much confused by a great mass of names, a large proportion of which belong to one species, viz. *R. bicolor*, which varies so much, owing to a total or partial bleaching of its hairs, as to present considerable differences. It is worthy of note that this so-called bleaching † process does not take place in all the species; in *R. gigantea*, for instance, it is absent, although it occurs in *R. bicolor*, which overlaps the range of its larger congener in Malacca. In *R. bicolor* the bleaching is chiefly confined to the body, rarely extending to the limbs, although hardly any two individuals are exactly alike; in *R. affinis*, *aureiventer*, *bunguranensis*, and *nanogigas* it is complete, covering all the upper parts of the body, while in *R. ephippium* it is almost entirely absent, or, if taking place at all, is confined to the tail.

* For use of the generic name *Ratufa* see Thos., P. Z. S. 1897, p. 933.

† I have called this process "bleaching," as that was the term used by Mr. Oldfield Thomas (Zool. 1896, p. 401) when describing a similar process in our British squirrel. In default of further knowledge it is perhaps a convenient term to use; but by employing it I do not necessarily imply that the hair is worn or faded, but merely that it changes in colour to a light yellowish brown. The causes of this change are not known, but Mr. Thomas points out that it is *not* due to the special action of the summer sun.

[I certainly meant (and still think) that the change was a true bleaching or fading, due to the action of light. In the case I was discussing, the bleaching was already produced by the light of winter and spring, without waiting for the action of the summer sun.—O. T.]

Ratufa gigantea (MacCl.).

Sciurus giganteus *, MacClelland, P. Z. S. 1839, p. 150 Anderson, An. Zool. Res. p. 215 (1879).

Sciurus macruroides, Hodgson, J. A. S. B. x. 1841, p. 915 (no description); Jerdon, Mamm. Ind. p. 168 (1867).

Sciurus bicolor, Sparr., Blanford, Faun. Brit. Ind., Mamm. p. 373 (1891).

Sciurus bicolor, var. *giganteus* (MacCl.), W. Sclater, Cat. Mamm. Ind. Mus. p. 8 (1891).

General colour above, including head and outer side of limbs, dark black, below yellow varying in intensity. Tail same colour as the back throughout. The skull is large and broad, the pterygoids and basioccipital processes being large and well developed; the latter turn inwards away from the bulla and end in a rounded head.

Dimensions (in flesh):—

Head and body 417 millim.; tail 477; ear 30; hind foot 82.

Skull: greatest length 80; basal length 62; zygomatic breadth 48·7; greatest length of nasals 24; length of palate to henselion 29.

Ratufa bicolor (Sparrm.).

Sciurus bicolor, Sparrman, Götheb. Vet. Svensk. Handl. i. p. 70 (1778);

Thos. P. Z. S. 1836, p. 67; Anderson, An. Zool. Res. p. 215 (1879);

Blanford, Faun. Brit. Ind., Mamm. p. 373 (1891).

Sciurus bicolor, var. *typicus*, W. Sclater, Cat. Mamm. Ind. Mus. p. 7 (1891).

Sciurus javensis, Zimm. Geog. Ges. ii. p. 342 (1780).

Sciurus albiceps, Desm. Nouv. Dict. Hist. Nat. x. p. 105 (1817).

Sciurus Leschenaulti, Desm. Mamm. p. 335 (1820).

Sciurus hypoleucos, Horsf. Zool. Res. (1824).

Sciurus humeralis, Coulon, Mém. Soc. Sc. Nat. Neuchâtel (1835).

Smaller and paler than the preceding species and much lighter across the back. General colour above dark brown, considerably bleached across the centre of the back, but varying greatly in shade, some specimens being nearly black. Colour of underparts and tail as in the preceding species. Ears never tufted. Skull shows no marked differences from that of *R. gigantea* except in its smaller size.

Dimensions:—

Skull: greatest length 71·5 millim.; basal length 57; zygomatic breadth 45; greatest length of nasals 22; length of palate to henselion 27.

With regard to the smaller size of this species, it is as well to give the limits of variation, so as to show how

* For full synonymy of this and the next species see Anderson and W. Sclater as quoted above.

easily it may be distinguished by size alone, which is the chief point of difference between this and the preceding species.

The limits are as follows :—

	Greatest length. mm.	Basal length. mm.	Zygomatic breadth. mm.	Length of nasals. mm.	Length of palate to henselion. mm.
<i>R. gigantea</i> .	80—77	62—61	48·7—47·5	26—24·5	31—30
<i>R. bicolor</i> .	71·5*	57*	45—44·5	22—19·5	29—27

Almost every specimen of the present form is lighter in colour than its larger relative ; but there is no doubt that this colour is due to the “bleaching” process referred to above.

This species is by far the most variable of the group, and has in consequence received many names. I have carefully gone over all the original descriptions of the names given in the above synonymy, and am convinced that they all refer to one and the same species.

With regard to the limits of its distribution there exists some doubt ; it is certainly commonest in Java and Sumatra, and probably occurs in Borneo. The Museum possesses two specimens labelled N.W. Borneo, which were procured by Mr. Waterstraat ; they are both alike, but differ slightly from examples from the other islands ; and there is also an old skeleton labelled Borneo, the skull of which agrees perfectly with Javan examples. On the other hand, should this species occur in Borneo it is strange that neither Mr. Hose nor Mr. Everett ever came across it. It seems to me that the balance of evidence is in favour of its being found there, but a few more thoroughly authenticated specimens are required before pronouncing a definite opinion. The other locality where its occurrence may be considered somewhat doubtful is in the Malay Peninsula. The Museum contains two specimens from Bankasun, collected by Mr. W. Davison, which, except in being slightly darker, agree in all respects with Javan examples. Mr. Davison was such a careful collector that there can be no doubt that the data given are correct ; it must therefore overlap the range of its larger ally, specimens of which have been got far to the south in the Malay Peninsula ; Mr. Blanford, moreover, describes this species (as a variety of *R. gigantea*) from the “Irrawady delta and perhaps Martaban and Tenasserim.” It probably occupies the low-lying land in the Malay Peninsula, while *R. gigantea* occupies the hills.

* Owing to the skulls being imperfect only one measurement was taken.

The remaining species can be easily distinguished from the foregoing by certain well-marked characters. They are all slightly smaller than *R. bicolor*. The tail is markedly distichous and its hairs light at their bases. The skull is narrower in proportion to its length and the supraorbital processes well developed; the basioccipital processes are small and laterally flattened, they hardly bend inwards, and do not end in a knob as in the larger species. Except in size, the skulls of this latter group do not differ much among themselves.

Ratufa affinis typica (Raffles).

Sciurus affinis, Raffles (nec Horsf.), Linn. Trans. xiii. 1822, p. 259.

General colour above, including head and outside of feet, light brown or "café-au-lait," bleaching to light yellow, each hair when newly grown having a faint subterminal annulation of yellowish. Underparts pure white.

Dimensions (from skin):—

Head and body 330 millim.; tail 375; hind foot 70.

Skull: zygomatic breadth 39; greatest length of nasals 20; length of palate from henselion 25.

Hab. Singapore and Johore.

Raffles's description, which agrees closely with several specimens in the Museum from Johore, was made from a specimen from Singapore collected by M. Diard, when writing a paper on some of the latter's specimens from Sumatra. This is further evidence that the true locality of *R. affinis aureiventer*, the next species, is Malacca.

Ratufa affinis aureiventer (Geoffr.).

Sciurus aureiventer, Is. Geoffr., Guérin, Mag. Zool. 1832; Is. Geoffr. Voy. Ind.-Orient. Bélanger, p. 150 (1834); Coulon, Mém. de la Soc. Sc. Nat. de Neuchâtel, vol. i. 1835, p. 123, pl. ix.

Resembles the foregoing in all points, but is slightly smaller and the underparts are of a yellowish orange.

Dimensions (from skin):—

Head and body 336 millim.; tail 400; hind foot 70.

Skull: greatest breadth 40; greatest length of nasals 18.2; length of palate to henselion 27.

Hab. Described from Java. All specimens in the Museum come from the Malay Peninsula from Penang to Malacca. It does not apparently overlap the preceding form.

This species was named from a specimen collected by M. Diard in Java; the plate, however, agrees so exactly with specimens in the Museum from Malacca that there is

little doubt it represents the same animal. M. Diard also collected in the Malay Peninsula, so it is quite possible that the type specimen may have come from Malacca and have been wrongly labelled; it may occur in Java, but I can find no record to that effect beyond the original description. It is stated in the key at the end of this paper that this species has light subterminal annulations to each of the hairs; the bleaching process, however, goes on so quickly in this species that these annulations are only visible in freshly grown hairs. This squirrel is so distinct in coloration that there can be no difficulty in identifying it by the colour alone.

Ratufa ephippium typica (Müll.).

Sciurus ephippium, Müller, Tijdschr. voor Nat. Gesch. 1839, p. 147;
Müller and Schlegel, Verhandl. Nat. Gesch. 1843, pp. 86 & 91,
pl. xiii.

This form is chiefly noticeable for the purity of its colouring, very few of the hairs having subterminal annulations. From the top of the head to the root of the tail runs a broad and very dark brown stripe, slightly lighter over the shoulders owing to annulations on the hairs, and spreading out in a similar manner over the posterior part of the body; remainder of the flanks, sides of the neck, face, and ears ferruginous, fading into pale orange on the limbs, feet, and throat, being palest on the forehead. Underparts yellowish white. Tail dark brown.

Dimensions (as given by Müller):—

Head and body 350 millim.; tail 400.

Skull (from Museum specimen): greatest length 65; zygomatic breadth 42; greatest length of nasals 20; length of palate from henselion 26.

Hab. Great Dyak River, S.E. Borneo.

It is to be noticed that in this species the tail bleaches to a dirty creamy white.

Ratufa ephippium baramensis, subsp. n.

Sciurus ephippium, Wagner, Schreber, Säugeth. Suppl. vol. iii. 1843,
p. 193; Hose, Mamm. Borneo, 1893, p. 44.
Sciurus bicolor ephippium, Thos. P. Z. S. 1892, p. 225.

General colour above dark brown, each hair having a rufous subterminal annulation. Along the centre of the back, especially on the posterior half, there are no annulations, a dark median stripe being thus formed. Underparts, including outside of fore limbs and feet, deep yellow, becoming ferruginous on the cheeks. Tail uniform dark brown.

Dimensions of type (from skin):—

Head and body 400 millim.; tail 450; hind foot 70.

Skull: greatest length 67; basal length 52·2; length of nasals 19; length of palate to hensenion 26·2.

Hab. Baram District, Sarawak.

Type B.M. 99. 12. 9. 40. ♂, Baram District, Sarawak, 15th June, 1898. Presented by Charles Hose, Esq.

This form seems subject to many slight local variations. Mr. Hose informs me that those found on the hills are ruddier on the cheeks than those from the low-lying country, and the tail has a tendency to be ringed with rufous caused by sub-terminal annulations to certain of the hairs.

Ratufa ephippium sandakanensis, subsp. n.

Sciurus bicolor ephippium, Thos. P. Z. S. 1889, p. 230.

Sciurus ephippium, Motley and Dillwyn, Contrib. Fauna Borneo and Labuan, 1855, p. 3.

Resembling *R. ephippium baramensis*, but the hairs on the back black, not brown, with yellowish-white subterminal annulations instead of rufous. These annulations are absent along the centre of the back, thus forming a dark median dorsal stripe which starts between the shoulders and runs to the root of the tail. The feet, inner sides of limbs, and underparts are of a dirty yellowish white, and on the cheeks is a small patch of ferruginous.

Dimensions of type (from flesh):—

Head and body 350 millim.; tail 540; hind foot 74.

Skull: greatest length 68; basal length 54; zygomatic breadth 42; length of nasals 20; length of palate from hensenion 26.

Hab. Sandakan, British North Borneo.

Type B.M. 82. 11. 16. 3. Sandakan, British North Borneo. Presented by Mr. Arch. McKinlay.

The Museum possesses several other specimens of this form, all from North Borneo; they differ slightly from the type in having the head, neck, and feet more rufous, which is probably due to altitude, as noticed in the preceding species.

Ratufa ephippium bunguranensis (Thos. & Hart).

Sciurus ephippium bunguranensis, Thos. & Hart, Nov. Zool. i., Sept. 1894, p. 658.

This and the two remaining species are all very closely allied and are island forms of the typical mainland race. They are characterized by their duller colour and the absence of the dark median dorsal area, all the hairs on the upper

surface being uniformly annulated. The present species is of a light chocolate-brown above ("Prout's brown" of Ridgway, as it is styled in the original description). Underparts deep ferruginous; feet black.

Dimensions (from skin):—

Head and body 350 millim.; tail 420; hind foot 63.

Skull: greatest length 63; basal length 50; zygomatic breadth 39; greatest length of nasals 19·4; length of palate to henselion 27·5.

Hab. Island of Bunguran, Natuna Group.

This species, in common with the two succeeding forms, bleaches to a great extent, giving rise to many varieties.

Ratufa ehippium nanogigas (Thos. & Hart).

Sciurus ehippium nanogigas, Thos. & Hart, Nov. Zool. ii., Dec. 1895, p. 491.

Resembles *R. eph. bunguranensis* very closely except as regards size. The underparts also are much lighter in colour, being light yellow.

Dimensions (from skin):—

Head and body 330 millim.; tail 347; hind foot 60.

Skull: greatest length 47·5 millim.; basal length 43; zygomatic breadth 34; greatest length of nasals 16; length of palate from henselion 21.

Hab. Pulau Laut, N. Natunas.

Ratufa ehippium sirhassenensis, subsp. n.

Sciurus ehippium albiceps, Thos. & Hart, Nov. Zool. i., Sept. 1894, p. 659.

Allied to the *bunguranensis-nanogigas* group and intermediate in size between the two. In the general coloration it resembles the smaller of the two (*nanogigas*), but differs from that species in the light annulations to the hairs being broader and lighter, while the ears, sides of the face, and outer sides of the limbs are of the same colour as the underparts, viz. light yellow, instead of black, as in *nanogigas*.

Dimensions (from skin):—

Head and body 340 millim.; tail 410; hind foot 60.

Skull: zygomatic breadth 37; greatest length of nasals 18; length of palate from henselion 23·5.

Hab. Sirhassen Island, Natuna Group.

Type B.M. 94. 9. 28. 13. Sirhassen, 23rd Sept., 1893. Collected by Mr. A. Everett.

Key to Species.

- Tail not markedly distichous, its hairs dark at their bases.
- Large; colour above deep black *R. gigantea*.
- Smaller; colour above lightish, especially across the centre of the back *R. bicolor*.
- Tail markedly distichous, with light bases to the hairs.
- All the hairs on the back with light subterminal annulations.
- Feet light.
- Colour of upperside "café-au-lait."
- Belly yellowish orange *R. affinis aureiventer*.
- Belly white *R. affinis typicus*.
- Colour of upperside uniform grizzled amber-brown *R. ephippium sirhassen-*^[ensis]
- Feet black.
- Large; underparts deep orange *R. eph. bunguranensis*.
- Smaller; underparts yellow *R. eph. nanogigas*.
- Hairs along the centre of back without annulations, forming dark medio-dorsal tract.
- Hairs on the sides of body with annulations.
- General colour grey *R. eph. sandakanensis*.
- General colour brown *R. eph. baramensis*.
- Hairs on the sides of the body without annulations, especially anteriorly.
- Colour of flanks deep rufous *R. eph. typica*.

LXV.—A new Skunk from Peru.

By OLDFIELD THOMAS.

Conepatus inca, sp. n.

Size medium. Fur long, coarse, and close; underfur abundant. White markings much reduced, consisting only of a narrow ($\frac{1}{4}$ to $\frac{3}{4}$ inch wide) band on each side, joined on the occiput and running back only as far as the shoulders, or at most to middle of the back, where they come to an end. Tail black, an intermixture of white hairs at its tip.

Skull proportions as shown by the measurements below. Zygomata less widely expanded than in *C. mapurito*. Last upper molar decidedly larger than in *C. zorilla*.

Dimensions of the type (an adult female, measured by collector in the flesh):—

Head and body 350 millim.; tail 210; hind foot (s. u.) 65; ear 28.

Skull: greatest length in middle line 75.5; basal length 66.4; greatest breadth 44; intertemporal breadth 20; greatest posterior breadth 38; palate length from gnathion 32.4;

palate breadth outside $m.$ ¹ 30; greatest diameter of $m.$ ¹ 10.5; length of $m.$ ₁ 10.

A male skull has a basal length of 70 millim. and a zygomatic breadth of 49 millim.

Hab. of type Callao, Peru, sea-level. Other specimens from Surco, on the Cordillera behind Lima, alt. 2050 metres.

Type. Female. B.M. no. 0. 5. 7. 34. Original number 802. Collected 15th January, 1900, by Mr. P. O. Simons. Five specimens examined. Native name "Añas."

By this fine capture Mr. Simons has helped to elucidate the question as to what are the skunks referred to by Tschudi in his 'Fauna Peruana' *.

In that work three species are described:—" *Mephitis mapurito*, Less., *M. furcata*, Wagn., and *M. amazonica*, Licht." The first of these is said to be "an der Küste sehr gemein," and from the description there can be no doubt that Tschudi's animal was *C. inca*, which Mr. Simons has sent both from the coast at Callao and from the Sierra behind. The true *C. mapurito* is quite a different species which occurs at Bogota and north-westwards into Central America.

By "*M. furcata*" Tschudi apparently means the Chilean species, which has been commonly known as *C. chilensis*, was most unnecessarily renamed *furcata* by Wagner †, but whose proper name appears to be *C. chinga*, Molina ‡. As yet, however, I have seen no Peruvian skunks referable to *C. chinga*, but it may prove to occur in the southern parts of the country, unless Tschudi has mistaken *C. quitensis*, Humb., for it.

I am unable at present to identify Tschudi's "*M. amazonica*, Licht.," but the "drei-streifige *Mephitis*," of which he was told as inhabiting the Department of Junin, will very probably prove to be the remarkably coloured *Conepatus rex*, Thos., described from Sahama, Bolivia §.

It is curious to notice the great difference in the thickness of the fur between *C. inca* and *C. zorilla*, the skunk of the desert on the north-west coast of Peru. Tschudi speaks of *C. mapurito* as not being found on the coast in the "nördlichen heisseren Theile des Landes," and this greater heat of that region is well exemplified by the thin sparse coat of *C. zorilla* as compared with the thick one of the present species.

* Mamm. p. 112 (1845).

† Schr. Säug. Supp. ii. p. 192 (1841).

‡ *Viverra chinga*, Molina, Sagg. Stor. Nat. Chili, pp. 288 & 342 (1782).

§ Ann. & Mag. Nat. Hist. (7) i. p. 278 (1898).

LXVI.—*On the Special Protection of Appendages in Process of Regeneration after Artificial Mutilation among Insects.*
By EDMOND BORDAGE*.

WHEN a limb is removed owing to self-mutilation from the body of an Arthropod, such as a crab or a Phasmid for instance, regeneration starts from the very surface of the section so produced. The same thing, however, rarely happens when, on the other hand, regeneration follows the artificial severance of a limb. Among Mantidæ, Blattidæ †, and the Orthoptera saltatoria, for example, artificial cuts are followed by contraction and by more or less marked displacement of the divided muscles, which are retracted within the chitinous covering of the limb, so that, if regeneration follow, the part in process of growth remains entirely hidden until the next moult. The chitinous case therefore in this instance plays the part of a protector.

It may even happen among the Mantidæ, which possess the power of self-mutilation developed in a high degree, or among the Blattidæ, where it is much less marked, that contraction of the muscles may be produced in the interior of the trochanter, or even inside the joint, if developed, that forms the haunch (*coxa*), after self-mutilation along the trochanterofemoral suture. In this case, if there be regeneration the part in process of growth will remain hidden until the next moult.

Most often, however, among the Mantidæ, and more rarely in the Blattidæ, this contraction does not take place after self-mutilation.

In this case one can very soon see whether there will be regeneration without its being necessary to wait for the next moult. It is true that one cannot perceive the various parts which make up the rudiment in process of growth, for it is coiled upon itself, and, what is more, covered over by the non-chitinized cuticle, which protects it after the manner of a pocket. This cuticle lacks transparency on account of its brownish coloration; but the very slightly marked projection which this protective pouch forms at the end of the trochanter shows nevertheless that the work of regeneration is going on.

In the Phasmidæ the rudiment in process of growth destined

* Translated from 'Comptes Rendus,' cxxix. (1899) pp. 501-504, by Wilfred Mark Webb, F.L.S. From a separate impression communicated by the Author.

† H. H. Brindley, 'On certain Characters of Reproduced Appendages in Arthropoda,' 1898.

to replace a limb detached by self-mutilation sometimes shows itself, but in an indistinct manner, coiled up under the protective cuticle, which has some degree of transparency in certain species.

So far as the Mantidæ and Blattidæ are concerned, I noticed that the amount of withdrawal of the muscles divided by self-mutilation within the chitinous covering was proportional to the violence of the efforts made by the insects in getting rid of the limb. When self-mutilation took place easily the contraction was practically *nil*.

It now remains for us to examine the particular case presented by the Phasmidæ.

When artificial separation takes place in the region comprising the femur and the upper two thirds of the tibia, contraction of the severed muscles is most marked. When, again, similar cuts are made in the upper part of the region formed by the lower third of the tibia, contraction is still produced, and as it is exactly there that the power of regeneration begins to show itself, the part in process of growth remains hidden until the following moult. Then in proportion as the cuts approach the tarsus, contraction becomes less and less evident, until in the neighbourhood of the tibio-tarsal articulation the divided muscles practically remain in position; so that the part in process of regeneration may be visible before a moult takes place. The result is the same when the cuts are made on any of the first three joints of the tarsus.

On examining the internal structure of the limb we find that it is precisely in the spot under discussion—upon the lower portion of the tibia and the first joints of the tarsus—that the muscles are inserted which move the tarsus as a whole and its various parts. Cuts made in this region pass through the surfaces of the chitinous covering to which these muscles are attached and from which they run towards the joints below which they have to move. Under these circumstances one can understand why the contraction will be slight or not produced at all. It is only possible to produce it when the cut is more or less remote from the upper attachment-surface of the divided muscles, which is not the case. In other insects there is complete withdrawal of the cut muscles when the section passes through the tarsal region. It is evident that these particular features point to differences in the number and position of the attachment-surfaces of the muscles in question, differences which are revealed upon careful dissection.

It follows, then, that among the Phasmidæ parts in process of regeneration in the region we are considering are more or

less apparent from the outset of their formation. As I have already said, however, growth proceeds with the greatest slowness; it follows therefore that during the time which elapses before the next moult the part in process of growth barely forms a minute projection from 1 to 2 millim. in length. It is covered by a thin protective cuticle of a brown colour, moulding itself exactly upon the rudiment of the limb, which up to the present shows no separation into joints. It is only after the next moult that the limb, beginning to be of appreciable length, will show any distinct traces of division into tarsal joints. The growth is so slow that it is only after two or even three moults that the mutilated limb is completed and becomes serviceable to the insect*.

It is interesting to compare the slowness of the growth of parts in process of regeneration after artificial removal, as well as that—much less marked nevertheless—of limbs intended to replace those removed by self-mutilation, among Phasmidæ with the marvellous rapidity of such growth which has been found among the Mantidæ and Blattidæ. Whilst among the latter limbs regenerated after self- or artificial mutilation may begin to be of use to the insect immediately after the next moult, in the Phasmidæ limbs in course of regeneration cannot become useful until after the second or third moult. I have noted that the same holds good for the Orthoptera saltatoria.

LXVII.—*New Species of the Coleopterous Genus Prionocalus from Ecuador and Peru.* By CHAS. O. WATERHOUSE, V.P.E.S.

THE British Museum has recently received a few specimens of Longicorns of the genus *Prionocalus*. One I refer with a slight doubt to *P. cacticus*, White, but in the type the tubercle

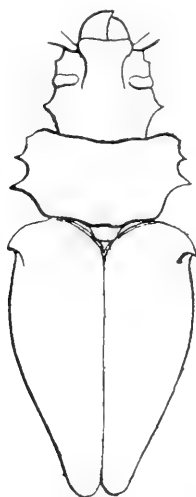
* In the most perfectly regenerated limbs there is a tetramerous tarsus. I have nevertheless obtained after cuts made upon the third joint of the tarsus:—

1. A pentamerous tarsus with incompletely separated joints.
2. A pentamerous tarsus as perfect as the normal one.
3. A bent and monstrous tarsus of six incompletely separated joints.

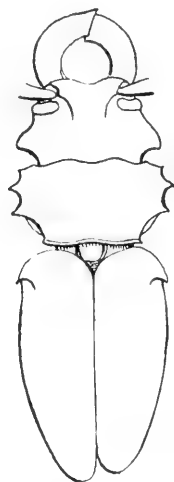
But these are rare exceptions to the rule. Tetramery after regeneration has been determined among the Phasmidæ not only in the four genera I quoted in my previous papers, but also in *Anchiale*, *Acanthoderus*, *Lopaphus*, *Diapheromera*, and probably in *Cyphocrania*, *Diura*, and *Bacteria mexicana*, the total number of species of Orthoptera cursoria in which tetramery has been determined being thus twenty-five.

behind the eye is more directed backwards than in the specimen just received. The other three species appear to be undescribed.

The accompanying camera-sketches will assist in the determination of these three species and *P. Güntheri*, Gahan.



Prionocalus Simonsi.



Prionocalus Whitei.

Prionocalus Simonsi, sp. n.

Niger, supra rugosus, sat nitidus; clytris apicem versus angustatis, elongato-triangularibus, basi vermiculoso-rugulosis, apice piceotinctis, subtilius rugosis, minus nitidis; antennis (basi excepta) tibiisque piceis, tarsis rufo-piceis. ♂.

Long. 38-47 mm.

Hab. Ecuador, in wood west of Cuença, 2600 m., May 1899 (*P. O. Simons*).

This species closely resembles *P. atys*, White, in form, colour, and sculpture, but is at once distinguished by the posterior angles of the thorax being slightly rounded instead of acute and slightly projecting, as they are in *P. atys*. The head is coarsely and closely rugose, with a short, not very acute, conical tubercle behind the eye. The mandibles are shorter than the head. The thorax is less rugose than the head, and the space on each side of the disk, although rather closely punctured, is smoother. The elytra are one-third

longer than broad, much narrowed towards the apex, vermiculate-rugose at the base, the sides and apex (which are impressed) with much finer rugose sculpture; the apex of each elytron is rounded. The femora are more or less pitchy, the tibiæ almost entirely so, the tarsi rather paler.

Prionocalus Whitei, sp. n.

Anthracinus, nitidus, supra rugosus; capite post oculos tuberculo magno, conico, obtuso armato; mandibulis falcatis; antennis corpore paulo longioribus; thoracis lateribus dentibus tribus acutis instructis, angulis posticis acutis porrectis; elytris ovalibus, postice arcuatim angustatis, apicibus singulatim rotundatis; palpis, tibiis tarsisque rufo-piceis. ♂.

Long. 50 mm.

Hab. Ecuador, Porvenir, March 1899 (*P. O. Simons*).

This species has the jet-black colour of *P. Buckleyi* and *P. iphis*, but differs from both these in having the elytra separately rounded at the apex, as in *P. cacicus* &c. It differs from *P. cacicus*, *atys*, *Simonsi*, and *Güntheri* in having the sculpture of the elytra almost uniform throughout, as in *P. Buckleyi*, and the apices are not flattened. The head is very coarsely and closely rugose. The mandibles as long as the head, falcate. The tubercle behind the eyes is thicker and larger and more obtuse at its apex than in any other species known to me. The thorax is vermiculate-rugose, almost as in the elytra; the sides have three nearly equidistant acute teeth, the anterior one much smaller and less prominent. The elytra are rather more than a third longer than broad (19 × 26 millim.), uniformly vermiculate-rugulose, as in *P. Buckleyi*; the sides gently arcuate (not rectilinear in any part). The antennæ are black and reach rather beyond the apex of the elytra.

Prionocalus uniformis, sp. n.

Niger, rugosus, sat nitidus; thorace lateribus dentibus duobus armatis, angulis posticis rotundatis; elytris convexis, fortiter rugosis, humeris dente parvo acuto armatis, lateribus leviter arcuatis; antennis apicem versus tibiisque plus minusve piceis; palpis tarsisque rufo-piceis. ♂.

Long. 36-47 mm.

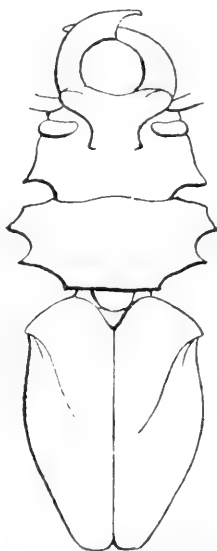
Hab. Peru, "at upper timber line, 3000 m., Nov." (*P. O. Simons*).

This species is unlike any known to me, and from its form

and convex elytra might be mistaken for a female. It differs from all in having the posterior angles of the thorax completely rounded off. It is most nearly allied to *P. iphis*, White, but has more ample elytra. The palpi have the apical joint unusually enlarged. The head has the tubercle at the side short and conical, not very acute. The thorax is rugose,



Prionocalus uniformis.



Prionocalus Güntheri.

but has two smooth spots on the front margin and another above each posterior angle. The sides are impressed and the margin is furnished with two rather small approximate triangular teeth just before the middle, and in front of these there is a slight angular prominence; behind the lateral teeth the thorax is obliquely narrowed, and there is no trace of any tooth at the hind angles. The elytra are nearly as wide as the thorax, convex, evenly and very coarsely rugose all over (each with two slightly indicated raised lines), not much narrowed towards the apex. The humeral angle is furnished with a very small acute tooth. The sides are evenly and gently arcuate. The apices are rounded, but there is a slight indication of the sutural angle.

The smaller example has the teeth at the sides of the thorax rather more prominent and acute than in the large specimen.

LXVIII.—*Descriptions of some new Genera and Species of Heterocera from Tropical South America.* By HERBERT DRUCE, F.L.S. &c.

Fam. Syntomidæ.

Sphecosoma sparta, sp. n.

Male.—The head and palpi yellow; antennæ black, the shaft bright red; collar and tegulæ black, edged with yellow; thorax black, with a white line crossing the base; abdomen black, banded with yellowish white; legs, underside of thorax, and abdomen pale yellow. Primaries and secondaries yellowish hyaline, the veins black.

Expanse 1 inch.

Hab. Colombia, Cacagualito (*Mus. Druce*).

Sarrosa helotes, sp. n.

Male.—Head and collar dark metallic blue; thorax, tegulæ, and abdomen bright orange, tegulæ edged with black; abdomen with three rows of metallic blue spots, the anal segment black; antennæ black, white at the tips; legs black. Primaries and secondaries hyaline, the veins all black, the apex and outer margin of the primaries broadly black, secondaries edged with black.—The *female* is almost identical with the male.

Expanse 2 inches.

Hab. Colombia, Valparaiso (*Mus. Druce*).

Mesotheron nomia, sp. n.

Male.—The head, palpi, thorax, tegulæ, abdomen, and legs chrome-yellow, tegulæ edged with black; antennæ black; abdomen banded with metallic blue, the two anal segments dark metallic blue. Primaries and secondaries yellowish hyaline, the veins, apex of the primaries, and the outer margin black, the base and the costal margin to the end of the cell chrome-yellow.

Expanse $1\frac{4}{6}$ inch.

Hab. Colombia, Valparaiso (*Mus. Druce*).

Eucereon atolia, sp. n.

Male.—Head, antennæ, and collar dark grey, collar edged with white; thorax and tegulæ grey; abdomen above black; the underside and the legs dark grey, the anal tuft pale yellow.

Primaries greyish brown, streaked with white near the base, along the costal margin, and on the outer margin, the inner margin edged with white from the base to the anal angle: secondaries dusky hyaline, palest about the middle, the fringe white.

Expanse 1 inch.

Hab. Colombia, Minca (*Mus. Druce*).

Eucereon ino, sp. n.

Male.—Head, thorax, tegulæ, abdomen, and legs brownish fawn-colour, the anal tuft pale yellow, antennæ black. Primaries pale fawn-colour, crossed from the costal to the inner margin by two narrow brown lines, the first line near the base, the second at the end of the cell, the veins slightly darker brown: secondaries whitish semihyaline, brownish at the apex and round the outer margin.

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

Hab. Colombia, Valparaiso (*Mus. Druce*).

Eucereon resina, sp. n.

Female.—Head, thorax, and tegulæ grey; antennæ and abdomen almost black; legs brownish black. Primaries greyish white, mottled with dark grey; a round dark grey spot in the cell, and a zigzag dark grey line extends from the apex to the anal angle: secondaries dark grey. Under-side of both wings brownish black, with a few white spots near the apex of the primaries.

Expanse $1\frac{6}{10}$ inch.

Hab. Colombia, Sierra del Libano (*Mus. Druce*).

Fam. Arctiidæ.

Belemnia attidates, sp. n.

Male.—Head, thorax, and abdomen bright metallic blue, underside of the abdomen red; antennæ black; tegulæ black, edged with metallic blue; legs black. Primaries black, shot at the base with metallic blue; a bright carmine short red band at the end of cell and a larger one beyond crossing the wing from the costal to the outer margin: secondaries bright metallic blue, broadly bordered with black at the apex and round the outer margin as far as the anal angle.

Expanse 2 inches.

Hab. Colombia, Bogota (*Mus. Druce*).

Belemnina mygdon, sp. n.

♂ ♀.—Head, thorax, and abdomen bronze-green; abdomen with a row of metallic blue spots on each side, the underside of the abdomen bright red; antennæ black; legs black, streaked with bronze-green. Primaries deep black, the basal half bright metallic bronze-green: secondaries deep black.

Expanse 2 inches.

Hab. Colombia, Cacagualito (*Mus. Druce*).

Opharus euripides, sp. n.

Male.—Head, antennæ, thorax, and tegulæ reddish fawn-colour; abdomen greyish on the upperside, the underside and the legs yellow. Primaries semihyaline reddish fawn-colour, darkest on the costal and inner margins: secondaries semihyaline white, slightly shaded with fawn-colour at the apex.

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

Hab. Colombia, Sierra del Libano (*Mus. Druce*).

Mazæras soteria, sp. n.

Male.—Head, thorax, and tegulæ dark reddish brown; collar with a black spot on each side; antennæ black; abdomen red at the base, the lower half chrome-yellow; a row of black spots extends down the middle from the base to the anus; the underside black; legs black. Primaries dark reddish brown, with a bright red spot on the inner margin close to the base: secondaries pinkish white, darkest on the costal margin, apex, and inner margin. Underside of both wings very similar to the upperside.—*Female* differs from the male in having the secondaries bright red.

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

Hab. Argentine Republic (*Mus. Druce*).

This species is allied to *Mazæras Franckii*, Schaus, but it is a smaller and much duller-coloured insect.

Subfam. *PERICOPINÆ*.*Eucyane kedar*, sp. n.

Head, collar, and base of the tegulæ dark chrome-yellow; antennæ, points of the tegulæ, thorax, abdomen, and legs black. Primaries deep black, crossed beyond the middle from the costal margin to the anal angle by a wide curved chrome-yellow band, streaked with red on the costal margin and partly red near the anal angle: secondaries deep black,

broadly bordered with bright red from the apex to the anal angle.

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

Hab. Colombia, Bonda (*Mus. Druce*).

Fam. Melameridæ.

Brachyglene grandis, sp. n.

Female.—Head, antennæ, thorax, tegulæ, abdomen, and legs black, the abdomen shot with steel-blue. Primaries black, shot with steel-blue, the base to nearly the middle of the wing bright chrome-yellow, crossed by black veins: secondaries black, glossed with steel-blue; a large chrome-yellow band extends from the costal margin near the base to about the middle of the wing.

Expanse 2 inches.

Hab. Colombia, Sierra del Libano (*Mus. Druce*).

This species is allied to *Brachyglene superba*, Druce.

Fam. Dioptidæ.

Polypætes nox, sp. n.

Male.—Head, palpi, antennæ, thorax, and abdomen black; tegulæ chrome-yellow. Underside of the head, thorax, abdomen, and legs white. Primaries black, the veins and a spot close to the apex chrome-yellow: secondaries grey-black, the apex and part of the outer margin deep black. Underside: primaries white near the base and at the end of the cell; the yellow spot at the apex the same as above; secondaries white, broadly bordered with black at the apex.

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

Hab. Colombia, Valparaiso (*Mus. Druce*).

Fam. Lasiocampidæ.

Apatelodes palma, sp. n.

Male.—Head, palpi, middle of thorax, and base of abdomen dark brown; antennæ, collar, tegulæ, and legs greyish brown; abdomen pale brown, the sides and anal tuft darker brown. Primaries greyish brown, crossed from the costal to the inner margin by several indistinct waved brown lines, the first nearest the base, the others beyond the cell; a white spot near the apex, below which a row of very indistinct black dots crosses the wing to the anal angle; two black spots on the inner margin nearest the base: secondaries pinkish brown,

crossed about the middle by two faint lines, the first darker, the second paler than the ground-colour; a dark brown mark at the anal angle, below which is a short white streak; the fringe dark brown. Underside of both wings darker than the upperside, the secondaries with a submarginal pale line extending from near the apex to the anal angle.

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

Hab. Colombia, Valparaiso (*Mus. Druce*).

This species is nearest to *A. heptaloba*, Druce, but very distinct on the underside.

Apatelodes lapitha, sp. n.

Male.—Head, palpi, collar, the first two segments of the abdomen and the anal tuft dark brown; the antennæ, tegulæ, and abdomen pale brown; legs dark brown. Primaries reddish fawn-colour, the outer margin from the apex to the anal angle broadly bordered with dark brown; a pale submarginal line extends from near the apex to the anal angle, and three curved brown lines cross the wing from the costal to the inner margin; a large elongated black spot on the inner margin near the base: secondaries reddish fawn-colour, slightly darker than the primaries; a pale submarginal line extends from near the apex to the anal angle. Underside very similar to the upperside, excepting that the secondaries are clouded with dark brown in the middle.

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

Hab. Colombia, Cacagualito (*Mus. Druce*).

This species is allied to *A. cirna*, Druce, from Ecuador.

Hydrias zemira, sp. n.

Male.—Head, antennæ, collar, base of tegulæ, and thorax fawn-colour, tips of tegulæ and the upperside of the abdomen black; the underside of the thorax, abdomen, and legs fawn-colour. Primaries reddish fawn-colour, palest on the costal margin and at the apex; a curved brown line crosses the wing beyond the cell from the costal margin near the apex to the middle of the inner margin; a large black round spot at the end of the cell; the veins black: secondaries reddish fawn-colour, with a few black scales at the apex. Underside of both wings reddish fawn-colour; secondaries with three short dark brown lines at the apex.

Expanse 1 inch.

Hab. Colombia, Minca (*Mus. Druce*).

Hydrias dolosa, sp. n.

Male.—Head, antennæ, collar, tegulæ, thorax, abdomen, and legs black. Primaries black, with a submarginal row of brownish-black spots extending from the apex to the anal angle; a minute white dot close to the apex: secondaries brownish black, the veins slightly darker.

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

Hab. Colombia, Minca (*Mus. Druce*).

Fam. Limacodidæ.

Perola repetita, sp. n.

Male.—Head and antennæ black; collar, tegulæ, thorax, and abdomen brownish grey, thorax and abdomen darker on the underside; legs greyish black. Primaries greyish brown, without any markings; secondaries rather paler than the primaries. Underside very similar to the upperside, the primaries clouded with black on the costal margin.

Expanse $1\frac{3}{10}$ inch.

Hab. Colombia, Minca (*Mus. Druce*).

Perola sardites, sp. n.

Male.—Head, antennæ, collar, tegulæ, thorax, and abdomen pale greyish fawn-colour; legs pale brown. Primaries pale fawn-colour, crossed from the costal to the inner margin by three very indistinct waved brown lines; a brown dot at the end of the cell; the fringe pale fawn-colour: secondaries brownish fawn-colour, the fringe near the anal angle black. Underside of both wings uniformly pale fawn-colour.

Expanse $1\frac{3}{10}$ inch.

Hab. Colombia, Minca (*Mus. Druce*).

Perola vafera, sp. n.

Male.—Head, antennæ, collar, tegulæ, thorax, abdomen, and legs brownish black. Primaries brownish black, crossed from the apex to the middle of the inner margin by a fine grey line: secondaries slightly paler than the primaries; the fringe of both wings blackish brown.

Expanse 1 inch.

Hab. Colombia, Cacagualito (*Mus. Druce*).

Perola salta, sp. n.

Male.—Head, antennæ, collar, tegulæ, thorax, abdomen,

and legs very pale fawn-colour. Primaries and secondaries uniformly pale fawn-colour, the primaries crossed from near the apex to the inner margin nearest the base by a rather wide blackish-brown band, shaded with dark brownish scales on the inner side; the fringes of both wings pale fawn-colour.

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

Hab. Colombia, Bonda (*Mus. Druce*).

Perola dertosa, sp. n.

Male.—Head, antennæ, collar, tegulæ, thorax, and abdomen reddish brown, the base of the thorax dark brown; underside of the thorax, abdomen, and legs blackish brown. Primaries reddish brown, palest on the outer margin, irrorated with minute black scales; a reddish spot close to the apex, from which a reddish-brown line edged with white on the inner side crosses the wing to the inner margin; the fringe alternately light and dark brown: secondaries dark brown.

Expanse 1 inch.

Hab. Colombia, Sierra del Libano (*Mus. Druce*).

Semyra marisa, sp. n.

Male.—Head, antennæ, collar, tegulæ, thorax, abdomen, and legs dark brown. Primaries dark purple-brown, crossed from the costal to the inner margin by three dark brown waved lines—the first close to the base, the second at the end of the cell, the third submarginal, the space between the second and third line being bright reddish brown: secondaries brown, the marginal line and fringe pale brown.

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

Hab. Colombia, Minca (*Mus. Druce*).

Semyra phara, sp. n.

Female.—Head, antennæ, collar, tegulæ, thorax, and abdomen reddish fawn-colour. Primaries reddish fawn-colour; a spot at the end of the cell, the veins, and a submarginal line extending from near the apex to the inner margin all dark brown: secondaries uniformly brownish fawn-colour.

Expanse 1 inch.

Hab. Colombia, Minca (*Mus. Druce*).

Fam. **Arbelidæ**.

Arbela salara, sp. n.

Male.—Head, collar, and tegulæ pale greyish brown; antennæ reddish brown; thorax black; abdomen and legs dark

brown. Primaries brownish grey, darkest along the costal margin, irrorated with black scales; a large greyish spot at the apex, broadly bordered with black on the inner side, below which is a small square-shaped black spot; a large black spot below the cell close to the inner margin and a marginal row of black dots extending from the apex to the anal angle; the fringe pale fawn-colour: secondaries brown.

Expanse 2 inches.

Hab. Colombia, Sierra del Libano (*Mus. Druce*).

Fam. Hepialidæ.

OSRHOES, gen. nov.

Head very small; palpi rather short, thickly clothed with long hairs, the third joint very minute; antennæ very short; thorax and abdomen slender; legs slender, the hind legs of the male thickly clothed with hair. Primaries long, very rounded at the anal angle, the cell long and narrow: secondaries long and narrow and rounded at the apex.

Type *Osrhoes coronta*.

Osrhoes coronta, sp. n.

Male.—Head, antennæ, collar, palpi, and thorax golden brown; abdomen and legs dark brown. Primaries golden brown; secondaries pale brown; the fringes of both wings brown.—*Female*. Primaries dark brown, with some very indistinct darker brown markings along the inner margin, the outer margin from the apex to the anal angle irrorated with grey scales.

Expanse, ♂ ♀, $1\frac{3}{10}$ inch.

Hab. Colombia, Sierra del Libano (*Mus. Druce*).

Fam. Notodontidæ.

Lophopteryx eumeta, sp. n.

Head, collar, tegulæ, and thorax reddish brown, the front of the head and the thorax with a few yellowish hairs; antennæ reddish brown; the abdomen and legs dark brown. Primaries reddish brown, crossed about the middle from the costal to the inner margin by a curved dark brown line, on both sides of which are a series of yellow lunular-shaped markings; a large yellow spot at the apex and one at the end of the cell; a yellow streak extends from the base to the anal angle and a submarginal row of small yellowish-white spots

extends from the apex to the anal angle; two black dots close to the apex and one on the anal angle; the fringe reddish brown: secondaries dark brown, with a black spot on the inner margin a little above the anal angle; the underside of both wings blackish brown, the secondaries the palest.

Expanse $1\frac{3}{10}$ inch.

Hab. Colombia, Sierra del Libano (*Mus. Druce*).

Heterocampa mina, sp. n.

Male.—Head, collar, tegulae, and thorax dark grey, with some greenish hairs on the thorax; antennae dark brown; abdomen dark brown, with some fawn-coloured hairs at the base, the anal tuft greenish grey. Primaries pale greyish green, irrorated with fine black scales; a broad greyish-white band partly crosses the wing close to the base from the costal margin; several very indistinct fine black lines cross the wing from the costal to the inner margin; a waved black submarginal line extends from the apex to the anal angle: secondaries reddish fawn-colour; the underside of both wings pale fawn-colour.

Expanse 2 inches.

Hab. Colombia, Sierra del Libano (*Mus. Druce*).

This species resembles *Somera viridifusca*, Walker, from India.

Heterocampa eusebia, sp. n.

Female.—Head, palpi, collar, tegulae, and thorax greyish brown; antennae dark brown; abdomen brown above, the underside and legs pale fawn-colour. Primaries greyish brown, crossed from the costal to the inner margin by three double zigzag fine black lines, the first two near the base, the third beyond the cell; a reddish-brown spot edged with black at the end of the cell; a waved fawn-coloured line extends from the apex to the anal angle and a marginal row of small black dots from the base to the anal angle; the fringe brown: secondaries brown, palest at the base and along the inner margin; a small black spot at the anal angle, with a white streak in the middle; the fringe pale fawn-colour.

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

Hab. Colombia, Sierra del Libano (*Mus. Druce*).

Heterocampa ionia, sp. n.

Male.—Head, palpi, antennae, collar, tegulae, and thorax reddish brown; abdomen above blackish brown, the underside fawn-colour, the anal tuft reddish brown; the underside

of the thorax and legs dark brown. Primaries reddish brown, irrorated with black and grey scales along the costal and inner margin; a double black line crosses the wing close to the base; a row of black spots beyond the cell and a submarginal row of black dots extending from the apex to the anal angle; a large bluish-grey patch at the anal angle, partly extending as far as the middle of the outer margin; the fringe reddish brown: secondaries dark brown, palest at the base, which is clothed with some fawn-coloured hairs.—*Female* very similar to the male, but the thorax and tegulæ are lighter in colour, the primaries redder and without the bluish-grey patch at the anal angle.

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

Hab. Amazons, Manaos (*Mus. Druce*).

Heterocampa perses, sp. n.

Female.—Head, palpi, collar, and front of thorax reddish brown, the collar edged with black; tegulæ dark brown; the base of the thorax clothed with greyish hairs; abdomen above dark brown, the underside pale yellowish brown; underside of the thorax and legs reddish brown. Primaries dark grey, clouded with brown; a black line at the end of the cell, beyond which a row of greyish-white spots edged with black crosses the wing from the costal to the inner margin; a large greyish-white spot at the apex, and a submarginal black line extends from the apex to the anal angle; the fringe greyish brown: secondaries blackish brown, palest at the base, the fringe brown.

Expanse 3 inches.

Hab. Amazons, Manaos (*Mus. Druce*).

Heterocampa volana, sp. n.

Female.—Head, antennæ, palpi, collar, tegulæ, thorax, abdomen, and legs dark brown. Primaries yellowish white, crossed near the base by a dark brown band, clouded with brown at the end of cell; a large brown patch near the apex, from which a zigzag line crosses the wing to the middle of the inner margin; the fringe alternately brown and yellowish white: secondaries dark brown, with a short yellowish line at the anal angle; the underside of both wings dark brown.

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

Hab. Ecuador, Sarayacu (*Buckley, Mus. Druce*).

Crinodes minuta, sp. n.

Male.—Head, palpi, antennæ, collar, tegulæ, and thorax

dark brown; abdomen grey, the anal segments and tuft dark brown; underside of thorax and legs dark brown. Primaries dark brown, with two large metallic silver streaks, the first in the cell close to the base, the second beyond is the largest and almost reaches the outer margin; a submarginal row of dark brown streaks extends from the apex to the anal angle: secondaries fawn-colour, broadly bordered with dark brown.

Expanse $1\frac{6}{10}$ inch.

Hab. Amazons, Manaos (*Mus. Druce*).

Cerura phyllis, sp. n.

Male.—Head white, collar black, tegulæ and thorax grey spotted with black; antennæ yellow; abdomen dark grey; legs black, banded with white. Primaries greyish white, crossed from the costal to the inner margin by a number of fine waved black lines, the marginal line black; the fringe alternately black and white: secondaries pure white, the fringe white.

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

Hab. South Brazil, Rio Grande (*Mus. Druce*).

A specimen of this species is in the National Collection from Porto Allegre, S. Brazil.

Fam. Noctuidæ.

OXYTHRES, gen. nov.

Head small; palpi short, the third joint very minute; antennæ short; thorax and abdomen stout; legs short and rather thick. Primaries long and narrow, rounded at the apex and anal angle: secondaries large, elongated in shape.

Type *Oxythres splendens*.

Oxythres splendens, sp. n.

Male.—Head, antennæ, underside of the thorax, and legs dark brown; the collar and base of the tegulæ pinkish white; the tips of the tegulæ, thorax, abdomen, and anal tuft grey, a few white hairs at the base of the abdomen. Primaries pale brown, the costal margin from the base to the apex broadly pinkish white; a V-shaped black mark close to the apex; the wing crossed from the white costal margin by a number of fine waved white lines; the veins white: secondaries pure white, the apex and costal margin shaded with black, the fringe white. Underside of the primaries blackish

brown, the costal margin broadly bordered with pink.—The female does not differ from the male excepting that it is larger.

Expanse, ♂ $1\frac{6}{10}$, ♀ 2 inches.

Hab. Colombia, Minca (*Mus. Druce*).

A specimen of this species is in the National Collection from an unknown locality.

Acanthodica hages, sp. n.

Male.—Head, antennæ, tegulæ, and thorax greenish grey; the palpi, collar, underside of the thorax, and abdomen black; the anal segments on the underside of the abdomen and the anus grey. Primaries greenish grey, the costal margin spotted with black; a large black spot close to the apex on the inner side of the spot; a black band crosses the wing from the costal to the inner margin, where it joins a wide black band that extends almost to the base: secondaries white; the inner margin, the veins, and the fringe greenish grey.

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

Hab. Colombia, Minca (*Mus. Druce*).

Palindia nicæa, sp. n.

Male.—Head and antennæ brown; collar brown, edged with white; tegulæ, thorax, and the abdomen white; legs yellowish white. Primaries white, bordered with very pale brown from the apex to the anal angle, the marginal line and two lines on the inner side of the brown border dark brown; a narrow pale brown band crosses the wing from about the middle of the costal margin to the inner margin near the apex; the band is broadest on the costal margin; the fringe golden: secondaries yellowish white, darkest on the outer margin; the submarginal line black, edged with white on the inner side; the underside of both wings pale primrose-yellow.

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

Hab. Colombia, Minca (*Mus. Druce*).

Palindia primulina, sp. n.

Male.—Head, antennæ, collar, tegulæ, thorax, and abdomen pale primrose-colour; the underside of the thorax, abdomen, and legs white. Primaries and secondaries pale primrose-yellow: primaries, the costal margin edged with white, three curved chrome-yellow bands cross the wing from the costal to the inner margin, the first two bands nearest the base, the

third beyond the cell; the marginal line white, with minute black dots; the fringe chrome-yellow: secondaries with a few metallic scales near the anal angle, above which is a short chrome-yellow line; the underside of both wings pale primrose-yellow.

Expanse 1 inch.

Hab. Colombia, Valparaiso (*Mus. Druce*).

Arbostola (?) *viridis*, sp. n.

Male.—Front of head, palpi, underside of thorax, abdomen, and legs red; the head, collar, tegulae, and thorax dark purple-brown; antennae and abdomen black, the anal segments and anal tuft bright red. Primaries dark purple-brown; a small green dot at the end of the cell; the outer margin, anal angle, and inner margin nearly to the base bright green; the fringe brown: secondaries black; the underside of both wings black, the inner margin of the primaries brownish white.

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

Hab. Colombia, Bonda (*Mus. Druce*).

Two specimens of this species from Palma Sola, Venezuela, are in the National Collection.

NEOSTICTOPTERA, gen. nov.

Head large; antennae short, simple; palpi rather long, erect, the third joint minute; thorax broad; abdomen long. Primaries long and narrow, rounded at the anal angle: secondaries large, very square at the apex, with a large silky patch at the end of the cell on the costal margin of the male: legs long and slender.

Type *Neostictoptera nigropuncta*.

Neostictoptera nigropuncta, sp. n.

Male.—Head, antennae, collar, and tegulae fawn-colour; abdomen greyish brown. Primaries fawn-colour, thickly irrorated with greyish scales and fine black lines; a marginal row of small black dots extends from the apex to the anal angle; the fringe fawn-colour: secondaries semihyaline white, clouded with black on the costal and outer margin; a large silky black patch of hair at the end of the cell near the apex.—*Female* very similar to the male, but without the band on the secondaries.

Expanse, ♂, $1\frac{1}{2}$ inch.

Hab. Colombia, Minca (*Mus. Druce*).

Melipotis argos, sp. n.

Male.—Head, palpi, antennæ, collar, tegulæ, and thorax reddish brown, the base of the collar pale brown; the abdomen blackish brown; the underside and the legs pale yellowish brown. Primaries dark reddish brown, the outer margin from the apex to the anal angle bluish grey; a large oval-shaped light yellowish-brown spot at the end of the cell; nearer the base the wing is crossed from the costal to the inner margin by a lighter brown band: secondaries blackish brown, slightly paler in the middle.

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

Hab. Colombia, Minca (*Mus. Druce*).

Alamis (?) *binea*, sp. n.

Male.—Head white; palpi black, the third joint white; antennæ black; collar black, edged with white; tegulæ pale brown, tipped with black; thorax and abdomen pale brown; a white spot edged with black at the base of the abdomen, and an erect tuft of reddish hairs on the second and third segments; the underside of the thorax and abdomen pale brown; legs black, banded with white. Primaries brownish white, crossed from the costal to the inner margin by zigzag black lines, the submarginal line being the widest; the fringe alternately black and white: secondaries, the costal half of the wing black below, the cell reddish brown, crossed with black lines; the outer margin pale brownish white; the fringe black and white; the underside of both wings pale brownish black.

Expanse 2 inches.

Hab. Colombia, Minca (*Mus. Druce*).

Capnodes ocina, sp. n.

Head, antennæ, collar, tegulæ, thorax, and abdomen brown; underside of the abdomen and legs pale brown. Primaries reddish brown, the costal margin yellowish brown; a spot close to the base, one in the middle of the cell, a large triangular-shaped spot below the cell, a short band at the end of the cell, and a spot at the apex all white; the fringe dark brown: secondaries reddish brown; three small white spots near the apex and one at the anal angle; the fringe dark brown.

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

Hab. Colombia, Minca (*Mus. Druce*).

Capnodes albipunctata, sp. n.

Male.—Head, palpi, antennæ, collar, tegulæ, thorax, and abdomen pale greyish brown; underside of thorax and abdomen brownish white; legs brown. Primaries pale greyish brown, palest at the apex and along the outer margin; two white streaks on the costal margin, the first close to the base, the second beyond the middle; a large triangular cream-coloured spot, edged with black on the inner margin near the base, and a white Y-shaped mark close to the anal angle; a submarginal reddish-brown line extends from the costal nearly to the inner margin near the anal angle: secondaries pale greyish brown, with a reddish-brown spot at the end of the cell and a small white line on the inner margin above the anal angle; the marginal line of both wings black.

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

Hab. Colombia, Sierra de Libano (*Mus. Druce*).

Fam. Geometridæ.

Hygrochroa clota, sp. n.

Male.—Head, palpi, antennæ, collar, tegulæ, thorax, and abdomen fawn-colour; the anal tuft, underside of the abdomen, thorax, and legs yellow. Primaries fawn-colour, clouded with olive-green; a large square-shaped white spot at the end of the cell, and two zigzag greenish lines cross the wing from the costal to the inner margin: secondaries pale fawn-colour, shaded with olive-green at the apex; a double olive-green line crosses the middle of the wing from the apex to the inner margin. Underside: primaries very similar to the upperside, but considerably darker in colour, and the lines crossing the wing much more distinct: secondaries yellow, thickly irrorated with reddish-brown scales at the base and along the costal margin; the central line crossing the wing is wider and darker than on the upperside; a fine submarginal brown line extends from the apex to the anal angle.

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

Hab. Colombia, Sierra del Libano (*Mus. Druce*).

Hasodima dardania, sp. n.

Male.—Head and collar greyish white; tegulæ, thorax, and the abdomen black, with a few greyish scales on the thorax; antennæ and legs black. Primaries brown, crossed from the costal to the inner margin by two wide greyish-black bands, the first near the base edged with white on the

inner side, the second beyond the middle edged with white on the outer side; the outer margin grey, with a marginal row of small black dots extending from the apex to the anal angle: secondaries white, broadly bordered with black from the apex to the anal angle; a very indistinct wavy black line crosses the wing about the middle; the fringe alternately black and white.

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

Hab. Colombia del Libano (*Mus. Druce*).

Hasodima salapia, sp. n.

Male.—Head, antennæ, and collar pale greyish brown; thorax and abdomen black, abdomen banded with white; underside of the abdomen and legs grey. Primaries brown, irrorated with white scales and crossed from the costal to the inner margin by four white bands—the first close to the base, the second curved outwards, edged with black on the inner side, the third band wavy, crossing the wing at the end of the cell, below which it almost joins the second band, the fourth submarginal, broken in the middle; a black spot at the end of the cell, several at the apex and near the anal angle; the veins very pale yellowish brown; the fringe alternately brown and grey: secondaries white, bordered from the apex to the anal angle with black; a very small black dot at the end of the cell; the fringe white.

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

Hab. Colombia, Sierra del Libano (*Mus. Druce*).

Hasodima puta, sp. n.

Male.—Head and collar grey; antennæ, thorax, and upper side of the abdomen black, the underside of the thorax and abdomen white; legs grey. Primaries greyish brown, thickly irrorated with grey and black scales; some indistinct greyish-black bands cross the wing from the costal to the inner margin; the fringe alternately grey and black: secondaries pure white, the fringe white.

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

Hab. Bolivia (*Mus. Druce*).

Ophthalmophora erionia, sp. n.

Female.—Head, antennæ, collar, tegulæ, and thorax dark brown; abdomen and legs yellowish white. Primaries dark brown, the costal margin from the base nearly to the apex bright yellow, edged on the inner side from the base to the

apex with a metallic silver line ; the anal angle and partly along the inner margin chrome-yellow, edged with metallic silver scales on the inner side ; the fringe dark brown : secondaries chrome-yellow, the base dark brown, edged with a wide metallic silver band ; the inner margin of the wing is thickly irrorated with minute brown scales ; the marginal line silver ; two black dots near the apex edged with metallic silver ; the fringe chrome-yellow.

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

Hab. East Peru, Rio Napo (*Mus. Druce*).

Ophthalmophora hæmon, sp. n.

Male.—Head, antennæ, collar, tegulæ, thorax, abdomen, and legs brownish grey. Primaries brownish grey, with a V-shaped yellow mark on the costal margin near the apex and one about the middle of the inner margin ; a few metallic silver scales close to the apex : secondaries brownish grey, the apex and outer margin chrome-yellow ; the marginal line metallic silver ; a black spot edged with yellow nearest the apex, and a very small black spot on the outer margin ; the underside of both wings uniformly brownish grey.

Expanse 1 inch.

Hab. Colombia, Minca (*Mus. Druce*).

Ophthalmophora halala, sp. n.

Female.—Head, collar, tegulæ, thorax, abdomen, and legs grey. Primaries grey, edged with yellowish white on the inner margin from the base to the anal angle : secondaries grey, crossed close to the base by a pale yellow band ; the wing thickly irrorated with metallic silver scales ; a black spot edged with yellow close to the apex ; the fringe yellow. Underside of both wings white, the primaries clouded with brown along the outer margin.

Expanse $1\frac{3}{10}$ inch.

Hab. Colombia, Valparaiso (*Mus. Druce*).

Ophthalmophora sardes, sp. n.

Male.—Head, collar, tegulæ, thorax, abdomen, and legs grey ; antennæ brown ; the abdomen banded with white at the base ; the underside of the thorax, abdomen, and legs white. Primaries reddish brown, clouded with darker brown ; the costal margin from the base almost to the apex pale yellowish white ; the costal half of the wing thickly irrorated with white scales ; the inner margin and anal angle pale

yellow, edged with white; three indistinct dark brown lines cross the wing from the costal almost to the inner margin, the first near the base, the second and third beyond the middle; the fringe pale yellowish brown: secondaries pale reddish brown, thickly irrorated with white scales; the costal and outer margins pale yellow; a submarginal metallic silver line extends from near the apex, where it is curved round a black spot, to the anal angle; the fringe pale yellowish brown. Underside of both wings white, the apex of the primaries broadly bordered with black.—The *female* is almost identical with the male, but rather larger.

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

Hab. Colombia, Sierra del Libano (*Mus. Druce*).

Ophthalmophora cluana, sp. n.

Ophthalmophora amabilis, Cram. Biol. Centr.-Amer., Heterocera, ii. p. 97.

The Central-American species is distinct, and differs from Cramer's species in having the costal half of the primaries brown instead of black, the spot and metallic line on the secondaries also being in a different position.

Hab. Mexico to Panama, Chiriqui (*Arcé, Mus. Druce*).

Ophthalmophora geryon, sp. n.

Male.—Head, collar, tegulæ, thorax, and legs white; antennæ, palpi, and abdomen pale brown. Primaries white, the costal margin yellow; two very faint brown lines cross the wing from the costal to the inner margin close to the base; the outer margin thickly irrorate with pale brown scales; the fringe yellow: secondaries white, thickly irrorated with pale brown scales; the apex and outer margin yellow, with a submarginal metallic gold line extending from the costal margin to the anal angle; a small black dot near the apex. Underside of both wings white, the outer margin of the primaries black.

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

Hab. Ecuador, Intaj (*Mus. Druce*).

Bassodes æmonia, sp. n.

Male.—Head, collar, tegulæ, and abdomen pale yellow; antennæ and legs brown. Primaries primrose-yellow, crossed from the costal to the inner margin by six pale brown bands; the four bands nearest the base have a metallic line in the middle, the fifth and sixth bands join at the anal angle:

secondaries primrose-yellow, shading to chrome-yellow on the outer margin and at the anal angle; two brown bands cross the wing from the costal margin to the anal angle; two black spots on the outer margin.—*Female* very similar to the male, but paler in colour.

Expanse, ♂ ♀, $1\frac{3}{4}$ inch.

Hab. Jamaica (*Mus. Druce*).

Bapta erina, sp. n.

Female.—Head, collar, tegulae, thorax, abdomen, and legs white. Primaries white; three small brown spots close to the base; a large brown triangular-shaped spot at the end of the cell, and a waved submarginal line clouded with brown extending from near the apex to the anal angle: secondaries white, with a submarginal row of small brown spots; the marginal line of both wings black; the underside white.

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

Hab. S. Brazil, Rio Janeiro (*Mus. Druce*).

Fam. *Pyralidæ*.

Subfam. *SCHÆNOBILINÆ*.

Midila halia, sp. n.

Male.—Head, palpi, antennae, collar, tegulae, and abdomen dark brown, the base of the abdomen banded with red; the underside of the thorax, abdomen, and legs greyish white. Primaries and secondaries dull brown: primaries crossed from the costal to the inner margin by two darker brown lines, the first near the base, the second beyond the middle; the costal margin broadly bordered with reddish brown, extending across the wing as far as the median vein; a white streak at the end of the cell: secondaries crossed about the middle from the costal to the inner margin by a dark brown waved line; a small dark brown spot at the end of the cell; the fringe of both wings dark brown. The underside greyish white, the outer margins of both wings pale brown; a black spot on the costal margin near the apex and several indistinct black spots on the secondaries.

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

Hab. Colombia, Sierra del Libano (*Mus. Druce*).

Subfam. CRAMBINÆ.

Erupa gigantea, sp. n.

Head, palpi, antennæ, collar, tegulæ, thorax, abdomen, and legs dark brown. Primaries dark reddish brown, crossed from the apex to the inner margin near the anal angle by a darker brown line, edged on the inner side by a few bluish-grey scales; a whitish streak at the end of the cell and a marginal row of minute white dots tipped with black on the inner side extending from the apex to the anal angle: secondaries dull brown; the fringe of both wings brown.

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

Hab. Colombia, Sierra del Libano (*Mus. Druce*).

Erupa gyges, sp. n.

Male.—Head, palpi, antennæ, collar, tegulæ, thorax, abdomen, and legs dark brown. Primaries dark reddish brown, crossed from the costal to the inner margin by two bluish-grey lines, the first nearest the base, the second beyond the middle; a black spot at the end of the cell and a marginal row of small white dots extends from the apex to the anal angle; the fringe dark brown: secondaries pale yellow, with a very indistinct submarginal darker line from the apex to the anal angle; the fringe dark yellowish brown.

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

Hab. Colombia, Sierra del Libano (*Mus. Druce*).

Erupa cluaca, sp. n.

Male.—Head, palpi, antennæ, collar, tegulæ, thorax, abdomen, and legs pale fawn-colour, the base of the abdomen yellow. Primaries pale fawn-colour, darkest along the costal margin; two brown lines cross the wing from the costal to the inner margin, the first near the base, the second beyond the middle; a dark brown spot at the end of the cell: secondaries pale primrose-yellow.

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

Hab. Colombia, Valparaiso (*Mus. Druce*).

Erupa rhætia, sp. n.

Male.—Head, antennæ, palpi, collar, tegulæ, thorax, abdomen, and legs dark brown, the base of the abdomen yellowish brown. Primaries dark brown, palest at the base; a pale brown zigzag line crosses the wing from the apex to the

middle of the inner margin : secondaries blackish brown ; a paler submarginal line extends from the apex to the anal angle ; the fringe dark brown.

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

Hab. Colombia, Sierra del Libano (*Mus. Druce*).

Subfam. *EPIPASCHINÆ*.

Homura erythea, sp. n.

Male.—Head, antennæ, collar, tegulæ, thorax, and abdomen pale fawn-colour ; the underside of the thorax and palpi black ; the four anal segments of the abdomen blackish ; the anal tuft fawn-colour. Primaries fawn-colour, thickly irrorated with black scales ; a double row of fine black lines crosses the wing from the apex to the anal angle ; the fringe yellowish fawn-colour : secondaries pinkish white, clouded with brown at the apex and partly round the outer margin.—*Female* very similar to the male.

Expanse 2 inches.

Hab. Colombia, Sierra del Libano (*Mus. Druce*).

LXIX.—*Further Note on the Harvest-Mouse* (*Mus minutus*, *Pallas*) and its *Geographical Variations*. By G. E. H. BARRETT-HAMILTON.

To the 'Annals' of April 1899 I contributed a paper entitled "Note on the Harvest-Mice of the Palæarctic Region," in which I gave a list of four subspecies as being at that time known to me after a study of the material in the British Museum of Natural History and in my own collection. Since that time numerous additional specimens have come before me, throwing much new light on the subject. The fresh material consists of one specimen obtained by the late W. Dodson at Gageni, Roumania, thirteen from Brunswick, North Germany, and three from Warene, Belgium, collected by Mr. J. A. Loring for the United States National Museum, and sent over to me for determination by Mr. G. S. Miller, Jun., the Assistant Curator of Mammals.

From a study of the above, together with the older material, it appears that the Brunswick examples differ as regards coloration from those of Great Britain and Roumania in that the underside is not white, but strongly washed with yellowish buff, while the upperside is more uniform, the

contrast between the rump and the remainder of the dorsal region being less pronounced. Of the three Belgian specimens only one is adult, but that (a female) seems to represent, as might have been expected, a form intermediate between the harvest-mouse of Brunswick and that of England. It has the underside washed with yellow, but not in so marked a degree as in the case of the Brunswick mice, while the coloration of the upperside, being lighter and brighter, approaches in this respect rather closely to the British form in its particular tint of rufous. On the other hand, it agrees with the Brunswick mice in the general uniformity of distribution of the colour. For this subspecies a name is ready, at least provisionally, in *M. campestris*, Desmarest, a name applied, properly speaking, to the harvest-mice of Northern France. These, however, will probably prove to be identical with those of Belgium, as, indeed, seems to be indicated by the coloured plate in Trouessart's 'Les Petits Mammifères de la France.' It is now obvious that the Hungarian specimens can no longer be regarded as representatives of the subspecies *typicus*; the proper name for them would seem to be *M. pratensis*, Ockskay, a name which, as I have already stated, antedates *M. arundinaceus* (Petenyi), Chyzer. It seems, then, better to restrict the name *typicus* to Siberian specimens and to use the most suitable German name for the harvest-mouse of Brunswick. This appears to be *M. agilis*, Dehne, originally described from Dresden.

There seems to have been at one time or another considerable uncertainty as to the subspecific name properly applicable to the British harvest-mouse. The name *messorius*, long attributed to Shaw, appears to have been first used by Kerr, and its date having been thus carried back to the year 1792, it might reasonably have been assumed that we had reached the end of changes. I regret to find, however, that a name instituted by Gilbert White, and long overlooked, takes precedence of even Kerr's use of the name *messorius*. The British form will therefore more correctly stand as *Mus minutus minimus*, White, a change which should be at all events gratifying when regarded as connecting the name of a British naturalist with that of a British mammal.

According to the specimens at my disposal, the arrangement of the European and West Siberian subspecies may stand provisionally as follows:—

I. *Mus minutus typicus*, P. S. Pallas, Nov. Spec. pp. 96 & 315 (1779).

Hab. Siberia.

I have seen no specimen of this form.

II. *Mus minutus agilis* (J. F. A. Dehne), Hoflössnitz, p. 16 (1841).

Hab. Northern Europe (specimens seen from Brunswick).

Distinguishing characteristics. The upperside is not so red as in *M. m. minimus*, but the colour is uniformly distributed, there being no contrast between the rump and the upper dorsal region; the underside is strongly washed with yellow, hence the line of demarcation between the colours of the two surfaces is not so distinct as in *M. m. minimus*; the tail exceeds the combined length of the head and body; the hind foot seems to be larger than that of *M. m. minimus*. Young specimens have a duller and more *musculus*-like coloration of the upperside, and in some cases a less richly tinted underside than the adults.

The dimensions of an adult female (no. 85357*) reach (in millimetres):—Head and body 68; tail 76; hind foot 16; skull 18.5 × 8. The skull of a male (no. 85365*) reaches 18 × 8.5 millim. These are the two largest of the thirteen specimens from Brunswick; but in all the teeth are unworn.

III. *Mus minutus campestris*, A. G. Desmarest, Mamm., Suppl. p. 543 (1822). For synonymy see Ann. & Mag. Nat. Hist., April 1899, p. 345.

Hab. Probably Northern France, Belgium, and Central Western Continental Europe (specimens seen from Wrenne, Belgium).

Distinguishing characteristics. As compared with *M. m. minimus* the upperside is almost or quite as red in colour, but of more uniform arrangement, the contrast between rump and upper dorsal region being absent; the underside is yellower, but less so than in *M. m. agilis*; the line of demarcation is only moderately distinct.

The dimensions appear to be similar to those of *M. m. agilis*, those of an adult suckling female (no. 86000*) reaching:—Head and body 65 millim.; tail 70; hind foot 16; skull 17 × 8.

* The numbers refer to the labels of specimens in the collection of the U.S. National Museum at Washington.

IV. *Mus minutus minimus*.

Mus minimus, Gilbert White, Natural History of Selborne, pp. 33, 34, 39, & 43 (1789).

Mus messorius, R. Kerr, Animal Kingdom, p. 230 (1792).

An account of this form has been given in my paper already alluded to.

V. *Mus minutus pratensis*.

Mus pratensis, F. L. B. de Oekskay, Nov. Acta Leopold.-Carol. xv. 2, p. 243, tab. lxviii. (1831).

Mus arundinaceus (Petenyi), C. Chyzer, Rel. Pet. Termes-Fuzetek N. p. 91 (1881).

Hab. Western Hungary and Roumania (specimens seen from Czaloköz-somorja, plains of West Central Hungary, and from Gageni, Roumania).

Distinguishing characteristics. See my previous paper.

The dimensions of a female brought home by the late W. Dodson from Gageni, Roumania, where it was caught in an oat-rick on April 16th, 1899, are:—Head and body 63 millim.; tail 55; hind foot 14·5; ear 9.

LXX.—*On a small Collection of Odonata (Dragonflies) from Hainan, collected by the late John Whitehead.* By W. F. KIRBY, F.L.S., F.E.S., &c.

[Plate XII.]

HAINAN, a large island lying off the extreme south of continental China, is quite a new locality for dragonflies; and although the collection before me, which Mr. John T. Thomasson has kindly presented to the Natural History Museum, includes only fourteen species, yet, of the four species which I have described as new, two are the types of new genera and one of them is a remarkable form of quite extraordinary interest. Besides these, one or two of the other species are perhaps new, but the material obtained is insufficient to render it advisable to describe them.

In this and future papers I propose, in the case of known species, to quote the original reference, and my own Catalogue of *Odonata*, when no alterations or additions are required, instead of quoting the full synonymy.

The list of species is as follows:—

Libellulidæ.

LIBELLULINÆ.

Neurothemis, Brauer.1. *Tullia*, Dru.*Trithemis*, Brauer.2. *trivialis*, Ramb.*Crocothemis*, Brauer.3. *servilia*, Dru.*Zygonidia*, g. n.4. *insignis*, sp. n.*Orthetrum*, Newm.5. *testaceum*, Burm.*Diplacodes*, Kirb.6. *nebulosa*, Fabr.*Acisoma*, Ramb.7. *panorpoides*, Ramb.

Æshnidæ.

GOMPHINÆ.

Æshna, Fabr.8. *Thomassoni*, sp. n.

Agrionidæ.

AGRIONINÆ.

Matrona, De Selys.9. *basilaris*, De Selys.*Bayadera*, De Selys.

10. sp.

Pseudophaea, Kirb.11. *decorata*, De Selys.*Rhinocypha*, Ramb.12. *Whiteheadi*, sp. n.

CŒNAGRIONINÆ.

Ceriagrion, De Selys.13. *coromandelianum*, Fabr.*Pseudolestes*, g. n.14. *mirabilis*, sp. n.1. *Neurothemis Tullia*.*Libellula Tullia*, Drury, Ill. Exot. Ent. ii. pl. xlv. fig. 9 (1773).*Neurothemis Tullia*, Kirb. Cat. Neur. Odon. p. 8. n. 6 (1890).

Five specimens were obtained of this common East-Indian species.

2. *Trithemis* (?) *trivialis*.*Libellula trivialis*, Ramb. Ins. Névr. p. 115 (1842).*Trithemis trivialis*, Kirb. Cat. Neur. Odon. p. 18 (1890); De Selys, Ann. Mus. Genov. xxx. p. 467 (1891).*Diplacodes trivialis*, Karsch, Ent. Nachr. xvii. p. 246 (1891).

Three specimens obtained.

Dr. Karsch has pointed out that this species is not a true *Trithemis*, from which it differs in having the sectors of the triangle distinctly separated on the hind wings. He refers it to *Diplacodes*, the type of which is *D. tetra*, Ramb.; but from *Diplacodes* it differs in several important characters. The triangle of the fore wings is traversed; the subtriangular space consists normally of 3 cells, and only exceptionally of 2, whereas in *D. tetra* the usual number is 2, and only exceptionally 1 or 3; and the triangle is followed by one row of 3 cells and then several of 2. The more extensive genera of Libellulinæ need a further revision; typical *Trithemis* has the triangle followed by 3 cells, increasing, and *Diplacodes* by 2; and species with one row of 3 cells, followed by several of 2, do not, strictly speaking, belong to either genus. But I do not wish to subdivide existing genera in the present paper.

3. *Crocothemis servilia*.

Libellula servilia, Drury, Ill. Exot. Ent. i. pl. xlvii. fig. 6 (1773).

Crocothemis servilia, Kirb. Cat. Neur. Odon. p. 21. n. 3 (1890); Karsch, Ent. Nachr. xvii. p. 246 (1891); McLachl. Ann. & Mag. Nat. Hist. (6) xvii. p. 366 (1896).

A single specimen only.

As Dr. Karsch remarks, this species might easily be mistaken for *Orthetrum testaceum*, Burm., but that the last antenodal cross-nervure on the fore wings is not continuous.

ZYGONIDIA, gen. nov.

Frontal tubercle broad, not bifid; abdomen moderately long and slender, with a strong transverse carina on the third segment and a slighter one on the second, and a strong dorsal carina commencing on the third segment; segment 2 shorter than broad, 3 one and a half times as long as broad, 4-8 more than twice as long as broad, 9 a little longer than broad, 10 half as long as broad. Appendages of the second segment rather small; anal appendages slender and about as long as the ninth segment; lower appendage scarcely shorter than the others. Eyes large, connected for a moderately long space, and slightly expanded behind. Legs rather long; *claws bifid*; femora and tibiæ very finely serrated on the upper carinæ; femora beneath with numerous small teeth, mostly directed towards the knee, and with a few very long fine bristles towards the extremity; tibiæ set with long fine hairs or bristles beneath.

Wings rather long and pointed, moderately broad; pterostigma rather short; fore wings with 16-19 antenodal and 10-11 postnodal nervures, *the last antenodal normally continuous*; nodal sector waved, sectors of the arculus stalked, rising at two thirds of its length; lower basal cell long and narrow, with a second cross-nervure towards the extremity; triangle rather small, traversed by one nervure, and followed by three rows of cells, increasing; lower sector of the triangle separated from the upper, and rising distinctly below the apex of the triangle, from which the upper sector rises; subtriangular space consisting of 3 cells; no supra-triangular nervures. *Triangle of the fore wings often rising distinctly beyond the level of that of the hind wings*, which is traversed by a nervure, and extends nearer the base than the level of the arculus; no supra-triangular nervures, one cross-nervure only in the lower basal cell of the hind wings; sectors

of the triangle narrowly separated at the base. Hind wings broader than the fore wings, with the anal angle rounded; membranule rather small.

Agrees with *Zygonyx*, Hagen, in many of its characters, but sufficiently distinct by the last antenodal cross-nervure of the fore wings being continuous (it is discontinuous on one side in one specimen), the longer pterostigma, the triangle of the hind wings being only followed by two rows of cells and its sectors almost united; the large number of cross-nervures, &c.

From *Protorthemis*, Kirb., to which it is also allied, it differs in its bifid claws, longer and slenderer abdomen, and in the form of the triangle of the hind wings.

The genera allied to *Zygonyx* are so little known and the synonymy is so confused that I find it necessary to disentangle it, as far as the imperfect materials at my disposal at present will permit. My results will be found in a supplementary paper (*infra*, p. 539).

4. *Zygonidia insignis*, sp. n. (Pl. XII. fig. 1.)

Long. corp. 53-56 millim.; exp. al. 105-108 millim.; lat. al. ant. 11 millim.; long. pter. $4\frac{1}{2}$ -5 millim.; lat. al. post. 12 millim.

Male.—Head rich purple above, the frons narrowly bordered below with yellow, expanding into a large yellow spot on each side; nasus black, the sides and a small mark in the middle in front yellowish; rhinarium yellow; lower mouth-parts black, with the base of the mandibles and the sides of the mentum broadly yellow; back of head black, slightly spotted with yellow on the sides.

Thorax and abdomen black above; 3 yellow interalary spots, the first irregular, between the hinder part of the bases of the fore wings, the second longitudinal, and the third transverse, between the bases of the hind wings. Abdomen with the lateral carinæ (except that on the third segment), the longitudinal carina as far as the seventh segment, and the sutures to the end of the third segment narrowly marked with yellow; there is also a slight transverse yellow mark at the end of the fourth segment and others on the sides at the end of the fifth and sixth segments. Pectus and pleura reddish testaceous, the pleura with two large coppery-green spots, the hindermost greenest. Legs black, coxæ testaceous. First three segments of the abdomen beneath and on the lower part of the sides mostly testaceous, interrupted with black behind the segments and along the lateral carinæ; there is also a

double longitudinal testaceous median line as far as the seventh segment.

Wings hyaline, with a slight yellowish tinge, and of nearly equal length; pterostigma narrow, black, covering about three cells, and near the apex of the wing, which is clouded with smoky yellow beyond, the arculus rising at or very near the second antenodal cross-nervure. Wings nearly parallel to the level of the pterostigma, but the fore wings slightly expanding to the broadest point.

Two specimens only obtained.

5. *Orthetrum testaceum.*

Libellula testacea, Burm. Handb. Ent. ii. p. 859. n. 64 (1839).

Orthetrum testaceum, Kirb. Cat. Neur. Odon. p. 39. n. 47 (1890); Karsch, Ent. Nachr. xvii. p. 246 (1891).

One specimen only.

This species appears to be pre-eminently insular in its tastes. There are specimens in the Natural History Museum from Penang, Dindings, Formosa, Philippines, Java, Borneo, and Celebes.

6. *Diplacodes (?) nebulosa.*

Libellula nebulosa, Fabr. Ent. Syst. ii. p. 379. n. 27 (1793).

Diplacodes nebulosa, Kirb. Cat. Neur. Odon. p. 42. n. 1 (1890); Karsch, Berl. ent. Zeitschr. xxxiii. p. 372 (1890).

A pair (♂ ♀) of this species, which, besides being Asiatic and not African, differs in several minor particulars from the type of the genus.

7. *Acisoma panorpoides.*

Libellula panorpoides, Ramb. Ins. Névr. p. 28, pl. ii. fig. 2 b (1842).

Acisoma panorpoides, Kirb. Trans. Zool. Soc. Lond. xii. p. 309 (1889); Cat. Neur. Odon. p. 43. n. 1 (1890).

One specimen only.

There are specimens in the Natural History Museum from China, India, Ceylon, Singapore, and Lombok.

8. *Æshna Thomassoni*, sp. n.

Exp. al. 74 millim.

Male.—Head black; a green band between the eyes on the occiput and another in front of the ocelli; a large yellow spot at the base of the mandibles. Pronotum black, with two small green contiguous spots in the middle. Mesonotum velvety black; a broad green band, connected in front, on

each side, the space between brownish black, bordered with reddish, and bisected by the median carina, which is green in front. Mesopleura black, with a broad central green band; metapleura and sides of the first two segments of the abdomen almost entirely green; pectus yellow and black; legs black, with a green streak on the underside of the front femora. Longitudinal alary spaces mostly green, and green dots at the base of the wings. Abdomen with a triangular green spot in the middle of the first segment, an oval yellow one on the second, an incomplete yellow median stripe on the third; a bifid spot at the base of the fourth and fifth; the remaining segments wanting. (The yellow markings may be green during life.) Earlets large, yellow.



Wings hyaline, with brown nervures; pterostigma covering about six cells; fore wings with 17 antenodal and 12-13 postnodal nervures; anal triangle of the hind wings composed of four cells, the fourth small, quadrate, on the middle of its inner edge, which is angulated inwards a little below it. Membranule of hind wings very small, linear, whitish.

A single imperfect specimen.

Somewhat resembles *Æ. Pryeri*, De Selys, but abundantly distinct.

9. *Matrona basilaris*.

Matrona basilaris, Selys, Syn. Cat. p. 17 (1853); Kirby, Cat. Neur. Odon. p. 100. n. 1 (1890).

Four specimens, three males and one female.

This species was formerly represented in the Natural History Museum by *M. nigripectus*, De Selys.

10. *Bayadera*, sp.

A single specimen of a very distinct species, with lateral greenish stripes on the thorax, and stained with smoky yellow towards the base, and broadly along the costa of all the wings nearly to the pterostigma. The tips of the wings are also infuscated nearly to the level of the base of the pterostigma. Unfortunately both the thorax and abdomen are so much damaged that it is not desirable to describe the species from so defective a specimen, especially as it is not improbably immature.

11. *Pseudophæa decorata* (?). (Pl. XII. fig. 2.)

Euphæa decorata, De Selys, Syn. Cat. p. 51 (1853).

Pseudophæa decorata, Kirby, Cat. Neur. Odon. p. 109. n. 6 (1890).

A male specimen considerably larger than the dimensions given by De Selys, and with the brown band of the hind wing extending basally as far as the nodus, and in the middle of the wing further than this point. It may be a distinct species, but in the absence of a typical specimen of *P. decorata* to compare, it would not be advisable to describe it from a single specimen.

12. *Rhinocypha Whiteheadi*, sp. n. (Pl. XII. fig. 4.)

Long. corp. 27 millim.; exp. al. 47 millim.

Male.—Black; vertex between the eyes with a transverse row of four blue spots; pronotum lilac above, with transverse black carinæ and two blue spots on each side; mesonotum with a lilac triangular spot in the middle at the base and a blue dash on each side; at the extremity is a blue spot on each side; mesopleura blue, nearly divided in two by a black space from behind, and projecting a short streak in front; metapleura blue, the suture between broad behind; interalary space spotted with blue, with a white spot between each pair of wings, and a white curve on each side of the front spot; legs white beneath; abdomen with the first segment blue on the sides and narrowly behind, second and third

segments blue on the sides, and also above, except the black central carina and the hinder part of segment 3; the following segments with terminal blue lateral spots, only distinct on the third, seventh, and eighth segments. Fore wings hyaline, blackish in the costal area from the fifth postnodal cross-nervure, and from about half the distance between the nodus and the black pterostigma the apical portion of the wing is purple to the tip, but leaving the inner margin below the purple portion dusky and shot with iridescent blue. Hind wings purple from the second postnodal cross-nervure to the tip; the inner marginal area, however, is only dusky from half the distance from the quadrilateral to the purple part of the wing, and as far below the latter. The purple part of the wing is crossed by two rows of long iridescent subhyaline spots: the outer row consists of a broad upper one, a narrow middle one, and a broad lower one, divided by two longitudinal nervures; the inner row consists of three long subhyaline iridescent spots, the middle broadest, but with its upper half shorter than the lower; besides these, a similar long iridescent subhyaline spot projects inwards into the hyaline part of the wing from the middle of the purple part.

Two specimens; one immature, in which the purple part of the wing is much paler, the blue spots on the head and abdomen are wanting, and the pterostigma is pale in the outer half.

Belongs to the group of *R. perforata*, Perch.

13. *Ceriagrion coromandelianum* (?).

Agrion coromandelianum, Fabr. Ent. Syst. Suppl. p. 287 (1798).

Ceriagrion coromandelianum, De Selys, Bull. Acad. Belg. (2) xlii. p. 528 (1876).

Agrion cerinum, Rambur, Ins. Névr. p. 279 (1842).

A single male specimen, agreeing with *C. melanurum*, De Selys, in size and in having 13 postnodal cross-nervures, but differing in the uniform colour of the abdomen and in the wings being petiolated as far as the basal postcostal nervure, in which characters it agrees with *C. coromandelianum*.

PSEUDOLESTES, gen. nov.

Wings petiolated nearly as far as the basal postcostal nervure, which is placed nearly halfway between the level of the two antenodal cross-nervures, or nearer the second; second antenodal cross-nervure almost corresponding with the arculus, the sectors of which rise close together above the

middle; arculus angulated where the lower sector rises, the median and subnodal sectors rising a little beyond the arculus, as in *Lestes*. Quadrilateral very long, especially on the hind wings, a little narrower above than below. Pterostigma long and thick, covering from two to four cells, acutely angulated inwards on its lower side. Lower sector of the quadrilateral long, slightly undulated on the fore wings. Nodal sector rising between the third and fifth postnodal cross-nervure, and the ultranodal sector at the level of about the eighth and ninth, above and below which, and also above and below the subnodal sector, are two shorter intercalated sectors, increasing in length as they approach the median sector. On the hind wings there are only three pairs of intercalated sectors, placed below the ultranodal sector, the subnodal sector, and the lower sector of the arculus respectively. The fore wings are rather long and narrow, and the hind wings are one third shorter, rather broader, and coloured. Front moderately prominent, rounded. Terminal appendages in male destroyed (probably hooked), in female straight, pointed, longer than the tenth segment; lower appendage stout, terminating in a strong obliquely raised pointed tooth, below which are a pair of short filiform appendages.

This is the most remarkable form in the collection, and stands about midway between three distinct subfamilies. It has the colour and general shape of *Pseudophaea decorata*, De Selys, which was received with it; the quadrilateral and pterostigma of *Podopteryx*; and the median and subnodal sectors of *Lestes*, from which it differs, however, in none of the sectors being visibly undulated, except the lower sector of the arculus on the fore wings. It should certainly form the type of a new subfamily.

14. *Pseudolestes mirabilis*, sp. n. (Pl. XII. fig. 3.)

Long. corp. 35-37 millim.; exp. al. ant. 56-60 millim.; exp. al. post. 42-45 millim.

Head black; ocelli yellow, in an equilateral triangle on the vertex; in some males a pale greenish-blue spot on each side of the inner orbits opposite the frontal ocellus and a transverse band in front of it, and all the rest of the face above of the same colour. Antennæ with the basal joint short and thick, the second much longer but of equal thickness, the flagellum hair-like, longer than the two other joints together. Body bronzed; pronotum rather large, with a testaceous lateral band, partly continued on the mesonotum; mesopleura with three testaceous stripes, the upper one linear,

the two lower ones broader and subcontiguous, the middle one interrupted. Legs black, with the femora inclining to rufous; bristles long and slender, not very numerous. Fore wings hyaline, with black pterostigma and nervures and with 18-21 postnodal cross-nervures. Male with the hind wings smoky brown towards the base and along the costa and the outer two fifths darker brown; on the middle third of the inner margin is a large orange space, extending nearly to the costa, and the tip of the wing is of the same colour. On the underside the large orange blotch and most of the space between this and the tip is clothed with silvery-white scales, the portions of the wing not thus covered being black, with a strong green and coppery iridescence. In the female the hind wings are hyaline yellow, with a broad black subapical band, with a strong green and coppery iridescence both above and below.

Described from six specimens, three of each sex.

EXPLANATION OF PLATE XII.

Fig. 1. *Zygonidia insignis*, gen. & sp. n., p. 533.

Fig. 2. *Pseudopheca decorata* (?), De Selys, p. 536.

Fig. 3. *Pseudolestes mirabilis*, gen. & sp. n., p. 538.

Fig. 4. *Rhinocephya Whiteheadi*, sp. n., p. 536.

LXXI.—On the Species which have been included in *Zygonyx*,
Hagen and De Selys. By W. F. KIRBY, F.L.S., F.E.S.,
&c.

I now take the opportunity of publishing the notes referred to in the preceding paper.

Genus ZYGOXYX, Hagen and De Selys.

- (1) Hagen, Verh. zool.-bot. Ges. Wien, xvii. p. 62 (1867).
- (2) Brauer, *op. cit.* xviii. p. 370 (1868).
- (3) *Id. op. cit.* p. 742 (1868).
- (4) De Selys, Ann. Soc. Ent. Belg. xii. p. 96 (1869).
- (5) *Id.* Ann. Nat. Hist. (4) iii. p. 274 (1869).
- (6) *Id.* Bull. Acad. Belg. (2) xxxi. p. 520 (1871).
- (7) Karsch, Berl. ent. Zeitschr. xxxiii. p. 281 (1890).
- (8) De Selys, C. R. Soc. Ent. Belg. xxxv. p. cxxxvii (1891).
- (9) Calvert, Proc. Acad. Nat. Sci. Philad. 1899, p. 245.

Hagen and Brauer (1-3) briefly notice this MS. genus of De Selys as belonging to the Corduliidæ and as including

two species, *Z. iris* and *Z. ida*, with the triangle traversed and the hind wings rounded in the male.

De Selys (4, 5) then described a new species from the Seychelles under the name of *Zygonyx luctifera*, differing from typical *Zygonyx* in having only one cross-nervure in the lower basal cells of all the wings and the last antenodal cross-nervure of the fore wings discontinuous. He says that *ida* is the type of *Zygonyx*, but that Brauer has made *iris* the type, which differs in having the triangles traversed (but this character having been insisted on from the first, excludes *ida* as a possible type, and De Selys' arbitrary alteration cannot be admitted). De Selys (6) incidentally mentions *Zygonyx* as belonging to the Libellulidæ.

Karsch (7) discriminates between *Zygonyx* and his new *Schizonyx*; but though he mentions *ida* as the type of the former, the characters given apply only to *iris*, and *ida* possesses almost every character assigned by Karsch to *Schizonyx*.

(8) De Selys, for the first time, fully describes *Z. ida* and *Z. iris*.

(9) Calvert compares *Zygonyx* with various allied genera.

According to the description, *Zygonyx (iris)* differs from *Zygonidia* in a variety of characters, some of which I have already pointed out. It is also probably a shorter-winged insect.

Zygonyx iris, Hagen and De Selys.

Hagen (1); Brauer (2, 3); De Selys (4, 5, 8).

|| *Zygonyx ida*, Karsch, Berl. ent. Zeitschr. xxxiii. p. 281 (1890).

Hab. Bengal.

Not in the collection of the Natural History Museum, nor does Prof. Calvert appear to have seen a specimen.

Genus ZYGNIDIA, Kirb.

Zygonidia, Kirb. (*antea*, p. 532).

Zygonidia insignis, Kirb. (*antea*, p. 533).

Hab. Hainan.

I refer to my previous remarks for all particulars relating to this genus.

Genus *NEUROCENA*, nov.

Fore wings with the last antenodal cross-nervure discontinuous; nodus much nearer the tip of the wing than the base; two cross-nervures in lower basal cell; nodal and subnodal sectors hardly curved, but much arched at the extremity, as are also the sectors of the arculus, which are stalked; triangle small, empty, followed by two rows of cells, increasing; subtriangular space consisting of 2 cells (sometimes 3, according to De Selys). Hind wings with the triangle empty, and the sectors of the triangle widely separated; only one cross-nervure in the lower basal cell.

Neurocena ida, Hagen and De Selys.

Zygonyx ida, Hagen (1); Brauer (2, 3); De Selys (4, 5, 8); Karsch, Ent. Nachr. xxi. p. 203 (1895).

Pseudomacromia luxuriosa, Karsch, Berl. ent. Zeitschr. xxxviii. p. 21 (1893).

Hab. Java, Malacca.

There is only one specimen at present in the Natural History Museum, from Malacca. I have therefore only characterized the genus briefly, referring to De Selys (8) for further details.

Genus *SCHIZONYX*, Karsch.

Schizonyx, Karsch, Berl. ent. Zeitschr. xxxiii. p. 281 (1890); De Selys, C. R. Soc. Ent. Belg. xxxv. p. cexxvi.

Schizopyga (err. impr.), Kirb. Cat. Neur. Odon. p. 184 (1890).

Sufficiently distinct from the other genera by having only one cross-nervure in the lower basal cell of all the wings.

Schizonyx luctifera, De Selys.

Zygonyx (?) *luctifera*, De Selys, Ann. Soc. Ent. Belg. xii. p. 96 (1869); Ann. Nat. Hist. (4) iii. p. 273 (1869).

Schizonyx luctifera, Karsch, Berl. ent. Zeitschr. xxxiii. p. 281 (1890); De Selys, C. R. Soc. Ent. Belg. xxxv. p. cexxvii (1835); Calvert, Trans. Amer. Ent. Soc. xix. p. 163 (1892); Proc. U.S. Nat. Mus. xviii. p. 122 (1896); Proc. Acad. Nat. Sci. Philad. 1899, p. 245.

Hab. Seychelles.

Not in the collection of the Natural History Museum.

I add a short description of another new genus, which, though it has not bifid claws, has a great general resemblance to *Zygonidia*.

CRATILLA, gen. nov.

Frontal tubercle bifid; claws dentated before the extremity; abdomen rather slender, shorter than the wings, rather long and narrow, only one cross-nervure in the lower basal cell; no supratrangular nervures; all the triangles traversed by one nervure: fore wings with the last antenodal cross-nervure continuous; triangle rather short and broad, followed by three rows of cells, increasing; subtriangular space consisting of 3 or 4 cells: hind wings with the triangle followed by a row of 2 (or the first row of 3) cells, increasing; its base corresponding with the arculus; sectors of the triangle united at the base.

Cratilla metallica, Brauer.

Orthemis metallica, Brauer, Sitzungsab. Akad. Wien, lxxvii. p. 199 (1878).

Protorthemis metallica, Kirb. Trans. Zool. Soc. Lond. xii. p. 290 (1878).

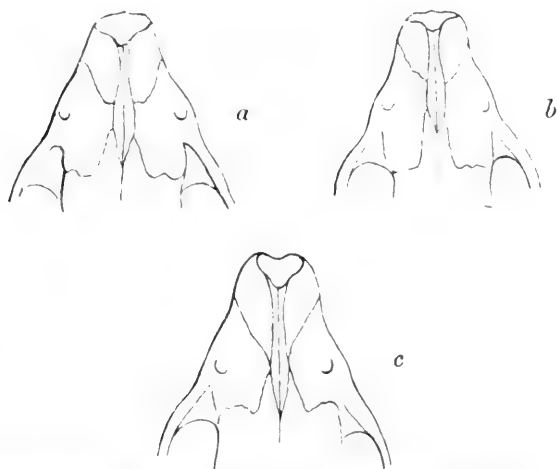
Hab. Singapore, Mount Ophir, Sarawak, Sumatra, Palawan.

Differs from *Protorthemis* by the more slender body and the want of supratrangular nervures; from *Zygonidia* by the dentated claws and the single nervure in the lower basal cell of the fore wings; and from *Nesoxenia* (to which, if I recollect rightly, some recent authors have referred it) by the traversed triangle of the hind wings, with its base corresponding to the arculus, the single nervure in the triangle of the fore wings, and the coarse reticulation, &c.

LXXII.—*Note on the Individual Variation of the Common Hedgehog (Erinaceus europæus, Linn.)*. By Dr. EINAR LÖNNBERG.

IN the 'Annals' for April last is a paper by Mr. G. E. H. Barrett-Hamilton, entitled "Note on the Common Hedgehog (*Erinaceus europæus*, Linnæus) and its Subspecies or Local Variations." The first two "subspecies" (of ten) are named "*Erinaceus europæus occidentalis*" and "*E. e. typicus*." The characteristics by which these forms are said to be distinguished from each other are, to judge from the diagnoses, rather slight. Concerning "*E. e. typicus*" Mr. Barrett-Hamilton says, under the head "distinguishing characteristics":—

"In size and colour similar to *E. e. occidentalis*, but the skull may be distinguished by the frontal processes of the premaxillæ, which, although extending backward half the length of the nasals, end in a sharply defined point." In "*E. e. occidentalis*" the same processes are stated to be provided "with a blunt or nearly square posterior termination, and seldom showing a sharply defined point or angle." The difference is consequently of little importance; but as the "type locality" of "*E. e. typicus*" is given as "Upsala, Sweden," I felt interested, and considered it the duty of an Upsala zoologist to examine the skulls of hedgehogs from the nearest vicinity of Upsala. I found then at once that the processes in question are subject to so much variation, that it is impossible to use them for the distinction of even local varieties; subspecific value cannot on any account be attributed to them. The differences are merely individual, as may be seen from the accompanying three figures. Fig. a,



Figures of front part of three skulls of *Erinaceus europæus*, Linn., from the vicinity of Upsala, Sweden.

drawn, as are also the others, with the help of a camera lucida, of the natural size, is taken from the skull of an animal caught in the parish just outside the town of Upsala, but should, I suppose, be regarded as belonging to the "subspecies" "*occidentalis*." Fig. c, from the same neighbourhood, is a "*typicus*," and fig. b intermediate. The series

could be made still more continuous, and there are also other skulls with these processes double-pointed, and so on, which may be mentioned as proving the variation of this bone; but I think this is enough.

I do not wish to add any disparaging remarks; but I must say that it seems really better not to burden the already copious nomenclature with new names of subspecies established on such trifling characteristics.

Upsala,
May 3, 1900.

PROCEEDINGS OF LEARNED SOCIETIES.

GEOLOGICAL SOCIETY.

December 6th, 1899.—W. Whitaker, B.A., F.R.S.,
President, in the Chair.

The following communication was read:—

‘On the Occurrence in British Carboniferous Rocks of the Devonian Genus *Palæoneilo*, with a Description of a New Species.’
By Dr. Wheelton Hind, B.S., F.R.C.S., F.G.S.

The family Nuculidæ is represented in Carboniferous rocks by the genera *Nucula*, *Nuculana*, and *Ctenodonta*, and to these must now be added *Palæoneilo*, which the author describes from two fine specimens in the Museum of Practical Geology, from Carboniferous Shale (Yoredale Shale) south of Hammerton Hall, Slaidburn, Yorkshire. It is remarkable that a genus so well developed in Devonian times should be found at the top of the Carboniferous Limestone Series, but not in intermediate beds. Hall’s diagnosis of the genus is given, with additional remarks, and a new species is described and contrasted with *Ctenodonta (Palæoneilo) lirata*, Phil., from the Devonian of Baggy.

January 24th, 1900.—W. Whitaker, B.A., F.R.S.,
President, in the Chair.

The following communications were read:—

1. ‘Fossils in the University Museum, Oxford: II.—On Two New Genera and Species of Crinoidea.’ By W. J. Sollas, M.A., D.Sc., LL.D., F.R.S., V.P.G.S., Professor of Geology in the University of Oxford.

The first genus and species are founded on two calyces in the

University Collection and three in the British Museum; all the specimens come from the Carboniferous Limestone. The arms and stem are at present unknown. The genus in general character and structure recalls *Platycrinus*, but the incorporation of the costal and distichal plates in the calyx affords a very obvious distinction. The analysis of the calyx, however, suggests the Melocrinidæ, from the members of which it is chiefly distinguished by the comparatively small size of the costal and distichal plates. The new genus is a truly annectant form uniting the Melocrinidæ and the Platycrinidæ, and may be indifferently associated with either.

The second genus and species are founded on a specimen in the Grindrod Collection, obtained probably from the Silurian rocks, but from a locality not known, possibly Dudley. In general appearance it resembles an elongated form of *Pisocrinus*, particularly in its calyx, but the arms are those of a Heterocrinid. This conjunction of characters, though rendering necessary a revision of the definition of the Pisocrinidæ, cannot be regarded as bringing this family appreciably nearer to the Heterocrinidæ, which are fistulate, while the Pisocrinidæ, so far as known, are not.

2. 'Fossils in the University Museum, Oxford: III.—A New Worm-track from the Slates of Bray Head, Ireland, with Observations on the genus *Oldhamia*.' By W. J. Sollas, M.A., D.Sc., LL.D., F.R.S., V.P.G.S., Professor of Geology in the University of Oxford.

The curious markings known as *Oldhamia* have not been hitherto recorded from other than the Lower Palæozoic rocks, although they have a wide distribution in space, being found in Ireland, in the Ardennes, in Brabant, in America, and possibly in Norway. While the organic nature of *Oldhamia* was scarcely a matter of doubt in the minds of the earlier writers, there existed a great diversity of opinion as to its place in the organic world, and it was placed by different observers among polyzoa, hydrozoa, and plants, respectively. The microscopical observations made by the Author prove that *Oldhamia* is not the remains of an organism, but merely a marking in the rock, though one which might be, nevertheless, of organic origin. Certain markings formed in the mud at Portishead, by the feeding-habits of a small burrowing crustacean, bear a considerable resemblance to specimens of *Oldhamia*; but a stronger resemblance to the new species described in this paper is found in Nathorst's figures of the impressions made by one of the two recent worms *Glyceria alba* or *Gonidia maculata*. Prof. Joly's observation that markings of *Oldhamia antiqua* always occur in relief, while those of *O. radiata* are depressions, might suggest that while one set of markings was produced by the animal when feeding, the other was connected with its castings of excrementitious matter. This explanation is open, however, to several objections, and the Author is inclined to believe that these species of *Oldhamia* are the traces

of some kind of siphonaceous alga: the cavities left by their decay were subsequently filled in by sediment under pressure. If the upper surface of *O. antiqua* were more resistant than the lower, this might account for its preservation in relief. The microscopical examination of slate containing *Oldhamia* affords evidence of original and secondary structures which has an important bearing on this question.

MISCELLANEOUS.

Golianthinus (Sphyrorrhina) Wisei.

By E. A. HEATH, M.D., F.L.S.

SINCE publishing a description of the above, from East Africa (*ante*. p. 397), I have come across a description and figure of a beetle described by Dr. Kraatz from the other side of the continent, and named by him *Fornasinius Hauseri*. This is the nearest ally to my species in form, structure, and markings, from which, however, *G. Wisei* differs by having *three sharp* outer spines on the front tibiæ; the terminal spines in Dr. Kraatz's specimen are very blunt, semitruncate; the first segment of the front tarsus is nearly twice as long as in my species. The markings on the thorax also are quite different; beside the three centre lines, which are somewhat similar in both species, Dr. Kraatz's species has a lateral line reaching from the anterior border to the middle of the thorax, and a line on both outer borders of the thorax from the base of the head, where it joins the last-mentioned short lines, to the shoulder of the elytra; my species is quite devoid of these short lines and the marginal lines; in mine the horn is much thicker than in Dr. Kraatz's species.

I have used the older name of *Golianthinus* as a generic name, as it more clearly indicates the group to which it belongs.

Two mistakes occurred in my description: for *Golianthus* read *Golianthinus*, and in the last line of the description instead of "femora" read "tibiæ."

May 14th, 1900.

On the Skeleton of the Snout and Os carunculæ of the Mammary Fetus of Monotremes. By Prof. J. T. WILSON, M.B., Ch.M.

For the research three specimens were utilized: one was the foetal *Ornithorhynchus*, whose external characters were described by the writer in a previous paper before the Society; another was a

more advanced specimen of *Ornithorhynchus*; whilst the third was an *Echidna* of about the same stage as the earlier of Professor W. N. Parker's specimens. All the stages were more advanced than those of *Echidna* lately investigated by Seydel. Wax-plate reconstructions of the anterior snout region were exhibited, together with serial photographs of the younger *Ornithorhynchus*.

The following features are revealed and illustrated by the models:—(1) The complete continuity of the nasal floor cartilage and the extensive marginal cartilage of the upper lip, which in the adult are separated by the premaxillæ. (2) As a result of this continuity the premaxillæ arise each as two entirely distinct bony splints on the dorsal and ventral surfaces of the cartilaginous plate aforesaid. (3) The great forward expansion of the so-called rostral cartilage of the *Ornithorhynchus* is seen to be due to the forward growth of two bilateral alar expansions of the same cartilage, which tend to meet in front after enclosing a deep notch corresponding to the hiatus described by Broom in the rostral cartilage of the adult. (4) The ventral lamellæ of the premaxillæ are provided with true palatine processes directed backwards paramesially. In the older of the two stages of *Ornithorhynchus* there exists, quite independently of the palatine process, and separated from it by a considerable interval, a separate ossification for the dumbbell-shaped bone, which is thus proved to be a perfectly distinct element—a true anterior vomer. (5) Anteriorly, the ventral premaxillary splints turn up dorsally in front of the anterior extremity of the snout in both *Ornithorhynchus* specimens, in the form of rather attenuated trabeculæ, lodged in the notch between the alar expansions of the rostral cartilage. Above this plane they fuse and are continued dorsally into a remarkable osseous mass which forms a definite skeletal foundation for the caruncle, and may therefore be named the os carunculæ. This is at its maximum development in the younger stage of *Ornithorhynchus*, and is undergoing resorption in the older; whilst in the *Echidna* model it is only represented by a small nodule of bone which has lost all connexion with the premaxillæ. From Seydel's figures of earlier stages it is evident that the *Echidna* condition is originally identical with that of *Ornithorhynchus*, though it would appear to exist in a less exaggerated form. (6) The cartilaginous septum of both Monotremes exhibits an oval "internasal fenestra" immediately behind its anterior termination at the pre-rostral notch. A similar fenestra, according to W. K. Parker, is "a common feature in low Eutheria."—*Linn. Soc. of New South Wales, Abstract of Proceedings, March 28, 1900, pp. iii-iv.*

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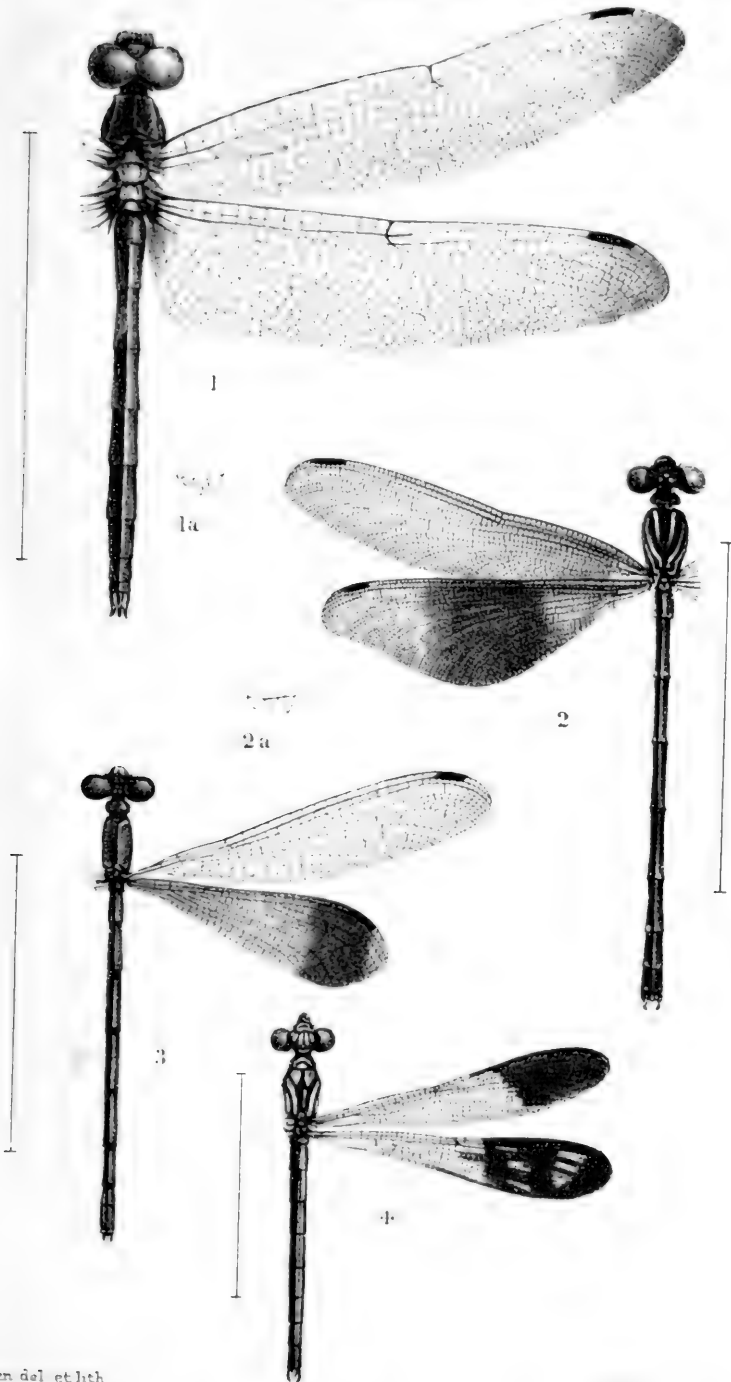
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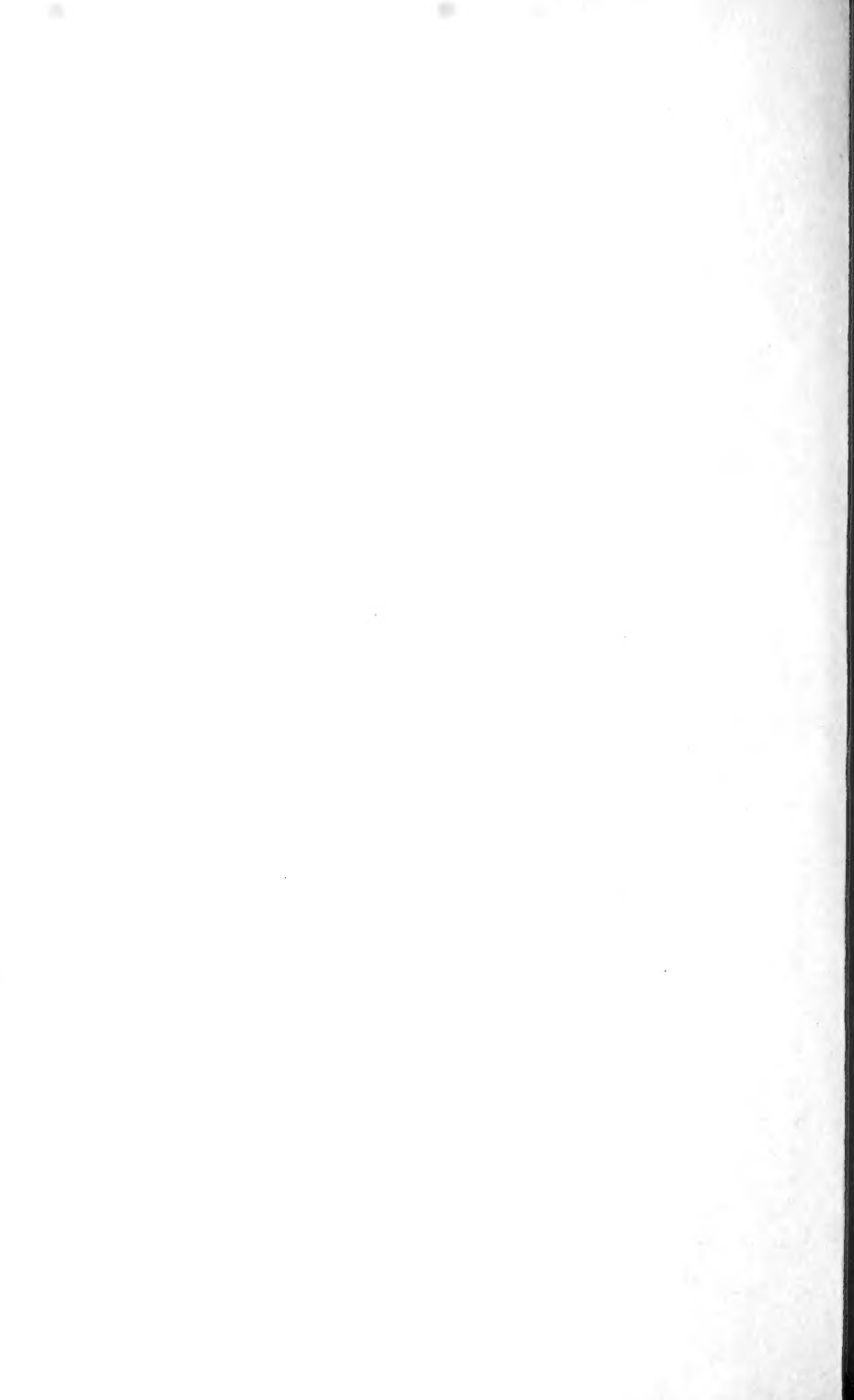
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