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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

SIR ARTHUR E. SHIPLEY, G.B.E., M.A., Sc.D., F.R.S., F.Z.S.,
ARTHUR SMITH WOODWARD, LL.D., F.R.S., P.L.S., F.G.S.,
GEORGE CHARLES CHAMPION, A.L.S., F.Z.S., F.E.S.,

AND

RICHARD T. FRANCIS, F.Z.S., M.B.O.U.

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VOL. XI.—NINTH SERIES.  
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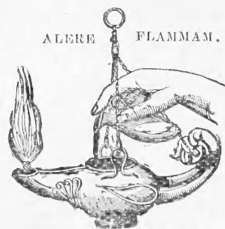
1923.

“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
 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.

[NINTH SERIES.]

"..... per litora spargite muscum,
Naiades, et circum vitreos considite fontes:
Pollice virgineo teneros hic carpite flores:
Floribus et pictum, 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 Giannettusi, Ecl. 1.

No. 61. JANUARY 1923.

I.—*A Revision of the Clupeid Fishes of the Genus Ilisha and allied Genera.* By J. R. NORMAN.

(Published by permission of the Trustees of the British Museum.)

THIS paper forms a continuation of a series of papers on the Clupeidæ by Mr. C. Tate Regan, F.R.S., to whom I am indebted for much help and advice. The fishes here dealt with correspond to Section B of Günther's Clupeinæ, *i. e.*, the genera with a long anal fin.

Synopsis of the Genera.

- I. Maxillary not adherent to præmaxillary; no canines.
- A. A ligament between the præmaxillary and the middle of the maxillary.
1. Pelvic fins present 1. *Ilisha*.
2. Pelvic fins absent.
- a.* Maxillary broadly rounded behind, not extending beyond middle of eye.
- Body elongate; abdominal profile not very convex. 2. *Opisthopterus*.
- Body very deep; abdominal profile very convex .. 3. *Pristigaster*.
- b.* Maxillary tapering behind in adults, extending to gill-opening or beyond.
- Dorsal present 4. *Odontognathus*.
- Dorsal absent 5. *Raconda*.
- Ann. & Mag. N. Hist.* Ser. 9. Vol. xi. 1

B. A toothed bone between the distal end of the præmaxillary and the middle of the maxillary.

- Pelvic fins present 6. *Neosteus*.
 Pelvic fins absent 7. *Pliosteostoma*.

II. Maxillary adherent to præmaxillary; canine teeth.

8. *Chirocentrodon*.

1. *ILISHA*, Gray, 1846.

(Gray) Richards, Ichth. China, p. 306.

Platygaster, Swainson, Nat. Hist. ii. p. 294 (1839).

Pellona, Cuv. & Val. Hist. Nat. Poiss. xx. p. 300 (1847).

? *Zunasia*, Jordan & Metz, Mem. Carnegie Mus. vi. 1913, p. 7.

Form elongate, compressed; abdomen sharp-edged, with scutes forming a continuous series on thorax and abdomen. Mouth moderate, terminal, with the lower jaw projecting; maxillary with a narrow proximal and an expanded distal part; in front of the narrow part a ligament runs from the end of the præmaxillary to the broad part of the maxillary; two well-developed supramaxillaries. Minute teeth in jaws; no canines; rasp-like bands of teeth on palatines and pterygoids; an elongate patch of teeth on the tongue. Scales of moderate size; with irregularly paired transverse grooves, the inner ends of which are separated by an interspace. Dorsal of 14–21 rays; anal with 33–52 rays, length of base $2\frac{1}{2}$ to $3\frac{2}{3}$ in length of body, origin below or just behind dorsal; upper pectoral ray strong; pelvics small. Gill-rakers stout, spinulose, not very numerous (16–25).

Tropical Indo-Pacific.

Ilisha (*Pellona*) *bleekeriana*, Poey ('Repertorio,' ii. 1867, p. 242), is placed in the genus *Ilisha* by Jordan and Evermann (Bull. U.S. Nat. Mus. xlvii. 1896, p. 436), but, unless the description is quite incorrect (teeth somewhat long and curved, with one canine above and two below on each side), it is not an *Ilisha* at all, and is probably more nearly related to *Chirocentrodon*, Günther.

Synopsis of the Species.

I. Less than 46 scales in a longitudinal series; 16–20 scutes before insertion of pelvics.

A. Depth of body $2\frac{3}{8}$ to $3\frac{1}{2}$ in the length.

- Anal of 45–49 rays; origin just behind dorsal . . . 1. *brachysoma*.
 Anal of 42 rays; origin below posterior third of dorsal. 2. *africana*.
 Anal of 38–41 rays; origin below last dorsal ray . . 3. *indica*.

B. Depth of body $3\frac{3}{4}$ to 4 in the length.

- Origin of dorsal much nearer end of snout than base of caudal; origin of anal just behind dorsal . . 4. *motius*.

- Origin of dorsal a little nearer end of snout than base of caudal; origin of anal below posterior part of dorsal 5. *kampeni*.
- II. More than 46 scales in a longitudinal series; 20-28 scutes before insertion of pelvics.
- A. Dorsal of 21 rays; 70 scales in a longitudinal series. 6. *leschenaultii*.
- B. Dorsal of less than 21 rays; less than 70 scales in a longitudinal series.
1. Origin of anal below anterior half of dorsal.
- a. Depth of body 4 to $4\frac{1}{3}$ in the length .. 7. *sladeni*.
- b. Depth of body $3\frac{1}{4}$ to $3\frac{3}{8}$ in the length.
- Origin of anal below first dorsal ray; maxillary not reaching middle of eye 8. *pristigastroides*.
- Origin of anal below first third of dorsal; maxillary reaching middle of eye or beyond 9. *amblyropterus*.
2. Origin of anal below posterior half of dorsal.
- a. Depth of body $3\frac{1}{2}$ to 4 in length; anal of 44-52 rays. 10. *elongata*.
- b. Depth of body 3 to $3\frac{1}{2}$ in the length.
- a. Anal of 42 rays; origin of dorsal nearer base of caudal than end of snout 11. *novacula*.
- β. Anal of 45-50 rays; origin of dorsal equidistant from end of snout and base of caudal, or nearer former.
- * Ventral scutes prominent 12. *macrogaster*.
- ** Ventral scutes not prominent.
- Pelvics inserted a little nearer base of pectoral than origin of anal; 21-23 gill-rakers on lower part of anterior arch; ventral scutes 24-27+10-13 . 13. *xanthoptera*.
- Pelvics inserted a little nearer base of pectoral than origin of anal; 18-19 gill-rakers on lower part of anterior arch; ventral scutes 22+10-11 14. *filigera*.
- Pelvics inserted at an equal distance from base of pectoral and origin of anal; 19-21 gill-rakers on lower part of anterior arch; ventral scutes 20-23+8-10 15. *megaloptera*.

1. *Ilisha brachysoma*.

Pellona brachysoma, Bleek. Verh. Bat. Gen. xxiv. 1852, Haring. p. 22; Günth. Cat. Fish. vii. p. 456 (1868); Day, Fish. India, p. 645, pl. clxiv. fig. 2 (1878); Weber & Beaufort, Fish. Indo-Austral. Archipelago, ii. p. 87 (1913).

Ilisha brachysoma, Bleek. Atl. Ichth. vi. p. 118, Clup. pl. ix. fig. 5 (1872).

Depth of body $2\frac{3}{5}$ to $2\frac{7}{8}$ in the length, length of head $3\frac{1}{2}$ to 4. Ventral profile much more convex than dorsal. Snout shorter than diameter of eye, which is $2\frac{3}{4}$ to 3 in length of head; maxillary extending nearly to below middle of eye; lower jaw a little projecting. Ridges on head run parallel posteriorly; greatest distance between them $4\frac{1}{2}$ to $5\frac{1}{2}$ in diameter of eye. 23-25 gill-rakers on lower part of anterior arch. Scales 42-45/14-16; ventral scutes

18–20 + 7–8. Dorsal 16–17; origin much nearer end of snout than base of caudal, equidistant from former and last anal rays. Anal 45–49; origin just behind dorsal; length of base $2\frac{2}{5}$ to $2\frac{3}{5}$ in length of body. Pelvics shorter than eye, inserted midway between origin of anal and base of pectoral. Dorsal powdered with brown.

India; Malay Archipelago.

Three specimens, 135 to 190 mm. in total length, including one of the types.

2. *Ilisha africana*.

Clupea africana, Bloch, Naturgesch. Ausländ. Fische, ix. p. 45, pl. cccvii. (1793).

Clupanodon africanus, Lacep. Hist. Nat. Poiss. v. pp. 469, 471 (1803).

Pellona iserti, Cuv. & Val. Hist. Nat. Poiss. xx. p. 307 (1847).

? *Pellona gabonica*, A. Dum. Arch. Mus. Hist. Nat. x. 1858–1861, p. 259, pl. xxiii. figs. 3, 3 a.

Pellona africana, Bleek. Natur. Verh. Holl. Maatsch. xviii. 1863, Guinée, p. 122, pl. xxvii. fig. 1; Günth. Cat. Fish. vii. p. 455 (1868).

? *Pristigaster dolloi* *, Bouleng. Proc. Zool. Soc. 1902, p. 271, pl. xxx. fig. 3.

Scarcely distinct from *I. brachysoma*, but origin of anal fin is farther forward, being below posterior third of dorsal. Ridges on head converge posteriorly; greatest width between them $3\frac{3}{5}$ in diameter of eye. Dorsal 16 (15–18). Anal 42 (42–47).

West Coast of Africa.

A single specimen, 170 mm. in total length.

3. *Ilisha indica*.

Platygaster indicus, Swainson, Nat. Hist. ii. p. 294 (1839).

Pellona ditchoa, Cuv. & Val. Hist. Nat. Poiss. xx. p. 313 (1847);

Bleek. Verh. Bat. Gen. xxiv. 1852, Haring. p. 24; Weber & Beaufort, Fish. Indo-Austral. Archipelago, ii. p. 88 (1913).

Pellona ditchoa (part.), Günth. Cat. Fish. vii. p. 455 (1868).

Ilisha indica, Bleek. Atl. Ichth. vi. p. 118, Clup. pl. i. fig. 4 (1872).

Pellona indica, Day, Fish. India, p. 644, pl. clxiv. fig. 4 (1878);

Pfeffer, Fische Ost-Afrikas, p. 69 (1896).

Depth of body $2\frac{3}{5}$ to $3\frac{1}{5}$ in the length, length of head $3\frac{1}{2}$ to 4. Ventral profile much more convex than dorsal. Snout shorter than diameter of eye, which is $2\frac{1}{2}$ to $2\frac{3}{4}$ in length of head; maxillary extending to below anterior part of eye; lower jaw a little projecting. Ridges on head run

* *P. dolloi*, described from a specimen 120 mm. long, is said to have no pelvic fins.

parallel or converge posteriorly; greatest distance between them 3 to $3\frac{2}{3}$ in diameter of eye. 23-25 gill-rakers on lower part of anterior arch. Scales 42-45/13-15; ventral scutes 18-20+8-9. Dorsal 16-17; origin much nearer end of snout than base of caudal, about equidistant from former and last anal rays. Anal (37) 38-41; origin below last dorsal ray; length of base about 3 in length of body. Pelvics shorter than eye, inserted about midway between origin of anal and base of pectoral.

India; Malay Peninsula and Archipelago; China.

Nine specimens, 65-135 mm. in total length.

4. *Ilisha motius*.

Clupanodon motius, Ham. Buch., Fish. Ganges, pp. 251, 383 (1822).

Clupea motius, Gray, Ill. Ind. Zool. ii. pl. xci. figs. 3, 4 (1835).

Platygaster parva, Swainson, Nat. Hist. ii. p. 294 (1839).

? *Pellona motius*, Cuv. & Val. Hist. Nat. Poiss. xx. p. 323 (1847).

Pellona motius, Day, Fish. India, p. 643, pl. clxv. fig. 3 (1878).

Depth of body $3\frac{3}{4}$ to 4 in the length, length of head $4\frac{1}{4}$ to $4\frac{1}{2}$. Ventral profile more convex than dorsal. Snout shorter than diameter of eye, which is about $2\frac{2}{3}$ in length of head; maxillary extending to below middle of eye; lower jaw a little projecting. Ridges on head run parallel posteriorly. 22-24 gill-rakers on lower part of anterior arch. Scales 45 (?)/12-13 (?); ventral scutes 16-17+7-8. Dorsal 16-17; origin much nearer end of snout than base of caudal. Anal 40-43; origin just behind dorsal; length of base about 3 in length of body. Pelvics equal to eye, inserted a little nearer base of pectoral than origin of anal. A silvery lateral band.

Assam, Bengal.

Six specimens, 45-55 mm. in total length.

5. *Ilisha kampeni*.

Pellona kampeni, Weber & Beaufort, Fish. Indo-Austral. Archipelago ii. p. 87 (1913).

Depth of body $3\frac{3}{4}$ in the length, length of head $3\frac{4}{5}$. Ventral profile a little more convex than dorsal. Snout equal to or a little shorter than diameter of eye, which is $3\frac{1}{4}$ in length of head; maxillary extending nearly to below middle of eye; lower jaw strongly projecting. Ridges on head run parallel posteriorly; greatest distance between them $\frac{1}{3}$ diameter of eye. 20 gill-rakers on lower part of anterior arch. Scales 43/14-15, ventral scutes 19+8. Dorsal (15) 16; origin a little nearer end of snout than base

of caudal. Anal 40 (42); origin below posterior part of dorsal; length of base about 3 in length of body. Pelvics shorter than eye; inserted midway between origin of anal and base of pectoral. Caudal dark-edged.

India; Indo-Australian Archipelago.

A single specimen, 160 mm. in total length, from Madras.

6. *Ilisha leschenaultii*.

Pellona leschenaultii, Cuv. & Val. Hist. Nat. Poiss. xx. p. 311 (1847);
Günth. Cat. Fish. vii. p. 459 (1868); Day, Fish. India, p. 646 (1878).

Depth of body a little less than 4 in the length. Teeth on præmaxillary and lower jaw larger than in other species. 70 scales in a longitudinal series. Dorsal 21. Anal 42. Pelvics inserted 8 or 9 scales in front of dorsal.

Pondicherry.

Originally described from a single dried example, 20 inches in total length.

7. *Ilisha sladeni*.

Pellona sladeni, Day, Proc. Zool. Soc. 1869, p. 623; Fish. India, p. 645,
pl. cexiv. fig. 1 (1878).

Depth of body 4 to $4\frac{1}{3}$ in the length, length of head 4 to $4\frac{1}{4}$. Greatest convexity of ventral profile in front of pectorals. Snout a little shorter than diameter of eye, which is $4\frac{1}{4}$ to $4\frac{2}{3}$ in length of head; maxillary extending to below anterior third of eye; lower jaw very oblique, strongly projecting. Ridges on head diverge a little posteriorly; greatest distance between them 3 to $3\frac{1}{2}$ in diameter of eye. 20-22 gill-rakers on lower part of anterior arch. Scales 46-49/10-11; ventral scutes 24+10-11. Dorsal 14-15; origin much nearer base of caudal than end of snout, about equidistant from former and posterior edge of operculum. Anal 42-45; origin below anterior half of dorsal; length of base $3\frac{1}{4}$ to $3\frac{3}{8}$ in length of body. Pelvics equal to or a little longer than eye; inserted much nearer base of pectoral than origin of anal. Caudal with a dark edge posteriorly.

Burma.

Three specimens, 230-340 mm. in total length, from the Irrawaddi and Sittang Rivers.

8. *Ilisha pristigastroides*.

Pellona pristigastroides, Bleek. Verh. Bat. Gen. xxiv. 1852, Haring,
p. 20; Günth. Cat. Fish. vii. p. 459 (1868); Weber & Beaufort,
Fish. Indo-Austral. Archipelago, ii. p. 89 (1913).

Ilisha pristigastroides, Bleek. Atl. Ichth. v. p. 118, Clup. pl. xi. fig. 1
(1872).

Depth of body $3\frac{1}{4}$ in the length, length of head $4\frac{1}{4}$. Ventral profile, especially anteriorly, much more convex than dorsal. Snout a little shorter than diameter of eye, which is $3\frac{3}{4}$ in length of head; maxillary extending nearly to below middle of eye; lower jaw strongly projecting. Ridges on head diverge posteriorly; greatest distance between them $2\frac{3}{4}$ in diameter of eye. 17 gill-rakers on lower part of anterior arch. Scales 50/14-15; ventral scutes prominent, 27+12. Dorsal 17; origin much nearer base of caudal than end of snout, equidistant from former and anterior edge of eye. Anal 48; origin below first dorsal ray; length of base $2\frac{1}{2}$ in length of body. Pelvics shorter than eye; inserted nearer base of pectoral than origin of anal.

Java, Borneo.

A single specimen, 160 mm. in total length; type of the species.

9. *Ilisha amblyuropterus*.

Pellona amblyuropterus, Bleek. Verh. Bat. Gen. xxiv. 1852, Haring. p. 21; Günth. Cat. Fish. vii. p. 459 (1868); Weber & Beaufort, Fish. Indo-Austral. Archipelago, ii. p. 90 (1913).

Ilisha amblyuropterus, Bleek. Atl. Ichth. vi. p. 113, Clup. pl. iv. fig. 4 (1872).

Depth of body $3\frac{1}{2}$ in the length, length of head 4. Ventral profile more convex than dorsal. Snout a little shorter than diameter of eye, which is $4\frac{1}{4}$ in length of head; maxillary extending to below middle of eye or beyond; lower jaw strongly projecting. Ridges on head diverge posteriorly; greatest distance between them $\frac{1}{2}$ diameter of eye. 16 gill-rakers on lower part of anterior arch. Scales 52-53/15-16; ventral scutes 27+12. Dorsal 17; origin much nearer base of caudal than end of snout, equidistant from former and middle of eye. Anal 47 (47-53); origin below anterior third of dorsal; length of base $2\frac{2}{3}$ in length of body. Pelvics shorter than eye; inserted a little nearer base of pectoral than origin of anal.

Malay Peninsula and Archipelago.

A single specimen, 330 mm. in total length, from Dr. Bleeker's collection.

10. *Ilisha elongata*.

Alosa elongata, Bennett, Mem. Life Raffles, p. 691 (1830).

Clupea affinis, Gray, Ill. Ind. Zool., i. pl. xevi. (1835).

Platygaster affinis, Swainson, Nat. Hist. ii. p. 294 (1839).

? *Clupea melastoma* (non Bloch), Bleek. Nat. Gen. Arch. Ned. Ind. ii.

- 1845, p. 509; Schleg., Faun. Japon., Pisces, p. 237, pl. cviii. fig. 1 (1846).
- Ilisha abnormis* (Gray), Richards, Ichth. China, p. 306 (1846).
- Pellona vimbella*, Cuv. & Val. Hist. Nat. Poiss. xx. p. 317 (1847).
- Pellona grayana*, Cuv. & Val. *t. c.* p. 315; Bleek. Verh. Bat. Gen. xxiv. 1852, Haring. p. 25; Kner, Novara Expd., Fische, p. 328 (1865).
- Pellona affinis*, Cantor, J. As. Soc. Bengal, xviii. 1850, p. 1273.
- Pellona schlegelii*, Bleek. Verh. Bat. Gen. xxvi. 1854, Japan, p. 118.
- ? *Pristigaster chinensis*, Basilewsky, Nouv. Mém. Soc. Nat. Mosc. x. 1855, p. 243.
- Pellona elongata*, Günth. Cat. Fish. vii. p. 456 (1868); Day, Fish. India, p. 643, pl. clxiv. fig. 3, pl. clxv. fig. 1 (1878); Jord. & Herre, Proc. U.S. Nat. Mus. xxxi. 1906, p. 635; Weber & Beaufort, Fish. Indo-Austral. Archipelago, ii. p. 90, fig. 30 (1913).
- Ilisha elongata*, Bleek. Atl. Ichth. vi. p. 119, Clup. pl. i. fig. 3 (1872).
- ? *Pristigaster (Pristigaster) sinensis*, Sauvage, Bull. Soc. Philom. (7) v. 1881, p. 107.
- ? *Zunasia chinensis*, Jord. & Metz, Mem. Carnegie Mus. vi. 1913, p. 7, pl. i. fig. 1.

Depth of body $3\frac{1}{2}$ to 4 in the length, length of head $3\frac{4}{5}$ to $4\frac{1}{3}$. Ventral profile more convex than dorsal. Snout a little shorter than diameter of eye, which is $3\frac{1}{4}$ to 4 in length of head; maxillary extending to below middle of eye or a little beyond; lower jaw strongly projecting. Ridges on head run parallel posteriorly; greatest distance between them 3 to $3\frac{3}{4}$ in diameter of eye. 20–25 gill-rakers on lower part of anterior arch. Scales 50–54/14–16; ventral scutes 24–28 + 12–15. Dorsal (15) 17–18; origin equidistant from end of snout and base of caudal, or a little nearer former. Anal (40) 44–52; origin below last dorsal rays; length of base $2\frac{3}{4}$ to $3\frac{1}{2}$ in length of body. Pelvics shorter than eye; inserted nearer base of pectoral than origin of anal.

India to Malay Archipelago; seas of China and Japan.

Twelve specimens, 90–450 mm. in total length, including the type of the species, the types of *I. abnormis* and *schlegelii*, and a specimen received from Dr. Bleeker as *I. affinis*.

11. *Ilisha novacula*.

- ? *Pellona novacula*, Cuv. & Val. Hist. Nat. Poiss. xx. p. 319 (1847).
- Ilisha novacula*, Bleek. Ned. Tijdschr. Dierk. iii. 1866, p. 302; Atl. Ichth. vi. p. 120, Clup. pl. xi. fig. 4 (1872).
- Pellona novacula*, Günth. Cat. Fish. vii. p. 458 (1868); Weber & Beaufort, Fish. Indo-Austral. Archipelago, ii. p. 92 (1913).

Depth of body $3\frac{1}{2}$ in the length, length of head 4. Greatest convexity of ventral profile below base of pectorals. Snout a little shorter than diameter of eye, which is $3\frac{3}{4}$ in length of head; maxillary extending almost to below posterior border of eye; lower jaw strongly projecting. Ridges on head diverge a little posteriorly; greatest distance between

them $\frac{1}{3}$ diameter of eye. 20 gill-rakers on lower part of anterior arch. Scales 45/14-15; ventral scutes prominent, 24+10. Dorsal 17; origin nearer base of caudal than end of snout, equidistant from former and anterior border of eye. Anal 42; origin below posterior half of dorsal; length of base $3\frac{1}{5}$ in length of body. Pelvics shorter than eye; inserted a little nearer base of pectoral than origin of anal.

Burma; Java; China.

A single specimen, 200 mm. in total length, from Java.

12. *Ilisha macrogaster*.

Ilisha macrogaster, Bleek. Ned. Tijdschr. Dierk. iii. 1866, p. 300; Atl. Ichth. vi. p. 121, Clup. pl. xiii. fig. 4 (1872).

Pellona macrogaster, Günth. Cat. Fish. vii. p. 458 (1868); Weber & Beaufort, Fish. Indo-Austral. Archipelago, ii. p. 93 (1913).

Depth of body about 3 in the length, length of head 4. Ventral profile, especially anteriorly, much more convex than dorsal. Snout shorter than diameter of eye, which is $2\frac{1}{2}$ to $2\frac{3}{4}$ in length of head; maxillary extending to below anterior part of eye; lower jaw moderately projecting. Ridges on head run parallel posteriorly; greatest distance between them $3\frac{1}{2}$ to $3\frac{3}{4}$ in diameter of eye. 21-24 gill-rakers on lower part of anterior arch. Scales 50/15 (?); ventral scutes prominent, 26+10. Dorsal 16-17; origin very little nearer end of snout than base of caudal. Anal 47-48; origin below posterior half of dorsal; length of base $2\frac{1}{2}$ to $2\frac{3}{4}$ in length of body. Pelvics shorter than eye; inserted nearer base of pectoral than origin of anal.

Rivers of Borneo.

Two specimens, 125 and 130 mm. in total length, including the type of the species.

13. *Ilisha xanthoptera*.

Pellona xanthoptera, Bleek. Nat. Tijdschr. Ned. Ind. ii. 1851, p. 439; Verh. Bat. Gen. xxiv. 1852, Haring. p. 49; Günth. Cat. Fish. vii. p. 457 (1868); Weber & Beaufort, Fish. Indo-Austral. Archipelago, ii. p. 94 (1913).

Ilisha xanthoptera, Bleek. Atl. Ichth. vi. p. 122, Clup. pl. vii. fig. 3 (1872).

Depth of body 3 to $3\frac{1}{3}$ in the length, length of head $3\frac{3}{4}$ to 4. Ventral profile much more convex than dorsal. Snout shorter than diameter of eye, which is $3\frac{1}{6}$ to $3\frac{2}{3}$ in length of head; maxillary extending to below anterior part or middle of eye; lower jaw strongly projecting. Ridges on head run parallel posteriorly; greatest distance between them $3\frac{1}{3}$ to 4 in diameter of eye. 21-23 gill-rakers on lower

part of anterior arch. Scales 50–52/15–16; ventral scutes 24–27 + 10–13. Dorsal 17–18; origin equidistant from end of snout and base of caudal, or a little nearer former. Anal 46–48; origin below posterior part of dorsal, or below its last rays; length of base $2\frac{3}{5}$ to $2\frac{1}{2}$ in length of body. Pelvics shorter than eye; inserted well in front of dorsal; a little nearer base of pectoral than origin of anal. Vertical distance from upper end of pectoral base to edge of thorax equal to or greater than postocular part of head.

Malay Archipelago.

Three specimens, 120–235 mm. in total length, including one of the types of the species.

14. *Ilisha filigera*.

Pellona filigera, Cuv. & Val. Hist. Nat. Poiss. xx. p. 322 (1847); Day, Fish. India, p. 643, pl. clxv. fig. 4 (1878).

Scarcely distinct from the preceding species. Depth of body $3\frac{2}{5}$ to $3\frac{1}{2}$ in the length. Diameter of eye $2\frac{4}{5}$ to $3\frac{1}{5}$ in length of head. 18–19 gill-rakers on lower part of anterior arch. Scales 50/15–16; ventral scutes 22 + 10–11. Dorsal 17–18. Anal 47–50.

Coasts of India.

Three specimens, 55–150 mm. in total length.

15. *Ilisha megaloptera*.

Platygaster megalopterus, Swainson, Nat. Hist. ii. p. 294 (1839).

Pellona drussumieri, Cuv. & Val. Hist. Nat. Poiss. xx. p. 316, pl. 596 (1847); Günth. Cat. Fish. vii. p. 457 (1868); Weber & Beaufort, Fish. Indo-Austral. Archipelago, ii. p. 92 (1913).

? *Pellona micropus*, Cuv. & Val. *t. c.* p. 320.

Pellona leschenaultii (non C. & V.), Bleek. Verh. Bat. Gen. xxiii. 1850, Bijdr. M. en O. Java, p. 11.

Pellona russelli, Bleek. Verh. Bat. Gen. xxiv. 1852, Haring. p. 23.

Pellona motius (non Ham. Buch.), Günth. Cat. Fish. vii. p. 456 (1868).

Ilisha megalopterus, Bleek. Atl. Ichth. vi. p. 119, Clup. pl. vi. fig. 6 (1872).

Pellona megaloptera, Day, Fish. India, p. 645, pl. clxv. fig. 2 (1878).

Depth of body $3\frac{1}{5}$ to $3\frac{2}{5}$ in the length, length of head $3\frac{1}{3}$ to $3\frac{3}{4}$. Ventral profile more convex than dorsal. Snout shorter than diameter of eye, which is $2\frac{3}{4}$ to $3\frac{2}{5}$ in length of head; maxillary extending to below middle of eye or a little beyond; lower jaw strongly projecting. Ridges on head run parallel or diverge a little posteriorly; greatest distance between them $3\frac{1}{2}$ to $4\frac{1}{2}$ in diameter of eye. 19–21 gill-rakers on lower part of anterior arch. Scales 46–50/14–16; ventral scutes 20–23 + 8–10. Dorsal 17–18; origin equidistant from

end of snout and base of caudal, or a little nearer former. Anal 42-47; origin below posterior part of dorsal or below its last rays; length of base $2\frac{3}{5}$ to $3\frac{1}{5}$ in length of body. Pelvics shorter than eye, inserted at an equal distance from origin of anal and base of pectoral, or nearer the former. Vertical distance from upper end of pectoral base to edge of thorax not as great as postocular part of head.

India; Malay Peninsula and Archipelago.

Nine specimens, 100-280 mm. in total length, including the type of *I. russelli*. A skeleton has 46 vertebræ (19 + 27).

2. OPISTHOPTERUS, Gill, 1861*.

Proc. Acad. Nat. Sci., Philad. p. 38.

Pristigaster (part.), Günth. Cat. Fish. vii. p. 460 (1868).

Differs from *Ilisha* in the absence of pelvic fins and in the position of the dorsal, which commences behind the origin of the anal. Anal long (56-65 rays).

Five species from tropical Indo-Pacific.

Synopsis of the Species.

I. More than 24 gill-rakers on lower part of anterior arch (Indo-Pacific).

Posterior supramaxillary nearly reaching posterior end of maxillary; depth of body $4\frac{1}{8}$ in the length. 1. *valenciennesi*.

Posterior supramaxillary not nearly reaching to posterior end of maxillary; depth of body $3\frac{1}{8}$ to $3\frac{1}{2}$ in the length. 2. *indicus*.

II. 15-20 gill-rakers on lower part of anterior arch (American).

A. Origin of dorsal nearer base of caudal than upper end of pectoral base; origin of anal about equidistant from base of caudal and tip of lower jaw.

1. Anal of 56 rays 3. *dovii*.

2. Anal of 65 rays 4. *effulgens*.

B. Origin of dorsal nearer upper end of pectoral base than base of caudal; origin of anal much nearer tip of lower jaw than base of caudal 5. *macrops*.

1. *Opisthopterus valenciennesi* †.

Pristigaster tartoor (part.), Bleek. Verh. Bat. Gen. xxiv. 1852, Haring. p. 25.

* The relationships of the genera *Opisthopterus*, *Pristigaster*, and *Odontognathus* are discussed by Weber & Beaufort (Verh. K. Akad. Wet., Amsterdam, Sect. II. xvii. No. 3, 1912, p. 9).

† This name was suggested by Bleeker (Atl. Ichth. vi. p. 124), who was doubtful whether his specimens from the East Indies were really identical with the "Tartoor" of Russell and the *O. tartoor* of Day.

Pristigaster tartoor (non Cuv.), Günth. Cat. Fish. vii. p. 460 (1868).
Opisthopterus tartoor, Bleek. Atl. Ichth. vi. p. 123, Clup. pl. v. fig. 5
 (1872); Weber & Beaufort, Fish. Indo-Austral. Archipelago, ii.
 p. 95, fig. 31 (1913).

Depth of body $4\frac{1}{6}$ in the length, length of head $5\frac{1}{4}$. Ventral profile more convex than dorsal; especially convex from chin to anal; dorsal profile of head concave. Snout shorter than diameter of eye, which is $3\frac{1}{5}$ in length of head; maxillary extending to below anterior $\frac{1}{4}$ of eye; posterior supra-maxillary extending almost to end of maxillary; lower jaw very oblique, strongly projecting. Ridges on head diverge posteriorly; greatest distance between them $3\frac{3}{4}$ in diameter of eye. 24–25 gill-rakers on lower part of anterior arch. About 52 scales in a longitudinal series; ventral scutes 31. Dorsal 17; origin equidistant from base of caudal and upper end of pectoral base. Anal 64; origin equidistant from base of caudal and tip of lower jaw; length of base $2\frac{2}{3}$ in length of body. Vertical distance from upper end of pectoral base to edge of thorax twice in length of head.

East Indies.

A single specimen, 190 mm. in total length, from Dr. Bleeker's collection as *O. tartoor*.

2. *Opisthopterus indicus*.

"*Tartoore*," Russell, Fish. Vizag. p. 74, pl. xciii.
Pristogaster indicus, Swainson, Nat. Hist. ii. p. 294 (1839).
Pristigaster tartoor, Cuv. Règne Anim., Disciples Ed., vii. p. 277 (1842);
 Cuv. & Val. Hist. Nat. Poiss. xx. p. 328 (1847).
Pristigaster tartoor (part.), Bleek. Verh. Bat. Gen. xxiv. 1852, Haring.
 p. 25.
*Opisthopterus macrognathus**, Bleek. Ned. Tijdschr. Dierk. iii. 1866,
 p. 299; Atl. Ichth. vi. p. 124, Clup. pl. x. fig. 4 (1872); Weber &
 Beaufort, Fish. Indo-Austral. Archipelago, ii. p. 96, fig. 32 (1913).
Pristigaster macrognathus, Günth. Cat. Fish. vii. p. 461 (1868).
Opisthopterus tartoor, Day, Fish. India, p. 646, pl. clxiii. fig. 5 (1878).

Depth of body $3\frac{1}{6}$ to $3\frac{1}{2}$ in the length, length of head $4\frac{2}{3}$ to $5\frac{1}{6}$. Ventral profile more convex than dorsal; especially convex from chin to anal; dorsal profile of head concave. Snout shorter than diameter of eye, which is 3 to $3\frac{1}{3}$ in length of head; maxillary extending to below middle of eye or not quite as far; posterior supra-maxillary not reaching nearly to end of maxillary; lower jaw very oblique, strongly projecting. Ridges on head diverge posteriorly; greatest

* Bleeker states that in *O. macrognathus* the maxillary extends to below the posterior part of the eye, and this led him to separate it from *O. indicus*, in which it extends to below the anterior part or middle. I have examined one of Bleeker's specimens of *O. macrognathus*, and find that the maxillary barely extends to below the middle of the eye.

distance between them $3\frac{1}{4}$ to $3\frac{3}{4}$ in diameter of eye. 25-27 gill-rakers on lower part of anterior arch. 48-52 scales in a longitudinal series; ventral scutes 29-32. Dorsal 15-16; origin nearer base of caudal than upper end of pectoral base. Anal 57-63; origin nearer tip of lower jaw than base of caudal; length of base 2 to $2\frac{1}{4}$ in length of body. Pectorals equal to or longer than head; vertical distance from upper end of pectoral base to edge of thorax $1\frac{1}{2}$ to $1\frac{3}{5}$ in length of head.

Coasts of India; Malay Archipelago.

Seven specimens, 130-185 mm. in total length, including one of the types of *O. macrognathus*. A skeleton has 49 vertebræ (18+31).

3. *Opisthopterus dovii*.

Pristigaster argenteus (non Cuv.), Günth. Proc. Zool. Soc. 1866, p. 603.

Pristigaster dovii, Günth. Cat. Fish. vii. p. 461 (1868).

Opisthopterus dovii, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 437.

Depth of body $3\frac{3}{4}$ in the length, length of head $4\frac{1}{5}$. Ventral profile more convex than dorsal; dorsal profile of head concave. Snout shorter than diameter of eye, which is $3\frac{1}{2}$ in length of head; maxillary extending to below anterior part of eye; posterior supramaxillary extending to posterior end of maxillary; lower jaw very oblique, strongly projecting. Ridges on head diverge posteriorly. 17 gill-rakers on lower part of anterior arch. Scales 53/13; ventral scutes 29, weak. Dorsal 11; origin nearer base of caudal than upper end of pectoral base. Anal 56; origin about equidistant from base of caudal and tip of lower jaw; length of base $2\frac{1}{3}$ in length of body. Pectoral a little longer than head.

Pacific Coast of Panama.

A single specimen, 200 mm. in total length; type of the species.

4. *Opisthopterus effulgens*.

Pristigaster (Opisthopterus) effulgens, Regan, Ann. & Mag. Nat. Hist. (7) xii. 1903, p. 621.

Depth of body $3\frac{3}{4}$ in the length, length of head 5. Ventral profile more convex than dorsal; dorsal profile of head concave. Snout shorter than diameter of eye, which is $3\frac{1}{2}$ in length of head; maxillary extending to below anterior part of eye; posterior supramaxillary extending to posterior end of maxillary; lower jaw very oblique, strongly projecting. Ridges on head diverge posteriorly. 15 gill-rakers on lower

part of anterior arch. Scales 56/13; ventral scutes 29, weak. Dorsal 11; origin much nearer base of caudal than upper end of pectoral base. Anal 65; origin equidistant from base of caudal and tip of lower jaw; length of base $2\frac{1}{2}$ in length of body. Pectoral longer than head.

N.W. Ecuador.

A single specimen from the Rio Vaqueria, 226 mm. in total length; type of the species.

5. *Opisthopterus macrops*.

Pristigaster macrops, Günth. Proc. Zool. Soc. 1866, p. 603; Cat. Fish. vii. p. 461 (1868).

Opisthopterus macrops, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 437.

Depth of body 3 in the length, length of head $4\frac{3}{4}$. Ventral profile much more convex than dorsal; dorsal profile of head concave. Snout shorter than diameter of eye, which is $2\frac{3}{4}$ in length of head; maxillary extending to below anterior half of eye; posterior supramaxillary extending to posterior end of maxillary; lower jaw very oblique, strongly projecting. Ridges on head diverge posteriorly. 19–20 gill-rakers on lower part of anterior arch. Scales 53/17; ventral scutes 28. Dorsal 13; origin a little nearer upper end of pectoral base than base of caudal. Anal 61; origin much nearer tip of lower jaw than base of caudal; length of base twice in length of body. Pectoral about equal to head. A black scapular spot.

Pacific Coast of Panama.

A single specimen, 190 in total length; type of the species.

3. PRISTIGASTER, Cuv., 1817.

Règne Anim., ed. 1, ii. p. 176.

Pristigaster (part.), Günth. Cat. Fish. vii. p. 460 (1868).

Differs from *Opisthopterus* in the greater depth of the body, with the abdominal profile very convex. Four or five supra-neural spines between occiput and origin of dorsal. Origin of dorsal in front of that of anal. Scales without transverse grooves.

A single species from tropical South America.

Pristigaster cayanus.

Pristigaster cayanus, Cuv. Règne Anim., ed. 1, iv. pl. x. fig. 3 (1817); Cuv. & Val. Hist. Nat. Poiss. xx. p. 334, pl. 597 (1847); Günth. Cat. Fish. vii. p. 463 (1868); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 438.

Pristigaster martii, Agassiz, Spix, Pisc. Brazil. p. 55, pl. xxiv. a (1828);

Cuv. & Val. t. c. p. 337.

Pristigaster phaeton, Cuv. & Val. t. c. p. 338.

Depth of body $1\frac{1}{2}$ to 2 in the length, length of head $3\frac{2}{3}$ to 4. Snout shorter than diameter of eye, which is $2\frac{1}{2}$ to $2\frac{2}{3}$ in length of head; maxillary extending to below anterior part of eye; lower jaw projecting. Ridges on head run parallel posteriorly. 20-23 gill-rakers on lower part of anterior arch. Scales 39-42/17-18; ventral scutes 31-33, posterior ones very prominent. Dorsal 15; longest rays a little shorter than head; origin much nearer to end of snout than base of caudal. Anal 46-55; origin behind dorsal; length of base about twice in length of body. Pectorals a little shorter than head. Dorsal and caudal powdered with brown.

Coast of Guiana and Brazil; Amazon System.

Six specimens, 68-100 mm. in total length, from Jurua River.

4. ODONTOGNATHUS, Lacep., 1800.

Hist. Nat. Poiss. ii. p. 221.

Gnathobolus, Bloch. & Schn. Syst. Ichth. i. p. 556 (1801).

Pristigaster (part.), Günth. Cat. Fish. vii. p. 460 (1868).

Closely related to *Opisthopterus*, but differs in the tapering maxillary, which extends as far as the gill-opening or beyond in adults. Anal fin long (67-78 rays); origin in front of that of dorsal. Pelvics absent. Ventral scutes divided into two series, thoracic and abdominal.

Two species from tropical America.

1. *Odontognathus mucronatus*.

Odontognathus mucronatus, Lacep. Hist. Nat. Poiss. ii. p. 221, pl. vii. fig. 2 (1800); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 438.

Gnathobolus mucronatus, Bloch. & Schn. Syst. Ichth. i. p. 556 (1801); Cuv. & Val. Hist. Nat. Poiss. xxi. p. 91, pl. 611 (1848).

Pristigaster mucronatus, Günth. Cat. Fish. vii. p. 462 (1868).

Depth of body $4\frac{2}{3}$ to $4\frac{3}{4}$ in the length, length of head $5\frac{1}{3}$ to $5\frac{2}{3}$. Ventral profile more convex than dorsal. Snout shorter than diameter of eye, which is 3 to $3\frac{1}{4}$ in length of head; maxillary truncate posteriorly in young, tapering in adults, extending to below middle of eye in a specimen of 98 mm., to below anterior half of eye in a smaller specimen; lower jaw projecting. Ridges on head diverge posteriorly. 25-26 gill-rakers on lower part of anterior arch. Ventral scutes 8+12. Dorsal 11-12; origin a little in front of

middle of anal. Anal 74–78 (82); origin nearer base of caudal than tip of lower jaw; length of base about twice in length of body. Pectorals a little shorter than head.

Coast of Guiana.

Two specimens, 75 and 98 mm. in total length.

2. *Odontognathus panamensis*.

Pristigaster (Odontognathus) panamensis, Steind. SB. Ak. Wien, lxxiv. 1876, p. 24.

Depth of body nearly 4 in the length, length of head $5\frac{1}{2}$. Ventral profile convex; dorsal profile of head concave. Snout equal to diameter of eye, which is $3\frac{3}{4}$ in length of head; maxillary extending to beyond gill-opening; lower jaw projecting. Ridges on head diverge posteriorly. 54–56 scales in a longitudinal series; ventral scutes 13+16. Dorsal 12; twice as far from gill-opening as base of caudal. Anal 67. Pectoral longer than head.

Total length 200 mm.

Panama.

5. *RACONDA*, Gray, 1831.

Zool. Miscell. p. 9.

Apterygia, Gray, Ill. Ind. Zool., ii. pl. xcii. fig. 1 (1835).

Pristigaster (part.), Günth. Cat. Fish. vii. p. 460 (1868).

Differs from *Odontognathus* in the absence of the dorsal fin, in addition to the pelvics. Maxillary tapering; extending as far as gill-opening in adults. Anal fin very long (83–87 rays); origin in front of that of dorsal. Scales without transverse grooves.

A single species from tropical Indo-Pacific.

Raconda russelliana.

Raconda russelliana, Gray, Zool. Miscell. p. 9 (1831); Cantor, J. As. Soc. Bengal, xviii. 1850, p. 1274; Bleek. Atl. Ichth. vi. p. 124 (1872); Day, Fish. India, p. 646, pl. clxiii. fig. 4 (1878); Weber & Beaufort, Fish. Indo-Austral. Archipelago, ii. p. 98, fig. 33 (1913).

Apterygia rancarata, Gray, Ill. Ind. Zool. pl. xcii. fig. 1 (1835).

Apterygia hamiltonii, Cuv. & Val. Hist. Nat. Poiss. xx. p. 333 (1847).

Pristigaster russellianus, Günth. Cat. Fish. vii. p. 462 (1868).

Depth of body $3\frac{3}{4}$ to 4 in the length, length of head $5\frac{2}{3}$ to 6. Ventral profile more convex than dorsal, especially convex anteriorly; dorsal profile of head concave. Snout shorter than diameter of eye, which is 3 to $3\frac{1}{3}$ in length of head; maxillary extending to below middle of eye in a specimen of 180 mm., to below anterior part of eye in smaller specimens; lower jaw very oblique, projecting. Ridges on

head diverge posteriorly. (22) 24-26 gill-rakers on lower part of anterior arch. Scales 60-64/12; ventral scutes 33-37, weak. Anal 83-87 (92); origin much nearer tip of lower jaw than base of caudal; length of base about $1\frac{3}{4}$ in length of body. Pectorals equal to or longer than head. A dark scapular spot.

Bay of Bengal; Malay Peninsula and Archipelago.

Several examples, 75-185 mm. in total length, including the types of the species and the type of *Apterygia ramcarata*.

6. *NEOSTEUS*, gen. nov.

Closely related to *Ilisha*, but differs in having a small toothed bone in place of the ligament between the distal end of the præmaxillary and the middle of the maxillary. Origin of dorsal in front of that of anal. Scales with transverse grooves, as in *Ilisha*.

The majority of the species are tropical, but *N. narragansetæ* was discovered as far north as Rhode Island on the Atlantic Coast of America.

Synopsis of the Species.

I. Anal of 33-43 rays.

A. Origin of anal behind dorsal, or below its last ray.

1. Scales 40-44/12-13; ventral scutes 18-19+7-8.

1. *ditchela*.

2. Scales 63-77/17-23; ventral scutes 21-23+11-14.

a. Scales 63-66/17-20; origin of dorsal equidistant from end of snout and base of caudal, or nearer former.

30-31 gill-rakers on lower part of anterior arch; axillary scale of pectoral not reaching middle of first ray

2. *flavipinnis*.

23-26 gill-rakers on lower part of anterior arch; axillary scale of pectoral reaching middle of first ray or beyond

3. *castelnæana*.

b. Scales 77/23; origin of dorsal nearer to base of caudal than end of snout

4. *altamazonica*.

B. Origin of anal below first third of dorsal . . . 5. *harroweri*.

II. Anal of 46-51 rays.

A. Origin of anal below dorsal; depth of body $2\frac{2}{3}$ to $2\frac{5}{8}$ in length.

6. *furthii*.

B. Origin of anal behind dorsal; depth of body 3 to $3\frac{1}{2}$ in length.

Anal of 46 rays; ventral scutes 25+7 7. *narragansetæ*.

Anal of 49-51 rays; ventral scutes 22-23+12-13 . . . 8. *panamensis*.

I. *Neosteus ditchela*.

? *Pellona melastoma*, Bloch. & Schn. Syst. Ichth. i. p. 427 (1801); Cuv. & Val. Hist. Nat. Poiss. xx. p. 308 (1847).

Pellona ditchela, Cuv. & Val. t. c. p. 314; Day, Fish. India, p. 644, pl. clxv. fig. 5.

Pellona hoevenii, Bleek, Verh. Bat. Gen. xxiv. 1852, Haring. p. 21; Nat. Tijdschr. Ned. Ind. iii. 1852, p. 712; Günth. Cat. Fish. vii. p. 455 (1868); Day, Fish. India, p. 644, pl. clxv. fig. 6 (1878); Weber & Beaufort, Fish. Indo-Austral. Archipelago, ii. p. 86 (1913).

Pellona ditchoa (part.), Günth. t. c. p. 455.

Ilisha hoevenii, Bleek, Atl. Ichth. vi. p. 117, Clup. pl. xi. fig. 2 (1872).

? *Pellona natalensis*, Gilchrist & Thompson, Ann. S. Afr. Mus. vi. 1908, p. 202.

Ilisha indica (non Swainson), Bouleng. Cat. Afr. Fish. i. p. 163, fig. 130 (1909).

Depth of body $2\frac{1}{5}$ to $3\frac{3}{4}$ in the length, length of head $3\frac{1}{2}$ to $3\frac{2}{3}$. Ventral profile a little more convex than dorsal. Snout shorter than diameter of eye, which is $2\frac{1}{2}$ to 3 in length of head; maxillary extending to below anterior part or middle of eye; lower jaw a little projecting. Ridges on head converge posteriorly; greatest distance between them $3\frac{1}{3}$ to $3\frac{1}{2}$ in diameter of eye. 20–25 gill-rakers on lower part of anterior arch. Scales 40–44/12–13; ventral scutes 18–19 + 7–8. Dorsal 17–19; origin nearer end of snout than base of caudal. Anal (33) 34–37; origin below or a little behind last dorsal ray; length of base $3\frac{1}{3}$ to $3\frac{2}{3}$ in length of body. Pelvics shorter than eye; inserted midway between origin of anal and base of pectoral, or a little nearer latter. Dorsal powdered with brown.

East Africa to Indo-Australian Archipelago.

Fifteen specimens, 60 to 170 mm. in total length, including one of the types of *N. hoevenii*.

2. *Neosteus flavipinnis*.

Pristigaster flavipinnis, Valenciennes, D'Orbigny, Voy. Amér. Mérid., Poissons, pl. x. fig. 2 (1839).

Pellona orbignyana, Cuv. & Val. Hist. Nat. Poiss. xx. p. 302 (1847).

Depth of body $3\frac{1}{4}$ to $3\frac{1}{3}$ in the length, length of head about 4. Ventral profile much more convex than dorsal. Snout shorter than diameter of eye, which is $3\frac{3}{4}$ to $4\frac{1}{4}$ in length of head; maxillary extending to below middle of eye; lower jaw strongly projecting. Ridges on head almost parallel posteriorly; greatest distance between them $2\frac{3}{4}$ in diameter of eye. 30–31 gill-rakers on lower part of anterior arch. Scales 64–66/19–20; ventral scutes 22–23 + 11–12. Dorsal 17; origin equidistant from each end of snout and base of caudal. Anal 37–38; origin behind dorsal; length of base $3\frac{3}{4}$ to $3\frac{3}{5}$ in length of body. Pelvics longer than eye; inserted much nearer base of pectoral than origin of anal. Axillary scale of pectoral not reaching middle of first ray.

Buenos Ayres.

Two specimens, 160 and 285 mm. in total length.

3. *Neosteus castelnaëana*.

Pellona castelnaëana, Cuv. & Val. Hist. Nat. Poiss. xx. p. 306 (1847).

Pellona flavipinnis, Günth. Cat. Fish. vii. p. 454 (1868).

Ilisha flavipinnis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 435.

Depth of body $3\frac{1}{4}$ to $3\frac{1}{3}$ in the length, length of head $3\frac{3}{5}$ to $3\frac{3}{4}$. Ventral profile more convex than dorsal. Snout a little shorter than diameter of eye, which is $3\frac{4}{5}$ to 4 in length of head; maxillary extending to below middle of eye or a little beyond; lower jaw strongly projecting. Ridges on head converge slightly posteriorly; greatest distance between them $2\frac{1}{2}$ to $2\frac{3}{4}$ in diameter of eye. 23-26 gill-rakers on lower part of anterior arch. Scales 63-66/17-19; ventral scutes 21-23 + 13-14. Dorsal 19-20; origin nearer end of snout than base of caudal. Anal 40-41; origin behind dorsal; length of base $3\frac{1}{2}$ to $3\frac{3}{5}$ in length of body. Pelvics longer than eye; inserted much nearer base of pectoral than origin of anal. Axillary scale of pectoral reaching middle of first ray or beyond.

Coast of Surinam and Brazil; Upper Amazons.

Three specimens, 280-390 mm. in length.

The following species are placed provisionally in this genus. They appear to be closely related to *Neosteus flavipinnis* and *castelnaëana*, but, as they are not represented in the British Museum collection, I am unable to say whether they possess the toothed bone in place of the ligament in the upper jaw:—

4. *Neosteus altamazonica*.

Pellona altamazonica, Cope, Proc. Acad. Nat. Sci. Philad. xxiii. 1871, p. 256.

Depth of body equal to length of head, which is $3\frac{3}{4}$ in length of body. Snout equal to diameter of eye, which is $\frac{1}{4}$ length of head. Scales 77/23. Dorsal 18; origin nearer base of caudal than end of snout. Anal 38-39; origin below last dorsal ray. Pelvics equal to eye.

Total length 186 mm.

Ambyiacu River, Ecuador.

5. *Neosteus harroweri*.

Ilisha harroweri, Fowler, Proc. Acad. Nat. Sci. Philad. lxix. 1917, p. 128, fig. 1.

Depth of body $2\frac{2}{3}$ in the length, length of head $3\frac{1}{8}$. Ventral profile more convex than dorsal. Eye $2\frac{3}{4}$ in length of head. Maxillary extending to beyond anterior edge of

pupil; lower jaw projecting. 24 gill-rakers on lower part of anterior arch. Scales $34/14$ (?); ventral scutes $20+6$. Dorsal 16; origin a little nearer base of caudal than tip of lower jaw. Anal 41; origin below first third of dorsal. Pelvics shorter than eye.

Total length 96 mm.

Colon, Panama.

6. *Neosteus furthii*.

Pellona furthii, Steindachner, Sitzber. K. Akad. Wiss. lxx. pt. 1, 1875, p. 388.

Depth of body $2\frac{3}{8}$ to $2\frac{6}{7}$ in the length, length of head $3\frac{3}{4}$ to 4. Ventral profile very convex; dorsal profile of head a little concave. Snout shorter than diameter of eye, which is $2\frac{6}{7}$ to $3\frac{2}{5}$ in length of head. 54–56 scales in a longitudinal series; ventral scutes $22-24+12-13$. Dorsal 16–17; origin a little nearer snout than base of caudal. Anal 49–50; first 5–7 rays below dorsal; length of base $2\frac{1}{2}$ to $2\frac{3}{4}$ in length of body.

Panama.

7. *Neosteus narragansetæ*.

Ilisha narragansetæ, Fowler, Proc. Acad. Nat. Sci. Philad. lxiii. 1911, p. 208, fig. 1.

Depth of body 3 in the length, length of head $3\frac{1}{2}$. Ventral profile more convex than dorsal. Eye 3 in head. Maxillary extending to below anterior third of eye; lower jaw projecting. 22 gill-rakers on lower part of anterior arch. Scales $49/14$ (?); ventral scutes $25+7$. Dorsal 18; origin nearer end of snout than base of caudal. Anal 46; origin just behind dorsal. Pelvics small; inserted nearer to origin of anal than origin of pectoral.

Total length 147 mm.

Rhode Island, Atlantic Coast of U.S.A.

8. *Neosteus panamensis*.

Pellona panamensis, Steindachner, Sitzber. K. Akad. Wiss. lxx. pt. 1, 1875, p. 389.

Depth of body $3\frac{1}{6}$ to $3\frac{2}{5}$ in the length, length of head $3\frac{3}{5}$ to $3\frac{4}{5}$. Ventral profile a little convex; dorsal profile of head concave. Snout shorter than diameter of eye, which is $3\frac{2}{5}$ to $3\frac{5}{6}$ in length of head. Scales $56-59/21-22$; ventral scutes $22-23+12-13$. Dorsal 16–17; origin equidistant from end of snout and base of caudal, or a little nearer former. Anal 49–51; origin just behind dorsal; length of base $2\frac{2}{3}$ to $2\frac{4}{5}$ in length of body.

Panama.

7. *PLIOSTEOSTOMA*, gen. nov.

Differs from *Neosteus* in the absence of the pelvic fins. Origin of dorsal behind that of the anal. Scales without transverse grooves.

A single species from America.

Pliosteostoma lutipinnis.

Pristigaster lutipinnis, Jord. & Gilb. Proc. U.S. Nat. Mus. iv. 1881, p. 340.

Opisthopterus lutipinnis, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 437.

Depth of body 4 to $4\frac{1}{4}$ in the length, length of head 4 to $4\frac{1}{3}$. Ventral profile not much more convex than dorsal. Snout shorter than diameter of eye, which is $2\frac{1}{5}$ to $3\frac{1}{3}$ in length of head; maxillary obtusely pointed posteriorly, extending to below middle of eye; posterior supramaxillary reaching to end of maxillary; lower jaw projecting. Ridges on head diverge posteriorly. 18 gill-rakers on lower part of anterior arch. Scales about 45/11; ventral scutes 27-28. Dorsal 13; origin about equidistant from base of caudal and occiput. Anal 53; origin nearer base of caudal than end of snout; length of base $2\frac{3}{8}$ to $2\frac{3}{4}$ in length of body. Pectorals a little shorter than head.

Pacific Coast of Mexico.

Seven specimens, 70-130 mm. in total length, from Mazatlan.

8. *CHIROCENTRODON*, Günth., 1868.

The relationships of this genus are uncertain. It agrees with the preceding genera in having a long anal fin, but may easily be distinguished from all of them by the structure of the mouth. Body oblong, compressed; abdominal serrature commencing on the thorax. Maxillary adherent to præmaxillary, their dentigerous margins continuous; two supramaxillaries. Teeth on præmaxillary uniserial, with 2 or 3 anterior canines; maxillary teeth uniserial, unequal; teeth in lower jaw uniserial, with a pair of canines inside; narrow bands of teeth on vomer, palatines, and pterygoids; a patch of teeth on tongue. Anal with more than 30 rays; origin just in front of that of dorsal. Pelvics very small.

A single species from the West Indies.

Chirocentrodon tæniatus.

Chirocentrodon tæniatus, Günth. Cat. Fish. vii. p. 463 (1868); Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 435.

Depth of body $4\frac{2}{3}$ to 5 in the length, length of head $4\frac{1}{5}$ to

4½. Ventral profile not much more convex than dorsal. Snout equal to or a little shorter than diameter of eye, which is 3 to 3¼ in length of head. Maxillary tapering posteriorly, extending to below posterior border of eye; lower jaw moderately projecting. Ridges on head converge a little posteriorly. 16-17 gill-rakers on lower part of anterior arch. Ventral scutes 16+9-10. Dorsal 14-15; origin equidistant from base of caudal and occiput. Anal 40-42; origin just in front of that of dorsal; length of base nearly 3 in length of body. Pectorals shorter than head. Pelvics shorter than eye; inserted much nearer to base of pectoral than origin of anal. A silvery lateral band.

West Indies.

Five specimens, 80-90 mm. in total length; types of the species.

Pellona bleekeriana, Poey ('Répertoire,' ii. 1867, p. 242), may not be distinct from *Ch. taniatus*. As described, it seems to differ chiefly in having a single canine above and two below on each side; no teeth on tongue; anal placed behind dorsal.

II.—*Notes on Dragonflies from the Old World Islands of San Thomé, Rodriguez, Cocos-Keeling, and Loo Choo.* By HERBERT CAMPION.

SMALL collections of dragonflies from the tropical islands of San Thomé, Rodriguez, and Cocos-Keeling, and the sub-tropical archipelago of Loo Choo, have recently come to my notice, and, in view of the infrequency with which those localities are referred to in the literature of the Odonata, some remarks on the collections in question appear to be called for.

SAN THOMÉ.

Through the kindness of Dr. Guy A. K. Marshall, C.M.G., I have had the opportunity of examining a few Odonata from this Portuguese West-African possession, submitted to the Imperial Bureau of Entomology by Mr. A. F. de Seabra in 1921 and Mr. H. J. Snell in 1922. Mr. Seabra sent only a female of *Ceragrion glabrum*, Burm., and a female of *Hemianax ephippiger*, Burm. Mr. Snell's specimens, dated

1919-1921, consisted of six species, particulars of which are subjoined:—

- Ceriagrion glabrum*, Burm., 2 ♂, 1 ♀.
Orthetrum stemmale capense, Calv., 1 ♂, 1 ♀.
O. guineense, Ris, 1 ♀.
Diplacodes lefebvrei, Ramb., 2 ♂.
Palpopleura lucia, Drury, 5 ♂, 3 ♀.
Pantala flavescens, Fabr., 2 ♂.

RODRIGUEZ.

According to Mr. Frederick Smith (Phil. Trans. R. Soc. clxviii., extra volume, p. 539, 1879), Mr. George Gulliver, who was attached to the Transit of Venus Expedition which visited Rodriguez in 1874, brought home some Odonata belonging to the three species, *Libellula mauritiana*, Ramb. (= *Tramea limbata*, Desj., b), *Anax mauritianus*, Ramb. (= *Anax imperator mauricianus*, Ramb.), and *Agrion ferrugineum*, Ramb. (= *Ceriagrion glabrum*, Burm.). I am unable, however, to trace in the British Museum the single specimen of *C. glabrum* referred to by Smith under the name of *Agrion ferrugineum*, although I have found a male of *Ischnura senegalensis*, Ramb., which he did not record.

In 1918 (August to November) Mr. H. P. Thomasset and Mr. H. J. Snell collected a few more dragonflies in Rodriguez, which were identified by Mr. W. H. T. Tams as *Pantala flavescens*, Fabr., *Tramea limbata*, Desj., *Orthetrum brachiale*, Beauv., *Anax imperator mauricianus*, Ramb., *Ischnura senegalensis*, Ramb., and *Agrion ferrugineum*, Ramb. (Proc. Cambridge Phil. Soc. xix. p. 289, 1920). These specimens have passed into the possession of the University Museum of Zoology, Cambridge, and Dr. Hugh Scott has been good enough to allow me to examine them.

The only rectifications which are needed in Mr. Tams's identifications concern what he calls *Agrion ferrugineum*, a name which should now be deleted from his list. The majority of the insects to which he has applied it prove to be examples of the orange stage of the heterochromatic female of *Ischnura senegalensis*. The series also includes a single female, in somewhat teneral condition, of a species of *Argiocnemis* which is not known to me, and which is smaller than the widely-distributed *A. rubescens*, Selys, and otherwise different from it. The Rodriguez males of *I. senegalensis* exhibit a peculiarity in the coloration of the meso-metathorax, as most of them have the pale antehumeral lines entirely obsolete. Three have the antehumeral lines in

successive stages of reduction, due to the progressive cutting off of their posterior portion. Thus, in the first specimen the lines are about three-quarters of their full length, in another little more than half, while in the third individual they are represented by mere vestiges on the anterior portion of the meso-metathorax. The twenty-three specimens of *I. senegalensis* contained in the collection may be analysed thus:—

Males:—	
Pale antehumeral lines complete	1.
Pale antehumeral lines reduced.....	3.
Pale antehumeral lines obsolete	8.
Females:—	
Homœochromatic.....	1.
Heterochromatic.	
Orange stage.....	7.
Olivaceous stage	3.

The single female of *Tramea limbata* in the collection agrees very well in its wing-markings with the female obtained from the same island by Gulliver.

As regards *Orthetrum brachiale*, of which there are two males and a female, it may be observed that the species has been recorded from Mauritius, but not otherwise from Rodriguez. One of the males is teneral, but the other specimens agree with it in having the anal appendages quite white. I have seen a long series of this species from various parts of Continental Africa, and found that the anal appendages, in males and females alike, are usually black. Ris, however, describes the appendages of both sexes as being normally bright yellow, while in very adult examples only are they dark and pruinose (Coll. Selys, Libell. p. 200, 1909). The hamules of the two males, and especially those of the fully matured specimen, are very similar to what Ris has figured from a Nossi Bé example (*loc. cit.* fig. 140).

COCOS-KEELING.

The dragonflies collected in April and May 1906 by Dr. F. Wood Jones are of unusual interest, inasmuch as “none of these species is resident on the atoll, and there is no open fresh water for them to pass their early stages in. All are wind-borne waifs, and do not belong properly to the fauna of the islands, although they are at times so conspicuous a feature of it” (Wood Jones, Proc. Zool. Soc. Lond. 1909, p. 155). The specimens were presented to the British Museum (Natural History), and were identified by Mr. W. F. Kirby as belonging to *Pantala flavescens*, Fabr.,

Tramea rosenbergii, Brauer, and *Anax guttatus*, Burm. According to Ris's monograph of the Libellulinæ, the single male *Tramea* should be referred to as *T. limbata*, Desj., *d.* The wing-markings are identical with those of males from Lombok with which I have compared them.

Next to the fact that these dragonflies were casual visitors to a coral atoll several hundred miles away from the nearest mainland, the chief point of interest about them is the discovery that what Kirby called *Anax guttatus* is really *Anax (Hemianax) papuensis*, Burm., a species of which no undoubted records exist outside the limits of the Australian continent. As extending the known distribution of this insect in the opposite direction, it may be mentioned that the British Museum series includes a male presented by Mr. W. Wykeham Perry, of H.M.S. 'Pearl,' and taken 60 miles off Lord Howe's Island on 15th September, 1874, when a strong wind was blowing off the island. It may be added that M. René Martin has recorded *Anax papuensis* from New Guinea, on the authority of a single male specimen in De Selys's collection (Coll. Selys, *Æsch.* p. 29, 1908). M. G. Severin, however, has been kind enough to inform me (*in litt.*, 28. vi. 22) that the collection in question contains no such specimen from New Guinea. There are two examples labelled New Holland, and it is probable that one of those labels was misread by Martin as referring to New Guinea. Burmeister's type also came from New Holland, and the specific name *papuensis* was evidently a misnomer from the first.

Loo Choo.

Scattered through the National Collection are a few Odonata obtained by Capt. F. W. Beechey during the voyage of H.M.S. 'Blossom' to the Pacific and Behring's Straits in 1825-28. Some of these specimens are provided with an oblong label inscribed "Loo Choo" and a round ticket bearing simply Capt. Beechey's name, while other specimens carry nothing beyond a round ticket marked "Sandw. I., Beechey." The so-called Sandwich Islands material furnished the specimen which became the type of *Deiella fasciata*, Kirby, an insect which, as McLachlan pointed out (*Ann. & Mag. Nat. Hist.* (6) x. p. 177, 1892), is nothing else than the heterochromatic ♀ of *D. phaon*, Selys, from Japan, Amoy, and Loo Choo. He added that "the 'Blossom' visited the latter islands [Loo Choo], and it is not at all improbable that some confusion in the locality labels subsequently occurred," especially as no "recent investigator of

the Hawaiian Islands has noticed this conspicuous insect." With the exception of *Diplacodes bipunctata*, Brauer, and *Trithemis annulata*, Beauv., the other dragonflies labelled in the same way also belong to well-known Asiatic species, and *Pantala flavescens* is the only one among them known to be a Hawaiian insect.

The Beechey dragonflies which I have so far succeeded in tracing in the British Museum are the following:—

Labelled as coming from "Loo Choo"—

Ischnura aurora, Brauer, 1 ♂.

Diplacodes bipunctata Brauer, 1 ♀, evidently belonging to this species.

Crocothemis servilia, Drury, 1 ♂.

Pantala flavescens, Fabr., 1 ♀.

Labelled as coming from the "Sandwich Islands"—

Orthetrum albistylum speciosum, Uhler, 1 ♂.

Diplacodes bipunctata, Brauer, 2 ♀.

Deielia phaon, Selys, 1 ♀.

Trithemis festiva, Ramb., 1 ♀.

? *T. annulata*, Beauv., 2 ♂.

Tholymis tillarga, Fabr., 1 ♂.

Pantala flavescens, Fabr., 3 ♂, 4 ♀.

The female *Trithemis* has the right hind wing in a teratological condition. A similar female, but presumably with normal wings, labelled in a similar way, passed from the British Museum into De Selys's collection, where it received the manuscript name of *Trithemis nereis*. Both specimens were carefully studied by Ris, who, suspecting that they really came from Loo Choo; with *Deielia phaon*, referred them, provisionally, to the Asiatic species *Trithemis festiva*. He also pointed out that *T. festiva* was known to occur as near to Loo Choo as Formosa (Coll. Selys, Libell. p. 799, 1912). The identification of the British Museum specimen as *T. festiva* is probably correct, in spite of the large pterostigma and of the fact that the tips of the three normal wings are hyaline, and not clouded with brown, as appears to be usual in females of that species.

The two broken males, labelled "Sandw. I., Beechey," are in the form of the hamule and the redness of the venation more like *T. annulata* than *T. festiva*. In all four hind wings Cu_1 has migrated upwards upon the outer face of the triangle, reminding one of the genus *Diplacodes*, although the other characters are those of true *Trithemis*. The unusual condition of Cu_1 , it may be remarked, is exhibited also by the female *Trithemis* discussed by Ris.

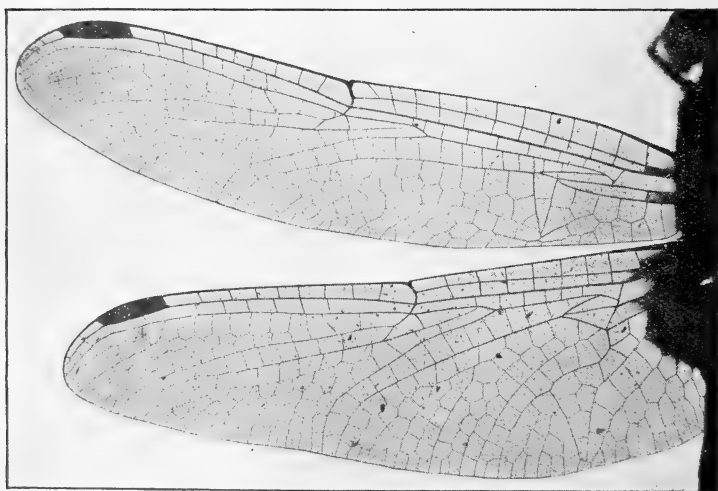
A perusal of Capt. Beechey's 'Narrative,' published in two volumes in 1831, reveals the fact that Teneriffe was the only place where a landing was made during the voyage of the 'Blossom' at which *Trithemis annulata* was at all likely to have been met with. Dr. B. P. Uvarov informs me that he has found a few Orthoptera of Beechey's in the British Museum purporting to come from the Sandwich Islands, which obviously had their origin in some locality like Madeira or the Canary Islands. If my determination of the two fragmentary males of *Trithemis* should be correct, it follows with a reasonable degree of certainty that they were obtained at Teneriffe in June 1825, although I have no positive record before me of the occurrence of *T. annulata* in that island.

Although the Sandwich Islands were visited by Beechey in May 1826, it cannot be taken as certain that any of the dragonflies alleged to come from that archipelago actually did so. Nevertheless, it is quite likely that the series of *Pantala flavescens* may be correctly labelled, as the species is well known in the Hawaiian Islands. It is also possible that the specimens of *Diplacodes bipunctata* likewise came from Hawaii, notwithstanding the lack of other records to show that the species occurs there (see Ris, Coll. Selys, Libell. p. 471, 1911, where the 'Blossom' material is cited). The Asiatic species were, in all probability, gathered at Loo Choo in May 1827, while the putative specimens of *Trithemis annulata* were secured at Teneriffe early in the outward voyage.

In 1915 Mr. K. Oguma published "A List of Dragonflies collected by Mr. Okumura from Kiusiu and Loo Choo" (Ent. Mag., Japan, i. pp. 146-148). The text of this paper is in Japanese, and Mr. S. Yamada, of the Imperial University, Tokio, has kindly assisted me to separate the Loo Choo records from the others. The names of fifteen species occurring in Loo Choo have been obtained in this way, namely:—*Orthetrum triangulare melania*, Selys, *O. sabina*, Drury, *O. albistylum speciosum*, Uhler, *Crocothemis servilia*, Drury, *Rhyothemis variegata imperatrix*, Selys, *Pantala flavescens*, Fabr., *Diplacodes trivialis*, Ramb., *Tramea chinensis*, De Geer, *Deiella phaon brevistigma*, Oguma, *Gynacantha rosenbergii*, Brauer, *Anax guttatus*, Burm., *A. parthenope*, Selys, *Ictinus fallax*, Selys, *Gomphus* sp., and *Matrona nigripectus*, Selys. It will be observed that Mr. Oguma's list does not include all of the species in the 'Blossom' collection which I have provisionally attributed to Loo Choo.

III.—*A new Form of Indothemis limbata from Ceylon*
(Odonata). By HERBERT CAMPION.

INDOTHEMIS LIMBATA, Selys, is an uncommon species known only from four localities in Burma and the Malay Peninsula, but an examination of some material in the British Museum (Natural History) shows that a local form of it occurs also in Ceylon. This material consists of two males and one female obtained in 1890 by Col. J. W. Yerbury, and it appears to have been recorded as *Trithemis festiva*, Ramb., in Mr. W. F. Kirby's report upon the collection of Cinghalese Odonata to which it belongs (Linn. Soc. Journ., Zool. xxiv. p. 551, 1894). Indeed, the males resemble those of



Indothemis limbata sita, subsp. n., holotype.

T. festiva so closely that they are very likely to be confused with them, unless an inspection is made of the venational characters or of the genitalia of the second abdominal segment.

The males of the new subspecies differ from those of the typical form in having (1) the tips of the wings hyaline, instead of being narrowly bordered with dark brown; (2) the brown markings at the base of the wings more opaque; (3) the basal wing-markings extending further distally, *e.g.*, reaching to the first antenodal in the fore

wing and to the second antenodal in the hind wing, instead of ceasing halfway to (fore wing) or at (hind wing) the first antenodal; and (4) the pterostigma about 1 mm. shorter and of a darker and redder shade of brown. The hamules of the two forms are barely distinguishable from one another.

Specimens of *Indothemis* are still very rare in collections, and the female of *I. limbata limbata* has never been described. Although the female of *I. cæsia*, Ramb., was in the possession of De Selys-Longchamps in 1884, he mistook it for *Sympetrum meridionale*, and the unique specimen remained unrecognised for more than a quarter of a century. The undescribed female from Ceylon likewise resembles a *Sympetrum*, and at a cursory glance might easily be confused with *S. danæ*, Sulz., ♀.

Indothemis limbata sita, subsp. n.

♂ (holotype). Trincomali, 6. xii. 1890, *Yerbury*.

Closely resembling the ♂ of *I. limbata limbata*, Selys.

Length of abdomen 23 mm.; hind wing 27 mm.

Wings hyaline, except at base. Fore wing with umber-brown streaks in the (1) subcostal space, ending at the first antenodal, (2) cubito-anal space, ending at the anal crossing, and (3) basal cell in the anal field. Hind wing with large umber-brown basal spot, extending outwards to a point between the first and second antenodals, and continuing posteriorly at about the same level to the end of the first proximal cell in the anal loop: the outline then proceeds obliquely to meet the inner margin of the wing at a point four or five cells beyond the apex of the membranule. Pterostigma 3 mm. long, dark reddish brown. Antenodals $\frac{11\frac{1}{2}}{8} \cdot \frac{11\frac{1}{2}}{8}$. Postnodals $\frac{8 \cdot 7}{8 \cdot 8}$. Discoidal area of left fore wing with one row of three cells next to the triangle. Triangle of right fore wing free.

On the dorsum of segments 7 and 8 of the abdomen a pair of conspicuous orange-brown streaks, somewhat less than half the length of the segment. On the ventral surface of segments 5-8 (and perhaps on 4 also) a pair of stripes similar in position, length, and colour to the streaks on the dorsum of 7 and 8, but wider.

♂ (paratype). Trincomali, 18. ix. 1890, *Yerbury*.

Length of abdomen 22 mm.; hind wing 26 mm.

Antenodals $\frac{11\frac{1}{2}}{8} \cdot \frac{11\frac{1}{2}}{8}$. Postnodals $\frac{8 \cdot 8}{8 \cdot 9}$. Discoidal area of

right fore wing with one row of three cells next to the triangle.

Evidently a more fully adult specimen. Even under the most favourable illumination, abdominal segments 7 and 8 show no trace of pale markings. On the ventral surface of segments 5-7 (but not on 4 and 8) are just discernible orange-brown stripes similar to those seen in the holotype. There are also some patches of orange-brown on the underside of segments 1 and 2. The labrum, clypeus, frons, metepimeron, pectus, and legs are blacker than in the holotype.

♀ (allotype). Trincomali, Ceylon, 19. viii. 1890, *Yerbury*.

Length of abdomen 20 mm. ; hind wing 26 mm.

Labium yellow, with a very large triangular black spot lying upon the median lobe and those portions of the lateral lobes which are immediately above it. Labrum and clypeus yellow. Frons yellow, with a rather broad black streak bordering the vertex and the eyes. Vertex, antennæ, and occipital triangle brownish black. Space behind each eye with two conspicuous yellow spots.

Prothorax yellowish. Meso-metathorax yellow, with a broad mid-dorsal black band: a still broader juxta-humeral black band: and a black band of intermediate width, partly above and partly upon the second lateral suture; this last-mentioned band embodies a row of five yellow spots, of which the first and the last are the largest. Pectus with a broad transverse band of blackish brown immediately behind the legs, a narrow black band upon the hind margin of the thorax, and a third band, broad, semicircular, and blackish brown, lying between the other two.

Fore wings with a mere trace of saffron at the base. Hind wings with a trace of saffron in the costal and median spaces; a streak of saffron in the subcostal space, reaching to the first antenodal; and a large basal saffron spot, extending from the cubitus above to a point three or four cells beyond the apex of the membranule, and reaching distally to the level of the first antenodal and the inner boundary of the anal loop. Pterostigma 3 mm. long, pale reddish brown. Antenodals $\frac{10\frac{1}{2} \cdot 10\frac{1}{2}}{8 \cdot 9}$. Postnodals $\frac{7 \cdot 8}{8 \cdot 8}$. Discoidal area of each fore wing with one row of three cells next to the triangle. Triangle of left fore wing free.

Legs black; femora of fore legs yellowish internally.

Abdomen tapering gradually from base to apex, mainly black. Segments 1-3 yellow at the sides, and with some

yellowish patches on the dorsum. On segments 4-8 the yellow area on each side takes on the form of a well-defined yellow marking, reaching from the base to about the middle of the segment, except on 4, where it is about three-quarters as long as the segment: on 5-7 the marking is deeply bifid, and the lower branch becomes progressively shorter: on 4 and 8 the branches of the marking are completely separated at the base: on 9 the yellow marking is reduced to a mere basal dot. Segment 10 is wholly black. Ventral surface of segments 1 and 2 mostly yellow; a broad mid-ventral black band on 2; 3-8 yellow in the basal half (or thereabouts) and black in the apical half (or thereabouts); 9 and 10 black.

Anal appendages blackish brown, about as long as segment 9; conical; straight, except at the tips, which are pointed and divergent.

Vulvar lamina not at all prominent; the posterior margin straight in ventral view and slightly arched when seen from behind.

IV. — *Results of the Oxford University Expedition to Spitsbergen, 1921.*—No. 25. *Hymenoptera Parasitica: Ichneumonidea.* By JAMES WATERSTON, B.D., D.Sc.

THE thirteen specimens of parasitic Hymenoptera taken by the Expedition are referable to three genera, whose study presents very considerable difficulties. Moreover, the descriptions of Holmgren—to whom mainly our knowledge of these insects from Spitsbergen is due—are insufficient for critical work. Thanks, however, to the kindness of Dr. A. Roman, Stockholm, who has access to Holmgren's types, three of the possibly four species represented in the collection have been determined. I desire to thank Dr. Roman heartily for the trouble he has taken. As Dr. Roman is at present engaged in revising the Hymenoptera of Spitsbergen, it is unnecessary to offer now any descriptive or comparative notes on the species recorded below.

All the specimens were taken by Mr. C. S. Elton (whose collecting was done at the head of Klaas Billen Bay, "Bruce City"), mostly from various flowers growing on a raised shingly beach at from 0-60 feet.

All of the three named species were originally described from Spitsbergen, and Mr. Elton's captures were apparently

made under the same conditions as Holmgren's over fifty years ago.

Braconidæ.

Ichneutes hyperboreus, Holmgr.

Ichneutes hyperboreus, Holmgren, Svensk. Vet.-Akad. Handl. viii. P. 5, p. 25, ♂ ♀ (1869).

♂ ♀, "shingly raised beach, with *Dryas* etc.," 22. vii. 1921.

♀, "*Dryas octopetala*, area of shingle," 30. vii. 1921.

♀, "on flowers," 2. viii. 1921.

The Rev. T. A. Marshall (Trans. Ent. Soc. Lond. 1889, pt. ii. June, p. 184) says:—"The Rev. A. E. Eaton brought a specimen [of *I. reunitor*, Nees] from Spitzbergen"—referring probably to the present species.

Ichneutes spp. are known to destroy saw-fly larvæ (Tenthredinidæ), and Holmgren remarks (*l. c.*) that *I. hyperboreus* doubtless parasitizes *Nematus* (i. e., *Pristiphora*) *frigidus*, Bohem. The latter species was also secured by the expedition [*cf.* Morice, Ann. & Mag. Nat. Hist. ser. 9, vol. x. no. 56, p. 220 (1922); *cf.* also R. Malaise, Ent. Tidskr. p. 11 (1921)].

Ichneumonidæ.

Atractodes bicolor, var. *arcticus*, Holmgr.

Atractodes bicolor, Gravenhørst, Ichneum. Europ. iii. p. 791, no. 179 ♀ (1829).

Atractodes arcticus, Holmgren, Öfvers. Svensk. Vet.-Akad. Förh. xxix. P. 6, p. 99, ♂ (1872).

2 ♀, "on flowers of *Saxifraga hirculus*," 4. viii. 1921.

Probably a dipterous parasite. Several species of this genus have now been bred from maggots in carrion.

Stenomacrus pedestris, Holmgr.

Orthocentrus pedestris, Holmgren, Svensk. Vet.-Akad. Handl. viii. P. 5, p. 23, ♀ ♂ (1869).

2 ♂, 3 ♀, "on flowers of *Silene acaulis*, about 30 ft.," 2. viii. 1921.

♀, "on hut window-pane or ledge below, about 25 ft.," 14. viii. 1921.

This is probably a parasite of some small nematoceros dipterous.

Stenomacrus sp.

2 ♂, "dry tundra on shingle, 0-60 ft.," 11. viii. 1921.

On first studying the *Stenomacrus* material of this collection I did not separate the above examples from *S. pedestris*, but later suspected they might be distinct.

I accordingly sent them to Dr. Roman, who tells me that in his Spitsbergen collection there are also two males comparable with those collected by Mr. Elton. Dr. Roman, however, is not yet prepared to offer a decided opinion as to the status of this form, and here the matter must for the present rest.

British Museum (Nat. Hist.),
Nov. 1922.

V. — *New Malachiid Beetles and further Notes on the Distribution and Synonymy of various other Species from South and East Africa* [Coleoptera]. By G. C. CHAMPION, F.Z.S.

SINCE the publication of my papers on the African species of the Malachiid-genera *Hapalochrus*, *Hedybius*, *Ebæus*, *Attalus*, &c., in recent volumes of this Magazine (1920-22), some overlooked material, including several novelties, has been found in the buried "accessions" in the British Museum, and various other forms have come to hand from S. Africa, these latter having been communicated by Dr. Péringuey, or received from Mr. R. E. Turner and the "Imperial Bureau of Entomology." Mr. H. E. Box, too, has recently brought four new Malachiids captured by himself during the present year at Kabete, near Nairobi, E. Africa, as well as six species of *Hapalochrus*, from the same locality. The new forms are numbered to indicate where they should be placed in the arrangement previously adopted.

HAPALOCHRUS, Er.

In addition to some corrections in the synonymy [Ann. & Mag. Nat. Hist. (9) vi. pp. 537-539], two species, *cyaneoguttatus* (No. 9 a) and *natalensis* (No. 9 b), were subsequently added [op. cit. (9) vii. pp. 344, 345]; one, *dollmani* (No. 58) transferred to a separate genus, *Notomalachius* [op. cit. (9) ix. p. 580]; and one, *dasytiformis* (No 10), proved to be a

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previously described insect [*op. cit.* (9) ix. p. 580, nota]. In the additional material now to hand, there is one new species (No 10 *a*); several more examples of *H. ramulosus* (No. 12), from Bulawayo and Victoria Falls (*Mus. Oxon.*) and Kaapmuiden, Transvaal (*Mus. Cape Town*); and specimens of *H. janthinus*, var. (σ), *kenyensis* (σ), *confusus* (σ), *trapeziderus* (φ), and *amplipennis* (φ), from Kabete, Kenya Colony. *Malachius cærulescens* (? = *mashunus*, Gorh.) and *M. caffer*, Boh. (? = *H. nitens*, Gorh.), must belong, as stated by me [*op. cit.* (9) ix. p. 581], to *Hapalochrus*.

10 (*a*). *Hapalochrus crassipes*, sp. n.

σ . Elongate, narrow, subparallel-sided, shining, clothed with fine pubescence intermixed with long erect hairs; black, the anterior legs in great part, the other legs (the posterior femora and the tips of the tarsi excepted) to a less extent, and an apical patch on the elytra, testaceous, the rest of the elytral surface metallic green. Head broad, densely, rugulose punctate; antennæ long, stout, 10-jointed, strongly flabellate. Prothorax short, broad, transversely subquadrate, very sparsely punctured. Elytra long, a little broader than the prothorax at the base, gradually widening towards the tip; closely rugose punctured. Legs stout; anterior femora strongly incrassate, toothed at the base beneath; anterior tibiæ greatly thickened, abruptly obliquely compressed, and emarginate towards the apex; anterior tarsal joints 1 and 2 thickened, curved, 2 with a claw-like extension over 3 above; intermediate tibiæ dilated, hollowed towards the tip within.

Length 3 mm.

Hab. S. AFRICA, Namutoni (*K. Barnard, in Mus. Cape Town*).

This remarkable Malachiid was sent me for determination or description after my paper on the species of *Hapalochrus* was published [*Ann. & Mag. Nat. Hist.* (9) vi., Aug. 1920]. It is a close ally of *H. (Calosotis) barkeri*, Pic (= *H. dasyti-formis*, Champ., No. 10)*, differing from the σ of that insect in the metallic-green, apically testaceous-maculate elytra; the stout, flabellate, black antennæ; and the thicker legs, the intermediate tibiæ being widened as in many other species of the same genus.

* *Cf.* *Ann. & Mag. Nat. Hist.* (9) ix. p. 580 (May 1922).

HEDYBIUS, Er.

Some remarks on the synonymy of various Abyssinian and S. African species have already been noted by me, and one new one, *ruficornis* (No. 36 a), added [*op. cit.* (9) ix. p. 581]. *Troglops megacephalus*, Roth (1851), was omitted from the synonyms of *H. formosus*, Reiche (1849) (sp. No. 8); *H. lividus*, Gorb. (1883) (sp. No. 6) = *H. (Troglops) luteus*, Roth (1851). Another specimen (♀) of the fasciate variety of *H. deliquescens* (No. 22) has been received from Nyasaland (*H. S. Stannus*). Three or four new species with simple tarsi in ♂ are added to the S. African list, and one of the subgenus *Hedybiinus* to the E. African list.

6 (a). *Hedybius leucopterus*, sp. n.

♀. Rather broad, shining, thickly clothed with soft, pallid, erect hairs, without longer setæ intermixed, the projecting hairs on the tibiæ very long; pale testaceous, the elytra dirty white, the eyes and mandibles black; the head and prothorax very sparsely, minutely, the elytra densely, finely punctured. Head (with the eyes) about as broad as the prothorax; antennæ moderately long, serrate. Prothorax transverse, very convex, obliquely narrowed posteriorly, the margins expanded. Elytra broader than the prothorax, subparallel, rounded at the apex.

Length 5 mm.

Hab. E. AFRICA, Kabete (*H. E. Box*: iii., v. 1922).

Two ♀ ♀. A close ally of the Abyssinian *H. luteus*, Roth (= *lividus*, Gorb.), differing from it in the denser and finer puncturing of the elytra, the latter clothed with shorter hairs. The Rhodesian *H. albipennis*, Gorb., has intermixed long black setæ on the elytra. All these insects have the general facies of a pallid Clythrid.

9 (a). *Hedybius atrocaveatus*, sp. n.

♂. Moderately elongate, narrow, rather convex, shining, finely cinereo-pubescent; black, the antennal joints 1-4 (except 1 above), tibiæ, and tarsi testaceous, the base of the head, the prothorax, and elytra with a metallic or violaceous lustre, the elytra each with a broad, outwardly widened, submedian, orange fascia (extending to the outer margin, but not reaching the suture); the head at the base and the prothorax minutely, the elytra finely closely punctured.

Head broad, as wide as the prothorax, with a very deep, smooth, shining, transverse frontal excavation, which is arcuate behind and (as seen from above) limited on each side above the eyes by a feebly subangular prominence, the cavity with a porrect horn in the centre and a triangular dentiform plica on each side near the oblique raised outer margin (thus appearing tridentate within, as seen from above); antennæ long, rather stout, subserrate. Prothorax transverse, convex, rounded at the sides, obliquely narrowed behind. Elytra wider than the prothorax, subparallel, rounded at the tip. Legs long; anterior tarsi 5-jointed, simple.

Length 3 mm.

Hab. S. AFRICA, Bechuanaland (*Mus. Brit.*).

One ♂, recently received by the "Imperial Bureau of Entomology." Separable from the same sex of *H. maculifer*, *flavinasus*, and *trilobatus* by the smooth, black, tridentate frontal cavity, the long, rather stout antennæ, and the testaceous tibiæ and tarsi. The elytral fascia is interrupted at the suture, as in *H. maculifer*.

11 (a). *Hedybius tridens*, sp. n.

♂. Moderately elongate, rather broad, shining, sparsely clothed with pallid, semierect hairs; nigro-cyaneous or violaceous, the antennæ (the testaceous lower surface of joints 2-4 excepted) and legs black, the frontal portion of the head and a common, broad, outwardly-widened, angulate median fascia on the elytra testaceous; the head at the base and prothorax finely, the elytra coarsely, punctured. Head (fig. 1) broad, wider than the prothorax, with a very deep, smooth, opaque, transverse frontal excavation, which is truncate in the middle behind, the cavity with an infuscate porrect horn in the centre and a triangular dentiform plica (arising from the outer portions of the epistoma, and infuscate behind) adjacent to it on each side; antennæ very long, stout, tapering towards the tip. Prothorax transverse, convex, rounded at the sides, obliquely narrowed posteriorly. Elytra broader than the prothorax, rather short, a little widened posteriorly. Anterior tarsi simple, 5-jointed.

♀. Head much smaller, metallic, minutely punctured, hollowed in the middle anteriorly; antennæ short, rather slender.

Length $3\frac{1}{10}$ - $3\frac{1}{2}$ mm.

Hab. S. AFRICA, Transvaal (*Mus. Brit.*).

One pair. Very like *H. trilobatus*, Champ., type from the

Cape. The elytral fascia much narrower; the frontal excavation of the ♂ with the three infuscate dentiform prominences closely placed, and the basal margin of the cavity truncate in the middle and without trace of angulation in front of the eyes.

11 (b). *Hedybius tripustulatus*, sp. n.

♂. Moderately elongate, broad, shining, thickly clothed with long, soft, erect, pallid hairs, the antennæ, legs, and under surface finely cinereo-pubescent; bluish-green, the antennæ and legs greenish-black, the cephalic cavity, clypeus, and elytra rufo-testaceous, the elytra with a large, common, subquadrate or cordiform patch at the base and a still larger transverse or rounded patch on the disc of each of them towards the apex (the latter extending to the suture, but not reaching the outer margin) cyaneous or violaceous; the head at the base and prothorax finely, the elytra coarsely, closely punctured. Head (with the eyes) (fig. 2) about as broad as the prothorax, with an extremely large, broad, deep, subopaque, frontal excavation, the margins of which are more or less reflexed, bisinuate above, angularly dilated inward on each side before the eyes, and raised in front into two triangular, curved, vertical, subcontiguous lamellæ, the tips of these reaching a correct horn arising from the centre of the cavity; antennæ long, stout, serrate, tapering towards the tip. Prothorax broad, strongly transverse, rounded at the sides, obliquely narrowed behind, canaliculate in the centre anteriorly, the margins reflexed. Elytra much broader than the prothorax, a little widened posteriorly, oblong-subquadrate, rounded at the tip. Anterior tarsi 5-jointed, simple.

♀. Head a little smaller, metallic, simply transversely depressed in the middle anteriorly; antennæ much shorter and more slender, joints 2-4 partly testaceous beneath.

Length $3\frac{1}{2}$ -4 mm.

Hub. S. AFRICA, Bothaville, Orange Free State (*Dr. Brauns*: 10. iv. 1899: ♀), New Hanover, Natal (*C. B. Hardenberg*: 24. ix. 1914: ♂ ♀, types).

One ♂, two ♀ ♀. A remarkably distinct form belonging to the first section of the genus, as defined by me in 1921, near *H. trilobatus* and *H. maculifer*. Dr. Péringuey some time ago sent me the ♀ of it captured by Dr. Brauns, but this was left unnamed till the ♂ had been found. The types have been presented to the British Museum. *H. diversi-*

pennis, Pic, ♂, unknown to me (No. 37), may belong to this section of the genus?

31 (a). *Hedybius bicornutus*, sp. n.

♂. Elongate, widened posteriorly, shining, thickly clothed with long, soft, erect hairs intermixed with whitish pubescence; metallic-green, bluish-green, or brassy, the head above (except at the sides behind the eyes or at the extreme base), antennæ (except at tip), and prothorax testaceous, the abdomen in great part rufous, the apical processes black; the head and prothorax very sparsely, minutely, the elytra densely, somewhat rugosely punctured. Head (fig. 3) a little narrower than the prothorax, armed with a stout, erect, blunt horn on each side near the eyes and deeply transversely excavate between them, the cavity extending for some distance forward exterior to a flattened, trapezoidal, sharply-margined lamella extending backward from the epistoma; antennæ moderately long, rather stout, serrate. Prothorax strongly transverse, rounded at the sides, the anterior margin raised into a triangular, basally-widened, dentiform prominence, behind which is a transverse excavation. Elytra moderately elongate, broader than the prothorax. Pygidium (fig. 3 a) abruptly constricted and deeply excavate on each side distally, and armed at the apex with two long, curved, hook-like processes; the corresponding terminal ventral segment with equally long, contiguous, apically divergent processes*. Anterior tarsal joint 2 produced over the base of 3 above.

♀. Head to the anterior margin and abdomen metallic, the labrum testaceous; antennæ shorter and more slender, in great part infusate.

Length $4\frac{1}{2}$ –5 mm.

Hab. E. AFRICA, Kabete, Uganda (*H. E. Box*: iii., iv. 1922).

Five ♂♂, numerous ♀♀, found with ♂ and ♀ examples of the closely allied *H. kabetensis* (No. 29), which has the head black, the horns short and angular, and the pygidial structure very different in the ♂ (*cf.* figs. 4, 4 a), and the elytra blacker and more densely punctured in the two sexes. *H. ruficornis*, Champ., type, ♂, from Nairobi (1922), is another similarly coloured form, with very different cephalic and pygidial structure in the same sex.

* *H. kabetensis*, ♂, has two similar terminal ventral processes, not mentioned in the description.

PHILHEDONUS, Gorb.

5 (a). *Philhedonus bifossulatus*, sp. n.

♀. Moderately elongate, rather broad, shining, finely cinereo-pubescent; nigro-cyaneous or bluish-green, the anterior portion of the head, palpi, antennæ, prothorax (a large, scutiform, metallic patch on the anterior part of the disc excepted), a broad median fascia on the elytra (not quite reaching the suture or outer margin) and a transversely-triangular patch at their apex, and the anterior legs (the femora in part excepted), rufo-testaceous or testaceous, the rest of the head and legs and the scutellum black; the head and prothorax very sparsely, minutely, the elytra more closely, subrugulose punctulate. Head short, narrower than the prothorax, bi-impressed between the eyes and with a smooth deep transverse fovea on each side adjacent to them posteriorly; antennæ not very slender, long, joints 3-10 elongate and each slightly widened towards the tip. Prothorax transverse, convex, rounded at the sides, narrowly margined, obliquely narrowed behind, the anterior margin subangulate in the middle. Elytra a little broader than the prothorax, widening to near the apex, strongly depressed below the base.

Length 3-3½ mm.

Hab. S. AFRICA, Willowmore [type] (*Dr. Brauns, in Mus. Cape Town*), Garies [xi. 1885] (*ex Mus. Cape Town*).

Two ♀♀: the type in perfect condition, the other discoloured. In the absence of the ♂, the generic position of this insect is uncertain; but, to judge from the deep juxta-ocular foveæ, the species may be related to *P. fossulifer*, Pic (type ♂), the ♀ of which is unknown to me. The antennæ, which might be described as subfiliform, are slightly infusate towards the apex.

EBÆUS, Er.

Numerous representatives of this genus have been found in the British Museum "accessions," including four new species and additional examples of others hitherto unique or known from one sex only. The latter include *E. rubricatus* (No. 3), ♀, which has the apical margin of the elytra smooth and callose, as in same sex of *E. martini* (No. 4); *E. crassicauda* (No. 9), a ♂ from the Upper Buzi River, Port. E. Africa, with the elytral markings disconnected on the disc; *E. albartitus* (No. 18), a ♂ from the Usangu

District, E. Africa; *E. zonarius* (No. 27, type from Abyssinia), ♀ ♀ from Salisbury and Marzoe, Mashonaland, similar to the ♀ type.

9 (a). *Ebæus sexdentatus*, sp. n.

♂. Moderately elongate, rather broad, widened posteriorly, very shining, clothed with semierect bristly hairs intermixed with fine scattered pubescence; black, the anterior half of the head, antennæ (the nigro-maculate inner portion of joints 4–11 excepted), prothorax (a broad wedge-shaped discoidal patch excepted), the apical excavation and processes of the elytra, and legs (a black spot at the tip of the posterior tibiæ excepted) testaceous or rufo-testaceous; the elytra with a streak extending down the sides before the middle, another streak opposite to it on the suture (extending backward along the sutural margin), and a rounded spot on the disc before the tip, whitish; the elytra finely punctured, the head and prothorax much smoother. Head narrower than the prothorax; antennæ rather stout, moderately long, sharply serrate. Prothorax transverse, rounded at the sides. Elytra with a deep transverse excavation at the tip, the margins of the cavity tumid, the outer one armed with a short tooth, the suture bearing an elongate stout appendage and a straight tooth behind it at the apex, the upper one with a downwardly-curved pencil of matted hairs at the tip (fig. 6). Anterior tarsal joint 2 extending over the base of 3 and nigro-pectinate along the oblique outer edge. Posterior tibiæ curved.

♀. Antennæ shorter and more slender; the elytra with a common, triangular, testaceous apical patch, connected along the suture with the antemedian whitish sutural streak, the rounded subapical spot wanting, the marginal streak as in ♂.

Length 3–3 $\frac{2}{5}$ mm.

Hab. E. AFRICA, Kabete (*H. E. Box* : iii., iv. 1922).

One ♂, three ♀ ♀, the sexes, as in various species of *Hypebæus*, having the elytra differently maculate at the apex. Near the S. and E. African *E. crassicauda*, Champ., the antennæ of the ♂ maculate and more strongly serrate, the prothorax vittate on the disc, the elytra otherwise marked.

10 (a). *Ebæus denticornis*, sp. n.

♂. Rather broad, widened posteriorly, shining; sparsely clothed with fine pubescence intermixed with scattered, erect,

black setæ; pale testaceous, the basal portion of the head tips of mandibles, eyes, a large subquadrate patch on the disc of the prothorax, and a smaller patch on the sides of the meso- and metasternum black; the elytra each with a humeral patch extending inwards along the basal margin, and two transversely placed, irregularly subquadrate spots towards the apex, nigro-cyaneous, the posterior tibiæ slightly infuscate before the tip; the head and prothorax almost smooth, the elytra finely punctured. Head narrower than the prothorax; antennæ long, acutely serrate. Prothorax transverse, rounded at the sides. Elytra broader than the prothorax; transversely excavate at the apex, the suture bearing a very long, stout, abruptly angulate, pointed appendage before the tip (fig. 5). Anterior tarsal joint 2 extending over 3 above, nigro-pectinate along the apical margin. Posterior tibiæ sinuate within and also tumid on the inner edge near the base.

Length 4 mm.

Hab. E. AFRICA, Kabete (*H. E. Box*: iii. 1922).

Two ♂♂. Near the W. African *H. bicaudatus*, Thoms. (= *bizonatus*, Ab.), the prothorax with a large subquadrate black patch on the disc, the elytra each with three nigro-cyaneous spots (one humeral, the others subapical), the antennæ much more sharply serrate in ♂.

15 (a). *Ebæus tetraspilotus*, sp. n.

♀. Elongate, shining, finely pubescent; black, the antennal joints 1-4 (except 1 above), prothorax, and legs (the posterior femora and tibiæ excepted) testaceous or rufo-testaceous, the rest of the antennæ slightly infuscate; the elytra bluish-black, with four sharply-defined oval whitish spots—one on the suture below the base and another near the tip, and one on each lateral margin before the middle; the head and prothorax almost smooth, the elytra subrugulose, rather sparsely finely punctured. Head narrower than the prothorax; antennæ rather slender, moderately long, feebly serrate. Prothorax small, transverse, convex, rounded at the sides. Elytra long, much broader than the prothorax, somewhat rounded at the sides, widest at about the middle. Posterior tibiæ curved, simple at the tip.

Length 3 mm.

Hab. E. AFRICA, Mogorr River (*A. O. Luckman*: v. 1913).

One ♀. Near *E. confluens*, Champ., and *E. consobrinus*,

Boh., the elytra bluish-black, with four sharply-defined oval whitish spots—two on the suture and one on each lateral margin before the middle. There is an allied unnamed form (♀) in the Cape Town Museum.

21 (a). *Ebæus rossi*, sp. n.

♂. Moderately elongate, broad, robust, shining, clothed with fine pubescence intermixed with scattered, erect, blackish, bristly hairs; testaceous, the basal half of the head, a broad, mesially-narrowed stripe extending down each elytron from the base to far beyond the middle and widened into a curved fascia posteriorly (leaving a common lanciform patch along the suture and an oblong lateral patch testaceous), and the metasternum black or bluish-black, the basal margin of the prothorax flavescent; the head closely, extremely minutely, the elytra finely conspicuously, punctured, the prothorax almost smooth. Head broad, narrower than the prothorax; antennæ moderately long, serrate. Prothorax transverse, rounded at the sides, which are explanate and transparent towards the base. Elytra widening to beyond the middle and arcuately narrowed thence to the apex; each with a large, transverse, tumid, oval area at the tip, the elevated space simply concave within and slightly curving forwards at the suture. Legs rather stout; anterior tarsal joint 2 with a claw-like, apically nigro-pectinate extension over 3 above; intermediate tibiæ subarcuately dilated near the base within; posterior tibiæ arcuate.

Length $4\frac{1}{2}$ mm.

Hab. S. AFRICA, Johannesburg (*Ross, ex coll. Distant*).

One ♂. Near *E. simoni*, Ab., and *E. sinuatipes*, Champ., differing from both in the longitudinally-confluent bluish-black elytral markings, the serrate antennæ, and the form of the apices of the wing-cases in the ♂. The dark markings on the elytra extend to the outer margin, but they do not quite reach the suture.

37. *Ebæus fortis*, sp. n.

♂. Robust, broad, elongate, shining, clothed with fine pubescence intermixed with erect bristly hairs; testaceous, the antennal joints 4–11 in part or entirely, eyes, and meta-

sternum black, the scutellum piceous, the elytra nigro-cæruleous, the apex and a triangular lateral patch (these markings connected along the outer margin) excepted; the head and prothorax almost smooth, the elytra closely strongly punctured. Head broad, tumid between the eyes and on the vertex, the latter depressed in the middle; antennæ long, stout, strongly pectinate. Prothorax broader than long, wider than the head, convex, rounded at the sides, much narrowed behind. Elytra widened to about the middle and arcuately narrowed thence to the apex, which is simply hollowed within, the disc obliquely depressed near the suture below the base, the apical portion convex. Penultimate dorsal abdominal segment (hypopygium) arcuately excavate at the base, strongly trilobate distally, the median lobe longer than the others, curved downward, excavate, and spoon-shaped at the tip; terminal dorsal segment (pygidium) subconical, convex, transversely hollowed at the base; terminal ventral segment furnished with two strong hooked processes. Legs long, stout; anterior tarsal joints 1 and 2 much thickened, 2 broad, nigro-pectinate along the apical margin, extending over the base of 3; posterior tibiæ sinuate.

Length 4 mm.

Hab. E. AFRICA, Samburu (*C. S. Betton* : x.-xi. 1896).

One ♂, in such rigid condition (possibly due to immersion in alcohol) that the structure of the terminal segments of the abdomen cannot be examined without maceration. A broad robust form not unlike *E. rossi*, with the basal portion of the head tumid, the antennæ pectinate, the prothorax moderately transverse and much narrowed behind, the elytra convex beyond the middle and simple at the tip, blue, except at the sides and apex, the hypopygium trilobate, &c. The species seems to be better placed under *Ebæus* than in *Attalus*.

38. *Ebæus lineatus*, sp. n.

♂. Moderately elongate, rather broad, shining, sparsely finely pubescent; testaceous, the basal half of the head, eyes, a very broad patch on the disc of the prothorax (leaving the sides and basal margin only pale), scutellum, two sinuous stripes on each elytron (sublateral and subsutural, extending from the base to the apical excavation), metasternum, abdomen, and the bases of the posterior tarsi black, the suture and outer margin of the elytra, and the pallid dorsal

stripe posteriorly, whitish; the head and prothorax almost smooth, the elytra finely punctured. Head broad, nearly as wide as the prothorax, the eyes prominent, large; antennæ long, sharply dentato-serrate from joint 5 onward, 2 very small. Prothorax transverse, convex, rounded at the sides, narrowed behind. Elytra wider than the prothorax; deeply, transversely excavate at the apex, and with two appendages arising from the sutural margin of the cavity—the upper one long, compressed, obliquely truncate, and furnished with a matted curved pencil of hairs at the tip, the lower one shorter, pointed, dentiform. Anterior tarsal joint 2 extending over the whole length of 3 and nigro-pectinate along the entire outer edge; posterior tibiæ sinuously bowed towards the apex.

Length $2\frac{1}{2}$ mm.

Hab. E. AFRICA, Narossura River (*W. P. Lowe*: xi. 1912).

One ♂. A peculiar form, with whitish, nigro-bilineate elytra, the prothorax black, except along the margins, the antennæ testaceous and sharply serrate, and the black comb on the second joint of the front feet very conspicuous.

ATTALUS, Er.

12 (a). *Attalus ramifer*, sp. n.

Attalus subcæruleus, var., Champ. Ann. & Mag. Nat. Hist. (9) ix. p. 576 (♀) (May 1922).

♂. Rather short, widened posteriorly, very shining, clothed with fine, semierect hairs; black, the basal joints of the antennæ in part and the prothorax (a short transverse space in front, formed by the basal portion of the head showing through the transparent chitin, excepted) rufo-testaceous or testaceous, the elytra cyaneous; the head and prothorax almost smooth, the elytra finely, rather sparsely punctured. Head a little narrower than the prothorax; antennæ very long, flabellate. Prothorax strongly transverse, convex, rounded at the sides, deeply, transversely sulcate at the base. Elytra comparatively short, broader than the prothorax, widening to near the tip, strongly depressed along the suture below the base, the apical portion convex. Legs slender; anterior tarsal joint 2 extending over 3 above.

♀. Antennæ much shorter, slender, serrate, joints 5–10 acutely triangular; elytra more widened posteriorly.

Length $2\frac{1}{2}$ mm.

Hab. S. AFRICA, Durban [type] (*F. Muir*: 1902: ♂), mouth of the River Ifafa* (*Mus. Durban*: ♀).

One pair, possibly a form of *A. subcæruleus* with a testaceous, relatively shorter prothorax; but till a ♂ with a black prothorax is found it is better to keep the two insects as distinct, the ♂ found at Durban having the antennæ flabellate as in the same sex of *Ebaeus ramicornis*, Boh. The elytra are much more sparsely punctured than in the similarly-coloured *A. frerensis*. All these insects and other closely allied forms inhabit Natal.

15. *Attalus bevinsi*, sp. n.

♂. Moderately elongate, widened posteriorly, somewhat depressed, shining, thickly clothed with fine cinereous pubescence intermixed on the elytra with numerous erect blackish bristly hairs; brassy or bronze-black, sometimes with a cupreous tinge, the antennæ black, the mandibles at the base, tibiæ, and basal joint of anterior tarsi testaceous; the entire upper surface closely, minutely punctured, the puncturing on the elytra rugulose and a little stronger than on the prothorax and interrupted by intermixed scattered smooth raised points. Head rather long, much narrower than the prothorax, the eyes oval as seen from above; antennæ moderately elongate, rather stout, tapering towards the tip, joints 4–10 triangular. Prothorax nearly as long as broad, feebly rounded at the sides, not very convex. Elytra much broader than the prothorax, widening to near the tip, incompletely covering the abdomen. Tibiæ and tarsi very slender; anterior tarsal joint 2 extending over the base of 3 above.

♀. Antennæ shorter and more slender; elytra more widened posteriorly, leaving two abdominal segments exposed.

Length $2\frac{1}{2}$ –3 mm.

Hab. S. AFRICA, Table Mountain, Cape of Good Hope (*W. Bevins*, in *Mus. Brit.*).

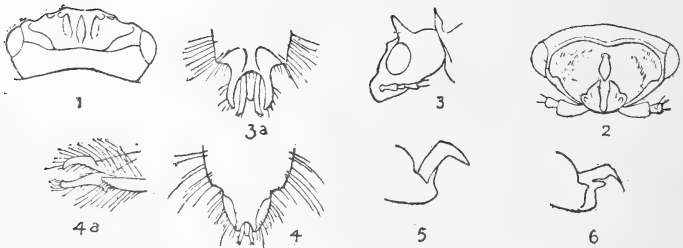
Two ♂♂, seven ♀♀, received by the Museum in 1906. A form of *A. ceresensis*, Champ., with the tibiæ testaceous, the prothorax unimpressed on each side of the disc (appearing more convex), and the antennæ of the ♂ less elongate, these organs in the same sex of the latter being nearly as long as in *A. oneili*, Pic. The present insect is not unlike the

* Wrongly quoted by me, *anteà*, as "Ifafa Mts."

Madeiran *Pecteropus rostratus*, Woll., except in the narrow prothorax, serrate antennæ, and much smaller size.

The following species are noticed or described in the preceding pages ; the names printed in italics are synonyms or do not belong to the genera under which they have been placed.

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|------------------------------------|---|
| Attalus bevinsi, sp. n. (15). | Hapalochrus mashunus, p. 34. |
| " ramifer, sp. n. (12 a). | " natalensis, p. 33. |
| Ebæus albopartitus, p. 39. | " nitens, p. 34. |
| " crassicauda, p. 39. | " ramulosus, p. 34. |
| " denticornis, sp. n. (10 a). | " trapeziderus, p. 34. |
| " fortis, sp. n. (37). | Hedybius atrocaveatus, sp. n. (9 a). |
| " lineatus, sp. n. (38). | " bicornutus, sp. n. (31 a). |
| " rossi, sp. n. (21 a). | " deliquescens, var., p. 35. |
| " rubricatus, p. 39. | " formosus, p. 35. |
| " sexdentatus, sp. n. (9 a). | " leucopterus, sp. n. (6 a). |
| " tetraspilotus, sp. n. (15 a). | " lividus, p. 35. |
| " zonarius, p. 40. | " luteus, p. 35. |
| Hapalochrus amplipennis, p. 34. | " megacephalus, p. 35. |
| " barkeri, p. 34. | " ruficornis, p. 35. |
| " cærulescens, p. 34. | " tridens, sp. n. (11 a). |
| " caffer, p. 34. | " tripustulatus, sp. n. (11 b). |
| " confusus, p. 34. | <i>Malachius cærulescens</i> , p. 34. |
| " crassipes, sp. n. (10 a). | " caffer, p. 34. |
| " cyaneoguttatus, p. 33. | Notomalachius dollmani, p. 33. |
| " dasytiformis, p. 33. | Philhedonus bifossulatus, sp. n. (5 a). |
| " dollmani, p. 33. | <i>Troglops luteus</i> , p. 35. |
| " janthinus, var., p. 34. | " megacephalus, p. 35. |
| " kenyensis, p. 34. | |



Explanation of Figures, all taken from ♂♂.

1. *Hedybius tridens*, sp. n., head from above. 2. *H. tripustulatus*, sp. n., head from in front. 3. *H. bicornutus*, sp. n., head in profile; 3 a, terminal dorsal segment &c. of abdomen. 4. *H. kabetensis*, Champ., terminal dorsal segment &c. of abdomen; 4 a, ditto, in profile. 5. *Ebæus denticornis*, sp. n., apex of one elytron in profile. 6. *E. sexdentatus*, sp. n., apex of one elytron in profile.

VI.—*A Revision of the Genera of the Family Liparidæ.*
By Colonel C. SWINHOE, M.A., F.L.S., F.Z.S., F.E.S.,
Member of the Entomological Society of France and of
the Bombay Natural History Society.

[Continued from vol. x. p. 484.]

241. *Nygmia cheela*.

Euproctis cheela, Swinhoe, *l. c.*

Type, ♂, Singapore, in B.M.

242. *Nygmia leucospila*.

Cozola leucospila, Walker, xxxii. p. 390 (1865).

Chærotricha leucospila, Felder, Reise Nov. pl. xxviii. fig. 16 (1868).

Types, ♂ ♀, Celebes, in Mus. Oxon.

243. *Nygmia chirunda*.

Euproctis chirunda, Swinh. Trans. Ent. Soc. 1903, p. 422.

Type, ♀, Sandakan, Borneo, in B.M.

244. *Nygmia perplexa*.

Euproctis perplexa, Swinh. *l. c.* (note).

Type, ♀, Singapore, in B.M.

245. *Nygmia variegata*.

Artaxa variegata, Hampson, Ill. Het. viii. p. 56, pl. cxl. fig. (1891).

Euproctis hampsoni, Swinh. *l. c.* p. 423 (note).

Type, ♂, Nilgiris, in B.M.

246. *Nygmia luteifascia*.

Artaxa luteifascia, Hampson, *l. c.* p. 57, pl. cxli. fig. 2.

Type, ♂, Nilgiris, in B.M.

247. *Nygmia atrisignata*.

Euproctis atrisignata, Swinh. *l. c.*

Type, ♂, Singapore, in B.M.

248. *Nygmia similis*.

Artaxa similis, Moore, Cat. Lep. E. I. Co. ii. p. 351 (1859).

Type, ♀, Java, in B.M. ; type, ♂, lost ; Singapore.

249. *Nygmia obscura*.

Artaxa obscura, Moore, *l. c.*

Type, ♀, Java, in B.M.; Singapore.

250. *Nygmia atomaria*.

Artaxa atomaria, Walker, iv. p. 796 (1855); Butler, Ill. Het. v. p. 53, pl. xc. fig. 2 (1881).

Euproctis atomaria, Strand, *l. c.* pl. xxi. *h.*

Type, ♀, N. India, in B.M.

251. *Nygmia charmetanti*.

Euproctis charmetanti, Vieill. Bull. Soc. Ent. France, 1890, p. 204; Mab. Bull. Soc. Ent. France, (6) x. p. cciv (1891); Strand, *l. c.* pl. xxi. *i.*

S. Algeria.

252. *Nygmia karghalica*.

Euproctis karghalica, Moore, Ann. & Mag. Nat. Hist. (5) i. p. 231 (1878); Moore, Second Yark. Miss., Lep. p. 7, pl. i. fig. 18 (1879); Strand, *l. c.* pl. xxi. *i.*

Types, ♂ ♀, Yarkand, in Mus. Calcutta; Jura, Samarkand, Turkestan.

253. *Nygmia apicalis*.

Arna apicalis, Walker, v. p. 1177 (1855).

Artaxa apicalis, Moore, Lep. Ceylon, ii. p. 85, pl. iii. figs. 4, 4 a, b (1883).

Euproctis apicalis, Swinhoe, Trans. Ent. Soc. 1903, p. 425 (note).

Type, Ceylon, in B.M.; Bombay.

254. *Nygmia lactea*.

Euproctis lactea, Moore, Ann. & Mag. Nat. Hist. (5) i. p. 211 (1878).

Type, Yarkand, in B.M.; E. Turkestan.

255. *Nygmia bimaculata*.

Euproctis bimaculata, Walker, iv. p. 836 (1855).

Euproctis bigutta, Walker, iv. p. 837; Moore, Lep. Ceylon, ii. p. 90, pl. cxii. fig. 6 a (1882).

Euproctis lutescens, Walker, *l. c.*; Butler, Ill. Het. v. p. 51, pl. lxxxix. fig. 10 (1881).

Euproctis biguttata, Moore, Trans. Linn. Soc. xxi. p. 55 (1884).

Type, Ceylon; type, *bigutta*, Kanara, S. India; type, *lutescens*, India: all in B.M. Poona, Nilgiris, Burma, Shanghai.

256. *Nygmia celsa*.

Euproctis celsa, Walker, xxxv. p. 1915 (1866).

Type, Philippines, in B.M.

257. *Nygmia inconspicua*.

Artaxa inconspicua, Leech, Trans. Ent. Soc. 1899, p. 133.

Euproctis inconspicua, Strand, *l. c.* pl. xxiii. *h.*

Type, ♀, Kia-tung-fu, in B.M.; Omeishan.

258. *Nygmia endoplaga*.

Euproctis endoplaga, Hampson, Journ. Bombay N. H. Soc. xi. p. 295 (1897); Strand, *l. c.* pl. xxiii. *b.*

Type, ♂, Khasia Hills, in B.M.; W. and C. China.

259. *Nygmia curvata*.

Euproctis curvata, Wileman, Trans. Ent. Soc. 1911, p. 271.

Types, ♂ ♀, Yoshina, Japan, in Coll. Wileman.

260. *Nygmia pauperata*.

Euproctis pauperata, Leech, *l. c.* p. 138.

Type, Moupin, in B.M.

261. *Nygmia seitzi*.

Euproctis seitzi, Strand, *l. c.* p. 139, pl. xxi. *g.*

Type, Hongkong, in Coll. Seitz.

262. *Nygmia scintillans*.

Somena scintillans, Walker, vii. p. 1734 (1856).

Artaxa scintillans, Butler, Ill. Het. v. p. 52, pl. xc. fig. 1 (1880).

Artaxa justicia, Moore, Cat. Lep. E. I. Co. ii. p. 352, pl. xvi. fig. 6, larva (1859).

Orvasca subnotata, Walker, xxvii. p. 502 (1865).

Euproctis moorei, Snellen, Tijds. v. Ent. xxii. p. 106, pl. viii. figs. 8-10 (1879).

Somena irrorata, Moore, Lep. Ceylon, ii. p. 87, pl. iii. fig. 2 (1882).

Euproctis scintillans, Strand, *l. c.* pl. xxi. *h.*

Types, *justiciæ* and *subnotata*, India; type, *irrorata*, Ceylon: all in B.M. Type, *moorei*, Celebes, in Coll. Snellen.

263. *Nygmia limbata*.

Artaxa limbata, Butler, Ill. Het. v. p. 53, pl. xc. fig. 5 (1881).

Type, Darjiling, in B.M.; Simla, Khasia Hills.

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264. *Nygmia paraneura*.

Artaxa paraneura, Meyrick, Proc. Linn. Soc. N.S.W. (2) i. p. 244 (1885).

Fly River.

265. *Nygmia aureoplaga*.

Euproctis aureoplaga, Kenrick, Trans. Ent. Soc. 1913, p. 598.

Type, ♀, Madagascar, in Coll. Kenrick.

266. *Nygmia miniata*.

Euproctis miniata, Kenrick, *l. c.*

Type, ♀, Madagascar, in Coll. Kenrick.

267. *Nygmia kenricki*, nom. nov.

Euproctis variegata, Kenrick, *l. c.* (præocc.).

Type, ♂, Madagascar, in Coll. Kenrick.

268. *Nygmia faceta*.

Euproctis faceta, Swinhoe, Trans. Ent. Soc. 1903, p. 427.

Type, ♂, Kapaur, N. Guinea, in B.M.

269. *Nygmia alba*.

Euproctis alba, Swinhoe, *l. c.* p. 438.

Types, ♂ ♀, Sambawa, in B.M.

270. *Nygmia lanaria*.

Terphothrix lanaria, Holland, Psyche, vi. p. 474 (1893).

Type, ♂, Ogove River, in Coll. Holland.

271. *Nygmia antiphates*.

Euproctis antiphates, Hmps. Moths of India, i. p. 478 (1892).

Type, ♂, Khasia Hills, in B.M.

272. *Nygmia phæa*.

Euproctis phæa, Hmps. Journ. Bombay N. H. Soc. xiii. p. 234 (1900).

Type, ♀, Khasia Hills, in B.M.

273. *Nygmia lyona*.

Euproctis lyona, Swinhoe, Ann. & Mag. Nat. Hist. (7) xiv. p. 131 (1904).

Type, ♂, Bipindi, Cameroons, in B.M.

274. *Nygmia sagroides*.

Somena sagroides, Hampson, Ill. Het. viii. p. 57, pl. cxi. fig. 14 (1891).

Type, ♂, Nilgiris, in B.M.

275. *Nygmia minutissima*.

Euproctis minutissima, Swinhoe, Trans. Ent. Soc. 1903, p. 425.

Type, ♂, Singapore, in B.M.

276. *Nygmia rubiginosa*.

Euproctis rubiginosa, Suellen, Tijd. v. Ent. xx. p. 10, pl. i. fig. 3 (1877).

Java.

277. *Nygmia kala*.

Artaxa kala, Moore, Cat. Lep. E. I. Co. ii. p. 351 (1859).

Type, ♀, Java, in B.M.

278. *Nygmia xanthopera*.

Euproctis xanthopera, Hampson, Journ. Bombay N. H. Soc. xi. p. 295 (1897).

Type, ♂, Khasia Hills, in B.M.

279. *Nygmia ormea*.

Euproctis ormea, Swinhoe, l. c. p. 426.

Type, ♀, S.E. Borneo, in B.M.

280. *Nygmia cerasina*.

Euproctis cerasina, Swinhoe, l. c.

Type, ♂, Sambawa, in B.M.

281. *Nygmia olivata*.

Euproctis olivata, Hampson, l. c.

Types, ♂ ♀, Khasia Hills, in B.M.

282. *Nygmia subrana*.

Artaxa subrana, Moore, l. c.

Type, ♀, Java, in B.M.; Singapore.

283. *Nygmia distracta*.

Artaxa distracta, Walker, xxxii. p. 333 (1865).

Type, ♂, Sarawak, in B.M.

284. *Nygmia subflava*.

Aroa flava, Brem. Bull. Acad. Sci. Pet. iii. p. 479 (1861) (præocc.).

Aroa subflava, Brem. Lep. Ost-Sib. p. 41, pl. iii. fig. 19 (1864).

Leucoma subflava, var. *piperita*, Oberth. Etud. Ent. v. p. 35 (1880).

Porthesia snelleni, Staud. Rev. sur Lep. iii. p. 207, pl. xii. fig. 3.

Euproctis intensa, Butler, Ann. & Mag. Nat. Hist. (4) xx. p. 402.

Euproctis punctigera, Strand, in Seitz, Macrolep. ii. p. 136 (1912).

Japan, China.

285. *Nygmia anna*.

Euproctis anna, Swinhoe, Ann. & Mag. Nat. Hist. (7) xii. p. 194 (1903).

Types, ♂ ♀, Kina Balu, in B.M.

286. *Nygmia orestes*.

Chærotricha orestes, Druce, P. Z. S. 1887, p. 674.

Type, Mongo-ma-Lobak, in Coll. Joicey; Aburi, Gold Coast.

287. *Nygmia barbará*.

Euproctis barbará, Swinhoe, *l. c.* p. 197.

Type, ♂, Kuching, Borneo, in B.M.

288. *Nygmia antica*.

Lacida antica, Walker, iv. p. 802, ♂ (1855).

Anaxila notata, Walk. iv. p. 919, ♀.

Types of both, Ceylon, in B.M.

289. *Nygmia osuna*.

Euproctis osuna, Swinhoe, Trans. Ent. Soc. 1903, p. 419.

Type, ♀, Kapaur, N. Guinea, in B.M.

290. *Nygmia armandvillei*.

Chærotricha armandvillei, Oberth. Etud. Ent. xix. p. 35, pl. v. fig. 31 (1894).

Type in Coll. Oberthür.

291. *Nygmia egregia*.

Euproctis egregia, Swinhoe, *l. c.*

Type, ♀, Batjan, in B.M.

292. *Nygmia limonea*.

Chærotricha limonea, Butler, Cist. Ent. iii. p. 11 (1882).

Type, ♂, Madagascar, in B.M.

293. *Nygmia costalis*.

Antipha costalis, Walker, iv. p. 806 (1855).

Utidava incomptaria, Walker, xxvi. p. 1689 (1862).

Lacida complens, Walker, xxxii. p. 336 (1865).

Rilia (?) *illepida*, Walker, xxxii. p. 436.

All types from Ceylon in B.M., except *complens*, which is in Layard's lost collection.

294. *Nygmia inepta*.

Artaxa inepta, Butler, Ann. & Mag. Nat. Hist. (5) xix. p. 223 (1887).

Types, ♂ ♀, Alu, in B.M.

295. *Nygmia pecla*.

Euproctis pecla, Swinhoe, Trans. Ent. Soc. 1903, p. 414.

Type, ♂, Milne Bay, N. Guinea, in B.M.

296. *Nygmia livia*.

Euproctis livia, Swinhoe, *l. c.*

Type, ♂, Milne Bay, N. Guinea, in B.M.

297. *Nygmia gentia*.

Euproctis gentia, Swinhoe, Ann. & Mag. Nat. Hist. (7) xii. p. 195 (1903).

Type, ♀, Kina Balu, in B.M.

298. *Nygmia sexmacula*.

Euproctis sexmacula, Swinhoe, *l. c.*

Type, ♀, Kina Balu, in B.M.

299. *Nygmia utilis*.

Euproctis utilis, Swinhoe, Trans. Ent. Soc. 1903, p. 415.

Types, ♂ ♀, Old Calabar, in B.M.

300. *Nygmia melaleuca*.

Artaxa melaleuca, Holland, Psyche, vi. p. 474 (1893).

Type, Ogove River, in Coll. Holland.

301. *Nygmia lacipa*, nom. nov.

Bembina apicalis, Walker, xxxii. p. 505 (1865) (præocc.).

Type, ♀, Ceylon, in B.M.

302. *Nygmia fervida*.

Artaxa fervida, Walker, P. Z. S. 1863, p. 168; Saalm. Lep. Madag. p. 185, pl. vii. figs. 115, 116 (1884).

Type, ♂, Madagascar, in B.M.

303. *Nygmia terminalis*.

Aroa terminalis, Walker, iv. p. 794 (1855).

Types, ♂ ♀, Natal, in B.M.

304. *Nygmia patavia*.

Bombyx patavia, Stoll, Pap. Exot. iv. fig. 347, F (1782).

Lopera patavia, Kirby, Cat. Moths, i. p. 463 (1892).

Cape.

305. *Nygmia squamosa*.

Lopera squamosa, Walker, iv. p. 920.

Types, ♂ ♀, Natal, in B.M.

306. *Nygmia punctifera*.

Aroa punctifera, Walker, iv. p. 792.

Lopera gaudens, Walker, xxxii. p. 357 (1865).

Types, ♂, Caffraria, ♀ *gaudens*, Natal, both in B.M.; Durban.

307. *Nygmia crocata*.

Liparis crocata, Boisd. Delagorgue, Voy. Afr. Austr. ii. p. 599 (1847).

Lopera crocata, Kirby, l. c.

Hypogramma cateja, Wallengren, Wien. ent. Mon. iv. p. 163 (1860).

Porthesia cateja, Wallengren, Vet.-Akad. Handl. (2) v. (4) p. 37 (1865).

S. Africa.

308. *Nygmia pallida*.

Cropera pallida, Kirby, Ann. & Mag. Nat. Hist. (6) xviii. p. 384, pl. x. fig. 6 (1896).

Mashonaland.

309. *Nygmia monosticta*.

Lopera monosticta, Butler, P. Z. S. 1898, p. 428, pl. xxxii. fig. 7.

Type, ♂, Jaru, E. Africa, in B.M.; Machako.

310. *Nygmia josiata*.

Orgyia josiata, Walker, xxxii. p. 326 (1865).

Charotricha nobilis, Felder, Reise Nov. pl. xcvi. fig. 17 (1868).

Type, Celebes, in B.M.; type, *nobilis*, Celebes, in Coll. Rothschild.

311. *Nygmia fleuriotti*.

Bombyx fleuriotti, Guérin, Rev. Zool. 1862, p. 314, pl. xiv. figs. 2, 2 a.

Artaxa (?) *fleuriotti*, Kirby, l. c. p. 454.

Madagascar.

312. *Nygmia semifusca*.

Orgyia semifusca, Walker, Char. Undescr. Lep. Het. p. 65 (1869).

Somena semifusca, Kirby, l. c. p. 455.

Australia.

313. *Nygmia enunciativa*.

Artaxa enunciativa, Swinhoe, Cat. Het. Mus. Oxon. i. p. 190 (1892).

Type, ♂, Philippines, in Mus. Oxon.

314. *Nygmia inturbida*.

Leucoma inturbida, Walker, xxxii. p. 345 (1865).

Artaxa megaxantha, Walker, xxxv. p. 1913 (1866).

Type, ♀ (nec ♂), Celebes; type, ♀ (nec ♂), *megaxantha*, Batjan: both in Mus. Oxon.

315. *Nygmia fuscipennis*.

Euproctis fuscipennis, Walker, Journ. Linn. Soc. vi. p. 128 (1862).

Type, Sarawak, in Mus. Oxon.

316. *Nygmia helladia*.

Bombyx helladia, Stoll, Pap. Exot. iv. pl. cccxcviii. H (1782).

Artaxa helladia, Kirby, l. c. p. 451.

Japan.

317. *Nygmia aethiopica*.

Euproctis aethiopica, Snellen, Tidschr. Ent. xv. p. 37, pl. iii. figs. 4, 5 (1872).

Lower Guinea.

318. *Nygmia faventia*.

Euproctis faventia, Druce, Ann. & Mag. Nat. Hist. (7) iii. p. 470 (1899).

Type, ♂, Fergusson Isl., in Coll. Joicey.

319. *Nygmia dersa*.

Euproctis dersa, Moore, Cat. Lep. E. I. Co. ii. p. 367 (1859).

Types, ♂ ♀, Java, in B.M.

320. *Nygmia ochrea*.

Gogana ochrea, Butler, Ann. & Mag. Nat. Hist. (5) ii. p. 459 (1878).

Nygmia ochrea, Kirby, l. c. p. 449.

Types, ♂ ♀, Madagascar, in B.M.

321. *Nygmia fulva*.

Artaxa fulva, Butler, Ann. & Mag. Nat. Hist. (5) x. p. 227 (1882).

Type, ♂, Duke of York Isl.; Port Darwin, Queensland, N. Britain.

322. *Nygmia pygmæa*.

Aroa pygmæa, Walker, iv. p. 793 (1855).

Type, ♂, Sierra Leone, in B.M.; Accra, Congo, Gold Coast, Old Calabar.

323. *Nygmæa chrysophæa*.

Orgyia chrysophæa, Walker, xxxii. p. 324 (1865).

Notolophus chrysophæa, Kirby, l. c. p. 493.

Euproctis chrysophæa, Swinhoe, Trans. Ent. Soc. 1903, p. 487 (note).

Type, ♂, Abyssinia, in B.M.

324. *Nygmia maza*.

Euproctis maza, Swinhoe, l. c. p. 407 (note).

Type, ♂, Kapaur, N. Guinea, in B.M.

325. *Nygmia drucei*.

Euproctis drucei, Swinhoe, l. c. p. 488.

Euproctis titania, Druce, Ann. & Mag. Nat. Hist. (7) iii. p. 469 (1899) (præocc.).

Type, ♂, Trobriand Isl., in Coll. Joicey; Kiriwini.

326. *Nygmia acrita*.

Euproctis acrita, Joicey & Talbot, Ann. & Mag. Nat. Hist. (8) xx. p. 55, pl. i. fig. 10 (1917).

Type, ♂, Dutch N. Guinea, in Coll. Joicey.

327. *Nygmia nessa*.

Euproctis nessa, Swinhoe, Ann. & Mag. Nat. Hist. (7) xvii. p. 542 (1906).

Type, ♂, Uganda, in B.M.

328. *Nygmia ridleyi*.

Euproctis ridleyi, Swinhoe, *l. c.*

Types, ♂ ♀, Singapore, in B.M.

329. *Nygmia humida*.

Euproctis humida, Swinhoe, *l. c.* p. 548.

Type, ♂, Singapore, in B.M.

330. *Nygmia chlora*.

Euproctis chlora, Joicey & Talbot, *l. c.* p. 56.

Type, ♂, Dutch N. Guinea.

331. *Nygmia annulipes*.

Bombyx annulipes, Boisd. Faun. Madag. p. 87, pl. xii. fig. 3 (1833).

Nygmia annulipes, Kirby, *l. c.* p. 449.

Bourbon.

332. *Nygmia monophyes*.

Euproctis monophyes, Swinhoe, *l. c.* p. 541.

Type, ♂, Bihé, W. Africa, in B.M.

333. *Nygmia cincta*.

Euproctis cincta, Swinhoe, *l. c.*

Types, ♂ ♀, Kina Balu, in B.M.

334. *Nygmia icelomorpha*.

Euproctis icelomorpha, Swinhoe, *l. c.*

Type, ♀, Padang, Sumatra, in B.M.

335. *Nygmia hemibathes*.

Euproctis hemibathes, Swinhoe, *l. c.* p. 542.

Type, ♂, Padang, Sumatra, in B.M.

336. *Nygmia gemmata*.

Lacipa gemmata, Distant, Ann. & Mag. Nat. Hist. (6) xx. p. 200 (1897).

Types, ♂ ♀, Transvaal, in Coll. Distant; Natal.

337. *Nygmia ostra*.

Euproctis ostra, Swinhoe, Trans. Ent. Soc. 1903, p. 402.

Type, ♀, Machakos, in B.M.; Kibanui, Brit. E. Africa.

338. *Nygmia quadripunctata*.

Lacipa quadripunctata, Dew. L. C. Akad. xlii. p. 67, pl. iii. fig. 4 (1881).

Lopera quadripunctata, Kirby, Cat. Moths, i. p. 463 (1892).

Lacipa sexpunctata, Distant, Ann. & Mag. Nat. Hist. (6) xx. p. 201 (1897).

South Africa.

339. *Nygmia florida*.

Euproctis florida, Swinhoe, l. c. p. 403.

Type, ♂, Nairobi Plains, Kikuyu, E. Africa, in B.M.

340. *Nygmia sundara*.

Euproctis sundara, Swinhoe, l. c.

Type, ♂, Katesa, Uganda, Brit. E. Africa, in B.M.

341. *Nygmia gracilis*.

Lacipa gracilis, Hopff., Peters' Reise, Zool. v. p. 430, pl. xxviii. figs. 4, 5 (1862).

Lopera gracilis, Kirby, Cat. Moths, i. p. 463 (1892).

Brit. E. Africa, Lake Nyassa, Mozambique.

342. *Nygmia pubescens*.

Euproctis pubescens, Swinhoe, l. c. p. 404.

Lacipa pulvereae, Distant, Ann. & Mag. Nat. Hist. (7) i. p. 117 (1898) (præocc.).

Type, Natal, in Coll. Distant; Zululand.

343. *Nygmia picta*.

Liparis picta, Boisd., Delagorgue, Voy. Afr. Austr. ii. p. 599 (1847).

Knysna, Cape, Natal.

344. *Nygmia distanti*.

Lacipa distanti, Den. Verh. L. C. Akad. xlii. p. 68, pl. iii. fig. 7 (1881).

Lomera distanti, Kirby, l. c. p. 463.

Cape.

345. *Nygmia submarginalis*.

Cozola submarginalis, Walker, xxxii. p. 391 (1865).

Type, ♀ (nec ♂), Makian, Celebes, in Mus. Oxon.

346. *Nygmia melanura*.

Hypogymna melanura, Wallgrn. Wien. ent. Mon. iv. p. 163 (1860).

Porthesia melanura, Wallgrn. Vet.-Akad. Handl. (2) v. (4) p. 37 (1865).

Euproctis (?) *melanura*, Kirby, l. c. p. 444.

Caffraria.

347. *Nygmia batoides*.

Euproctis batoides, Plötz, Stett. ent. Zeit. xii. p. 85 (1880); Kirby, *l. c.*
Bonjongo.

348. *Nygmia fulvipuncta*.

Euproctis fulvipuncta, Hmps. Moths India, i. p. 474 (1892).
Lopera fulvipuncta, Hmps. Ill. Het. ix. p. 76, pl. clix. figs. 2 *b*, pl. clxxv.
fig. 14, larva (1893).

Types, ♂ ♀, Ceylon, in B.M.

349. *Nygmia bifascia*.

Euproctis bifascia, Hmps. *l. c.* viii. p. 58, pl. cxli. fig. 18 (1891).

Type, ♀, Nilgiris, in B.M.; Travancore.

350. *Nygmia unipuncta*.

Euproctis unipuncta, Butler, P. Z. S. 1898, p. 427, pl. xxxiii. fig. 6.

Types, ♂ ♀, Brit. E. Africa, in B.M.

351. *Nygmia bizonoides*.

Lacipa bizonoides, Butler, P. Z. S. 1893, p. 677.

Type, ♀, Zomba, in B.M.

352. *Nygmia nobilis*.

Panthea (?) *nobilis*, Herr.-Schäff. Aussereur. Schmett. fig. 388 (1855).
Lopera nobilis, Kirby, *l. c.* p. 463.

Cape Colony, Knysna.

353. *Nygmia nigribasalis*.

Euproctis nigribasalis, Swinhoe, Trans. Ent. Soc. 1903, p. 397.

Type, ♀, Kina Balu, in B.M.

354. *Nygmia signata*.

Liparis signata, Blanch., Jacque. Voy. Inde, iv., Ins. p. 24, pl. i. fig. 7
(1844).

Muree, Punjab Hills, Stado.

355. *Nygmia tenuis*.

Euproctis tenuis, Swinhoe, *l. c.* p. 398.

Types, ♂ ♀, Sambawa, in B.M.

356. *Nygmia titania*.*Euproctis titania*, Butler, Ann. & Mag. Nat. Hist. (5) iv. p. 237 (1879).

Types, ♂ ♀, Madagascar, in B.M.

357. *Nygmia consocia*.*Euproctis consocia*, Walker, xxxii. 347 (1865).*Artaxa modesta*, Schaus & Clem, Sierra Leone Lep. p. 26 (1893).

Types, ♂ ♀, Sierra Leone, in B.M.; Machako, Pietermaritsburg.

358. *Nygmia zeboe*.*Artaxa zeboe*, Moore, Cat. Lep. E. I. Co. ii. p. 350, pl. ix. a, fig. 7 (1859).

Type, ♂, Java, in B.M.

359. *Nygmia anguligera*.*Artaxa anguligera*, Butler, P. Z. S. 1886, p. 385.

Type, ♂, Murree, in B.M.; Khasia Hills, Andamans.

360. *Nygmia recraba*.*Euproctis recraba*, Swinhoe, Ann. & Mag. Nat. Hist. (7) xii. p. 196 (1903).

Types, ♂ ♀, Malang, Java, in B.M.

361. *Nygmia dana*.*Euproctis dana*, Swinhoe, Trans. Ent. Soc. 1903, p. 408.

Type, ♀, Dana, Kashmir, in B.M.

362. *Nygmia albonotata*.*Euproctis albonotata*, Joicey, Noakes, & Talbot.

Type, Dutch N. Guinea, in Coll. Joicey.

363. *Nygmia neola*.*Euproctis neola*, Swinhoe, Ann. & Mag. Nat. Hist. (7) xx. p. 784 (1907).

Type, ♀, Padang, Sumatra, in B.M.

364. *Nygmia atrigutta*.*Euproctis atrigutta*, Walker, Trans. Ent. Soc. 1862, p. 77.

Type, W. Africa, in B.M.

365. *Nygmia mambara*.*Euproctis mambara*, Beth.-Baker, Nov. Zool. xv. p. 188 (1908).

Type, Brit. N. Guinea, in Coll. Bethune-Baker.

366. *Nygmia semirufa*.

Euproctis semirufa, Joicey & Talbot, Ann. & Mag. Nat. Hist. (8) xx.
p. 5, pl. i. fig. 9 (1917).

Type, ♂, Dutch N. Guinea, in Coll. Joicey.

367. *Nygmia indistincta*.

Euproctis indistincta, Roths., Journ. of the F.M.S. Mus. p. 131 (1920).

W. Sumatra.

368. *Nygmia postgrisea*.

Euproctis postgrisea, Roths. *l. c.*

W. Sumatra.

369. *Nygmia xanthura*.

Euproctis xanthura, Swinhoe, Ann. & Mag. Nat. Hist. (7) xx. p. 784
(1907).

Type, ♂, Padang, Sumatra, in B.M.

370. *Nygmia negrita*.

Euproctis negrita, Hmps. Moths of India, i. p. 171 (1892).

Types, ♂ ♀, Sikkim, in Coll. Rothschild.

371. *Nygmia canescens*.

Euproctis canescens, Roths. *l. c.*

W. Sumatra.

372. *Nygmia costiplaga*.

Lælia costiplaga, Walker, Journ. Linn. Soc. vi. p. 126 (1862).

Type, Sarawak, in Mus. Oxon.

373. *Nygmia strigifimbria*.

Lælia strigifimbria, Walker, Journ. Linn. Soc. vi. p. 126 (1862).

Artaxa fracta, Walker, xxxii. p. 333 (1865).

Both types, Borneo, in B.M. ; Pulo Laut, Sarawak.

374. *Nygmia strigulifera*.

Lælia strigulifera, Walker, xxxii. p. 336.

Antipha strigulifera, Kirby, *l. c.* p. 457.

Type, Ceylon, in B.M.

375. *Nygmia promittens*.

Lælia promittens, Walker, xxxii. p. 337.

Antipha promittens, Kirby, *l. c.*

Type, Ceylon, in B.M.

376. *Nygmia revera*.

Euproctis revera, Swinhoe, Ann. & Mag. Nat. Hist. (7) xiv. p. 721 (1904).

Types, ♂ ♀, Granville, N. Guinea, in B.M.

377. *Nygmia repanda*.

Artaxa repanda, Walker, xxxii. p. 351.

Type, ♂, Makian, Celebes, in Mus. Oxon.

378. *Nygmia torasana*.

Artaxa torasana, Holland, Trans. Amer. Ent. Soc. xvi. p. 73 (1889).

Euproctis torasana, Leech, Trans. Ent. Soc. 1899, p. 140 (note).

379. *Nygmia fumosa*.

Porthesia fumosa, Snellen, Tijds. v. Ent. xx. p. 69, pl. v. figs. 3, 4 (1877).

Euproctis fumosa, Kirby, l. c. p. 449.

Type, Sumatra, in Coll. Snellen.

380. *Nygmia subpunctata*.

Lacipa subpunctata, Beth.-Baker, Ann. & Mag. Nat. Hist. (8) vii. p. 344 (1911).

Type, ♂, N'Dalla Tondo, in Coll. Bethune-Baker.

381. *Nygmia munda*.

Euproctis munda, Walker, Journ. Linn. Soc. vi. p. 129 (1862).

Type, Sarawak, in B.M.; Sumatra, Malay Peninsula.

382. *Nygmia basalis*.

Artaxa basalis, Moore, Lep. Atk. p. 51, pl. ii. fig. 16 (1879).

Type, Darjiling, in Coll. Staudinger; Khasia Hills.

383. *Nygmia coccinata*.

Euproctis coccinata, Swinhoe, Ann. & Mag. Nat. Hist. (8) xviii. p. 216 (1916).

Type, Hainan, China, in Coll. Swinhoe.

384. *Nygmia motala*.

Euproctis motala, Swinhoe, l. c. p. 217.

Euproctis divisa, Walker, Journ. Linn. Soc. vi. p. 129 (1862) (præocc.).

Abdullia divisa, Swinhoe, Cat. Het. Mus. Oxon. ii. p. 186, pl. vi. fig. 14 (1892).

Type, Sarawak, in B.M.

385. *Nygmia laniata*.

Euproctis laniata, Hmps. Journ. Bombay Nat. Hist. Soc. 1904, p. 200, pl. D, figs. 10, 11.

Type, Pulni Hills, Madras, in B.M.

386. *Nygmia nigripennis*.

Euproctis nigripennis, Hmps. Moths of India, i. p. 681 (1892).

Type, Sikkim, in Coll. Rothschild; Jaintia Hills, Khasia Hills.

387. *Nygmia atripuncta*.

Euproctis atripuncta, Hmps. Journ. Bombay Nat. Hist. Soc. xi. p. 295 (1897).

Types, ♂ ♀, Khasia Hills, in B.M.

388. *Nygmia pallipes*.

Euproctis pallipes, Snellen, Tijds. v. Ent. xxii. p. 108, pl. ix. fig. 3 (1879).

Types, ♂ ♀, Celebes, in Coll. Snellen.

389. *Nygmia transversa*.

Artaxa transversa, Moore, Cat. Lep. E. I. Co. ii. p. 352, pl. ix. a, fig. 8 (1859).

Euproctis guttistriga, Walker, Journ. Linn. Soc. vi. p. 129 (1862).

Type, Java, in B.M.; type *guttistriga*, Sarawak, in Mus. Oxon.; Sumatra, Singapore, Malay Peninsula.

390. *Nygmia virgo*.

Euproctis virgo, Swinhoe, Trans. Ent. Soc. 1903, p. 398.

Type, ♂, Mandalay, in B.M.; Katha, Thyetmyo, Rangoon.

391. *Nygmia flava*.

Bombyx flava, Fabr. Syst. Ent. p. 574 (1775).

Artaxa guttata, Walker, iv. p. 795 (1855).

Type, *guttata*, N. India, in B.M.

392. *Nygmia fraterna*.

Artaxa fraterna, Moore, Lep. Ceylon, ii. p. 85 (1883).

Types, ♂ ♀, Ceylon, in B.M.; Bombay.

393. *Nygmia venosa*.

Artaxa venosa, Moore, Lep. Atk. p. 50, pl. ii. fig. 5 (1879).

Type, Sikkim, in Coll. Staudinger; Tenasserim.

394. *Nygmia lodra*.

Euproctis lodra, Moore, Cat. Lep. E. I. Co. ii. p. 343, pl. ix. a, fig. 6 (1859).

Type, ♀, Java, in B.M.; Sumatra.

395. *Nygmia dispersa*.

Artaxa dispersa, Moore, Lep. Atk. p. 50, pl. ii. fig. 6 (1879).

Euproctis bidentata, Hmps. Journ. Bombay Nat. Hist. Soc. xi. p. 296 (1897).

Both types, Sikkim, in B.M.

396. *Nygmia xanthosticta*.

Euproctis xanthosticta, Hmps. l. c. xvi. (2) p. 200, pl. D, figs. 12, 13 (1905).

Types, ♂ ♀, Karwar, in B.M.

397. *Nygmia semivitta*.

Artaxa semivitta, Moore, l. c. p. 43, pl. ii. fig. 25.

Type, Khasia Hills, in B.M.

398. *Nygmia trifasciata*.

Artaxa trifasciata, Moore, l. c. p. 51.

Type, Assam, in B.M.; Khasia Hills, Sikkim, Kangra, Umballa, Cachar.

399. *Nygmia subfuscula*.

Artaxa subfuscula, Hmps. Ill. Het. viii. p. 56, pl. cxl. figs. 5-11 (1891).

Type, Nilgiris, in B.M.

400. *Nygmia immaculata*.

Chærotricha immaculata, Butler, Ill. Het. v. p. 52, pl. lxxxix. fig. 14 (1880).

Type, Darjiling, in B.M.; Khasia Hills.

401. *Nygmia pelona*.

Artaxa pelona, Swinhoe, Trans. Ent. Soc. 1891, p. 138.

Type, Khasia Hills, in B.M.

402. *Nygmia subfasciata*.

Artaxa subfasciata, Walker, xxxii. p. 332 (1865).

Type, Darjiling, in Coll. Staudinger; Sikkim, Cachar, Nilgiris.

403. *Nygmia macrostigma*.

Euproctis macrostigma, Hampson, Journ. Bombay Nat. Hist. Soc. 1904,
pl. D. figs. 12, 13.

Type, Karwar, in B.M.

404. *Nygmia ruptata*.

Nygmia ruptata, Walker, Journ. Linn. Soc. vi. p. 126 (1862).

Type, Sarawak, in Mus. Oxon.

405. *Nygmia signiplaga*.

Artaxa signiplaga, Walker, l. c. p. 125.

Type, Sarawak, in Mus. Oxon.

406. *Nygmia postincisa*.

Euproctis (?) *postincisa*, Moore, P. Z. S. 1879, p. 400, pl. xxxii. fig. 5.

Type, ♀, N.E. Bengal, in B.M.

407. *Nygmia divisa*.

Euproctis divisa, Walker, iv. 836 (1855).

Euproctis melanophila, Walker, xxxii. p. 349 (1865).

Euproctis metamelana, Walker, l. c.

Type, ♀, Nepal, in B.M.; types of *metanophita* and
metamelana, in Coll. Atkinson.

408. *Nygmia convergens*.

Euproctis convergens, Beth.-Baker, Ann. & Mag. Nat. Hist. (8) vii.
p. 542 (1911).

Type, ♂, Gunnal, W. Africa, in Coll. Bethune-Baker.

409. *Nygmia ctiscitronea*.

Euproctis ctiscitronea, Beth.-Baker, l. c.

Type, ♂, N'Dalla Tondo, in Coll. Bethune-Baker.

410. *Nygmia n'dalla*.

Euproctis n'dalla, Beth.-Baker, l. c.

Type, ♂, N'Dalla Tondo, in Coll. Bethune-Baker.

411. *Nygmia isis*.

Euproctis isis, Beth.-Baker, l. c.

Type, ♀, N'Dalla Tondo, in Coll. Bethune-Baker.

412. *Nygmia nigrolunulata*.

Euproctis nigrolunulata, Beth.-Baker, l. c. p. 543.

Type, ♂, Gunnal, in Coll. Bethune-Baker.

413. *Nygmia xanthocephs*.

Euproctis xanthocephs, Hmps. Journ. Bombay Nat. Hist. Soc. xx. (1)
p. 113, pl. F. fig. 31 (1910).

Type, ♂, Ceylon, in B.M.

414. *Nygmia calva*.

Euproctis calva, Swinhoe, Trans. Ent. Soc. 1903, p. 406.

Types, ♂ ♀, Sambawa, in B.M.; Bali Lombok.

415. *Nygmia tinctifera*.

Euproctis tinctifera, Walker, xxxii. p. 349 (1865); Moore, Lep. Ceylon,
ii. p. 90 (1881).

Type, Ceylon, in Layard's lost collection.

416. *Nygmia diplaga*.

Euproctis diplaga, Hmps. Ann. & Mag. Nat. Hist. xx. p. 113, ♂;
Wileman, Entom. 1914, p. 322, ♀.

Type, ♂, Khasia Hills, in B.M.; Formosa.

417. *Nygmia flavicosta*.

Euproctis flavicosta, Hmps. l. c. xiii. p. 420, pl. B. fig. 3, and pl. ii.
fig. 18 (1900).

Type, ♂, Sikkim, in B.M.

418. *Nygmia semisignata*.

Cispa semisignata, Walker, xxxii. p. 356 (1865).

Artaxa citrina, Moore, Ann. & Mag. Nat. Hist. (4) xx. p. 344 (1877).

Artaxa leithiana, Moore, P. Z. S. 1879, p. 399, pl. xxxii. fig. 9.

Artaxa erecta, Moore, l. c. fig. 6.

Artaxa brevivitta, Moore, l. c. p. 400, pl. xxxii. fig. 10.

All the types from various parts of India and Ceylon,
in B.M.

419. *Nygmia howra*.

Artaxa howra, Moore, Lep. Atk. ii. p. 51 (1879).

Artaxa rhoda, Swinhoe, Trans. Ent. Soc. 1891, p. 138.

Artaxa obsoleta, Hmps. Ill. Het. viii. p. 57, pl. cxl. fig. 12 (1891).

Type, Calcutta; type, *rhoda*, N. Kanara; type, *obsoleta*,
Nilgiris: all in B.M. Burma, Andamans.

420. *Nygmia fulvinigra*.

Euproctis fulvinigra, Hampson, Journ. Bombay Nat. Hist. Soc. xxi.
p. 1245, pl. vi. fig. 15 (1911).

Type, Sikkim, in B.M.

421. *Nygmia butleri*.

Euproctis butleri, Swinhoe, Ann. & Mag. Nat. Hist. (6) xix. p. 203 (1907).

Aloa immaculata, Butler, Ann. & Mag. Nat. Hist. (5) x. p. 227 (1882) (præocc.).

Type, Duke of York Isl., in B.M.; N. Guinea, Sarawak.

422. *Nygmia inconcisa*.

Artaxa inconcisa, Walker, xxxii. p. 332 (1865).

Type, Darjiling, in Coll. Staudinger; Sultanpore, Khasia Hills, Sikkim.

423. *Nygmia intensa*.

Artaxa intensa, Butler, Ann. & Mag. Nat. Hist. (4) xx. p. 402 (1877);
Butler, Ill. Het. ii. p. 10, pl. xxiii. fig. 12 (1878).

Type, Japan, in B.M.; Corea, Central China.

424. *Nygmia singapura*.

Artaxa singapura, Swinhoe, Cat. Het. Mus. Oxon. ii. p. 189, pl. vi. fig. 19 (1892).

Type, Singapore, in Mus. Oxon.

425. *Nygmia ochreata*.

Euproctis ochreata, Walker, xxxii. p. 350 (1865).

Adhullia ochreata, Swinhoe, Cat. Het. Mus. Oxon. i. p. 186 (1892).

Type, Ceram, in Mus. Oxon.

426. *Nygmia atosquama*.

Gogana atosquama, Walker, xxxv. p. 1921 (1866).

Euproctis atosquama, Semper, Het. Philipp. p. 464, pl. N. figs. 11-13 (1898).

Chærotricha glandulosa, Felder, Reise Nov. pl. xxviii. fig. 14 (1868).

Type, ♀, Philippines, in B.M.

427. *Nygmia servilis*.

Euproctis servilis, Walker, xxxii. p. 350 (1865).

Darala prima, Walker, xxxv. p. 1917 (1866).

Euproctis incomta, Snellen, Tijd. v. Ent. xx. p. 9, pl. i. fig. 2 (1879).

Euproctis flavipennis, Snellen, l. c. xxii. p. 107, pl. 9. fig. 1, ♀ (1879).

Euproctis cinerea, Heylerts, Ann. Soc. Ent. Belg. xxxvi. p. 10 (1892).

Euproctis nurma, Druce, Ann. & Mag. Nat. Hist. (7) iii. p. 469 (1899).

Types, *servilis* and *prima*, Celebes, in Mus. Oxon.; Snellen's and Heylert's types, Java; type, *nurma*, Timor, in coll. Joicey. I have it also from Kina Balu, the colour of fore

wings varies from dark brown to pale yellowish fawn-colour, the extreme forms from the same locality; type, *flavipennis*, Celebes.

428. *Nygmia albescens*.

Euproctis albescens, Swinhoe, Trans. Ent. Soc. 1903, p. 399.

Euproctis immaculata, Moore, Trans. Ent. Soc. 1884, p. 358 (præocc.).

Type, ♀, Sikkim; Bhutan, Khasia Hills.

429. *Nygmia sabulosa*.

Euproctis abulosa, Heylerts, Ann. Soc. Ent. Belg. xxxvi. p. 8 (1892).

Java.

430. *Nygmia illauta*.

Euproctis illauta, Swinhoe, Trans. Ent. Soc. 1891, p. 138.

Types, ♂ ♀, Bombay, Poona, in B.M.; Nilgiris.

431. *Nygmia abjecta*.

Somena abjecta, Swinhoe, P. Z. S. 1879, p. 405, pl. xliii. fig. 13.

Types, ♂ ♀, Karachi, in B.M.

432. *Nygmia crocea*.

Teara crocea, Walker, xxxii. p. 355 (1865).

Euproctis holoxutha, Turner, Trans. Roy. Soc. S. Austr. xxvi. p. 178 (1902).

Type, ♀, Moreton Bay, in B.M.; Adelaide River, Innisfall, Townsville, Rockhampton, Brisbane, Mt. Tambourine, N. Guinea.

433. *Nygmia hymnolis*.

Euproctis hymnolis, Turner, Proc. Linn. Soc. N.S.W. xlv. (4) p. 485 (1920).

Type, Kuranda, near Cairns, in Coll. Lyell.

434. *Nygmia epaxia*.

Euproctis epaxia, Turner, Trans. Roy. Soc. S. Austr. 1906, p. 125.

Melville Isl., Cairns, Herberton.

435. *Nygmia epidela*.

Euproctis epidela, Turner, *l. c.*

Port Darwin, Cairns.

436. *Nygmia lucifuga*.

Artaxa lucifuga, Lucas, Proc. Linn. Soc. N.S.W. 1892, p. 250.

Euproctis chrysophaea, Turner, Proc. Linn. Soc. N.S.W. 1902, p. 178
(nec Walker).

Townsville, Eidsvold, Gayndah, Coloundra, Brisbane.

437. *Nygmia pyraustis*.

Euproctis pyraustis, Meyrick, Trans. Roy. Soc. S. Austr. xv. p. 194
(1891).

Euproctis scotochyta, Turner, Trans. Roy. Soc. S. Austr. xxvi. p. 178
(1902).

Adelaide River, Cairns, Townsville.

438. *Nygmia aganopa*.

Euproctis aganopa, Turner, Proc. Linn. Soc. N.S.W. xlv. (4) p. 484
(1920).

Herberton.

439. *Nygmia idonea*.

Euproctis idonea, Swinhoe, Trans. Ent. Soc. 1903, p. 401.

Type, Sherlock River, W. Australia, in B.M.

440. *Nygmia stenomorpha*.

Euproctis stenomorpha, Turner, *l. c.*

Port Darwin.

441. *Nygmia baliolalis*.

Urocoma baliolalis, Swinhoe, Cat. Het. Mus. Oxon. i. p. 215, pl. 6.
fig. 7 (1892).

Type, ♂, Australia, in Mus. Oxon. ; Moreton Bay, Cairns,
Sydney.

442. *Nygmia marginalis*.

Trichetra marginalis, Walker, iv. p. 845 (1855).

Urocoma marginalis, Swinhoe, Trans. Ent. Soc. 1903, p. 479.

Euproctis marginalis, Turner, Proc. Linn. Soc. N.S.W. xlv. (4) p. 487
(1920).

Type, Tasmania, in B.M. ; Victoria, Gisborne, Port
Lincoln, Gippsland.

443. *Nygmia limbalis*.

Urocoma limbalis, Herr.-Schäff. Aussereur. Schmett. i. fig. 389 (1855).

Sydney, Melbourne.

444. *Nygmia niphobola*.

Euproctis niphobola, Turner, Trans. Roy. Soc. S. Austr. xxvi. p. 179 (1902).

Townsville, N. Queensland, Brisbane.

445. *Nygmia actor*.

Euproctis actor, Turner, Proc. Linn. Soc. N.S.W. xlv. (4) p. 486 (1920).

Cairns, Lismore, N.S.W.

446. *Nygmia habrostola*.

Euproctis habrostola, Turner, Trans. Roy. Soc. S. Austr. xxvi. p. 179 (1902).

Euproctis pura, Swinhoe, Trans. Ent. Soc. 1903, p. 405.

Townsville, N. Queensland, Rockhampton; type, *pura*, ♂ ♀, Townsville, in B.M.

447. *Nygmia arrogans*.

Artaxa arrogans, Lucas, Proc. Roy. Soc. Queensland, 1899, p. 140.

Artaxa meeki, Druce, Ann. & Mag. Nat. Hist. (7) xii. p. 222 (1903).

Euproctis arclada, Swinhoe, Trans. Ent. Soc. 1903, p. 409.

Cairns, Cooktown, Innisfall, Cardwell, Ingham, Atherton, N. Guinea; type, *arclada*, Woodlark Isl., in B.M.

448. *Nygmia canariensis*.

Euproctis canariensis, Kenrick, Trans. Ent. Soc. 1913, p. 598.

Type, ♀, Madagascar, in Coll. Kenrick.

449. *Nygmia castaneo-striata*.

Euproctis castaneo-striata, Kenrick, *l. c.* p. 599.

Type, ♂, Madagascar, in Coll. Kenrick.

450. *Nygmia griseo-striata*.

Euproctis griseo-striata, Kenrick, *l. c.*

Type, ♀, Madagascar, in Coll. Kenrick.

451. *Nygmia purpureofasciata*.

Euproctis purpureofasciata, Wileman, Entom. 1914, p. 321.

Type, ♂, Arizan, Formosa, in Coll. Wileman.

452. *Nygmia postfusca*.

Euproctis postfusca, Wileman, *l. c.* 1917, p. 146.

Type, Kanshieri, Formosa, in Coll. Wileman.

453. *Nygmia simplex*.

Euproctis simplex, Wileman, *l. c.* 1911, p. 150.

Type, ♂, Kaushieri, Formosa, in Coll. Wileman.

454. *Nygmia albina*.

Bombyx albina, Stoll, Pap. Exot. iv. pl. 398, E (1782).

Euproctis albina, Kirby, *l. c.* p. 443.

Japan.

455. *Nygmia compacta*.

Artaxa compacta, Lucas, Proc. Roy. Soc. Queensland, 1892, p. 106.

Queensland.

456. *Nygmia usta*.

Artaxa usta, Lucas, *l. c.* 1901, p. 76.

Queensland.

457. *Nygmia plagiata*.

Cispia plagiata, Walker, iv. p. 858.

Type, Nepal, in B.M.

458. *Nygmia xanthomela*.

Euproctis xanthomela, Walker, Journ. Linn. Soc. vi. p. 128 (1862).

Adullia xanthomela, Swinhoe, Cat. Het. Mus. Oxon. i. p. 186, pl. vi. fig. 8 (1892).

Type, Sarawak, in Mus. Oxon.

459. *Nygmia flavociliata*.

Euproctis flavociliata, Swinhoe, Ann. & Mag. Nat. Hist. (6) vii. p. 465 (1901).

Type, ♀, Perak, in B.M. ; Singapore, ♂ ♀.

460. *Nygmia flavolimbata*.

Euproctis flavolimbata, Auriv. Ent. Tidsk. xv. p. 174, fig. 9 a (1894).

Sumba, Jambora.

461. *Nygmia biplagiata*.

Ozola? *biplagiata*, Walker, xxxii. p. 391 (1865).

Type, ♀, Makian, Celebes, in Mus. Oxon. ; ♂, Menado, Celebes, in my collection.

462. *Nygmia seminigra*.

Euproctis seminigra, Joicey, Noakes, & Talbot, Trans. Ent. Soc. 1915, p. 381, pl. lxi. fig. 11.

Type, Arfak Mts., Dutch N. Guinea, in Coll. Joicey.

463. *Nygmia nigra*.

Euproctis nigra, Semper, Het. Philipp. p. 469, pl. liv. fig. 3, ♂.

Type, ♂, Panaon, Philippines, in Coll. Semper.

464. *Nygmia austriaca*.

Euproctis austriaca, Semper, *l. c.* pl. liv. fig. 6, ♀.

Type, ♀, Mindanao, in Coll. Semper.

465. *Nygmia subnobilis*.

Porthesia subnobilis, Snellen, Tijd. v. Ent. xxiv. p. 128 (1881).

Artava simulans, Butler, Ann. & Mag. Nat. Hist. (5) xiii. p. 200 (1884).

Euproctis ericydes, Turner, Ent. Soc. 1904, p. 475.

Type, Amboina, in Coll. Snellen; type, ♀, *simulans*, Amboina, in B.M.; type, *ericydes*, Cairns, in Coll. Turner; Key Isl., Cape York.

466. *Nygmia funeralis*.

Euproctis funeralis, Swinhoe, Trans. Ent. Soc. 1903, p. 421 (note).

Types, ♂ ♀, Singapore, in B.M.; Sarawak, Penang, Java.

467. *Nygmia celebensis*.

Euproctis celebensis, Swinhoe, Ann. & Mag. Nat. Hist. (8) xviii. p. 213 (1916).

Adbullia (?) *signata*, Walker, xxxii. p. 393 (1865) (præocc.).

Type, Celebes, in Mus. Oxon.

468. *Nygmia edwardsi*.

Teara edwardsi, Newman, Trans. Ent. Soc. 1856, p. 284, pl. xviii. fig. 10.

Teara defecita, Walker, xxxii. p. 352 (1865).

Teara indecora, Walker, xxxii. p. 353.

Euproctis edwardsi, Turner, Proc. Linn. Soc. N.S.W. xiv. (4) p. 486 (1920).

Type, Australia; type, *defecita*, Australia: both in B.M. Type, *indecora*, Moreton Bay, in B.M.

469. *Nygmia hunteri*.

Euproctis hunteri, Warren, Nov. Zool. x. p. 120.

Type, British North Guinea, in Coll. Rothschild.

470. *Nygmia oreosaura*.

Euproctis oreosaura, Swinhoe, Ann. & Mag. Nat. Hist. (6) xiv. p. 435 (1894).

Types, ♂ ♀, Khasia Hills, in B.M.; Java, Sumatra.

471. *Nygmia varia*.

Euproctis varia, Walker, iv. p. 840 (1855); Moore, Cat. Lep. E. I. Co. ii. p. 348, pl. ix. a. fig. 5 (1859).

Artava varia, Moore, Trans. Linn. Soc. xxi. p. 55 (1880).

Chærotricha varia, Swinhoe, Trans. Ent. Soc. 1890, p. 188.

Adullia varia, Swinhoe, Cat. Het. Mus. Oxon. i. p. 185 (1892).

Type, without locality, in Mus. Oxon.; Simla, Subathu, Khasia Hills.

472. *Nygmia boliosa*.

Adullia boliosa, Swinhoe, l. c. p. 186, pl. vi. fig. 2.

Type, Sarawak, in Mus. Oxon.; Kuching, Borneo. Sexes alike; I have both sexes from Sarawak and Kuching.

473. *Nygmia madana*.

Euproctis madana, Moore, Cat. Lep. E. I. Co. ii. p. 348 (1859).

Adullia madana, Swinhoe, Cat. Het. Mus. Oxon. i. p. 185 (1892).

Type, Darjiling, in B.M.; Khasia Hills.

474. *Nygmia fulvistriata*.

Euproctis fulvistriata, Swinhoe, Trans. Ent. Soc. 1903, p. 408.

Type, St. Aignan Isl., Louisiade Group, in B.M.; Tonga.

475. *Nygmia lunifera*.

Adullia lunifera, Walker, xxxii. p. 392 (1865); Swinhoe, Cat. Het. Mus. Oxon. i. p. 184, pl. vi. fig. 3 (1892).

Euproctis discophora, Snellen, Tijds. v. Ent. xxii. p. 113, pl. ix. fig. 2 (1879).

Type, Menado, Celebes, in Mus. Oxon.; type, *discophora*, Celebes, in Coll. Snellen.

476. *Nygmia bipartita*.

Chærotricha bipartita, Moore, Lep. Atk. p. 42, pl. ii. fig. 4 (1879).

Type, ♀, Darjiling, in Coll. Rothschild.

477. *Nygmia postnigra*.

Euproctis postnigra, Swinhoe, Trans. Ent. Soc. 1903, p. 421.

Type, ♀, Matang, Borneo, in B.M.

478. *Nygmia magna*.

Somena magna, Swinhoe, Trans. Ent. Soc. 1891, p. 479, ♀; Swinhoe, Ann. & Mag. Nat. Hist. (7) xii. p. 197 (1903), ♂.

Types, ♂ ♀, Khasia Hills, in B.M.

479. *Nygmia striata*.

Adullia striata, Swinhoe, Ann. & Mag. Nat. Hist. (6) xii. p. 214 (1893).

Type, ♂, Mone, Shan States, in B.M.

480. *Nygmia calesia*.

Euproctis calesia, Swinhoe, Ann. & Mag. Nat. Hist. (6) ix. p. 81 (1902).

Type, ♀, Lawas, Borneo; Sandakan, Borneo.

481. *Nygmia mirabilis*.

Euproctis mirabilis, Swinhoe, Trans. Ent. Soc. 1903, p. 415.

Types, ♂ ♀, Andamans, in B.M.

482. *Nygmia ateralbus*.

Euproctis ateralbus, Roths. Nov. Zool. xxii. p. 213 (1915).

Type, ♀, Manusala, Central Ceram, in Coll. Rothschild.

483. *Nygmia catala*.

Euproctis catala, Swinhoe, Trans. Ent. Soc. 1903, p. 416 (note).

Euproctis atomaria, Walker, iv. p. 837 (1855) (præocc.); Snellen, Tijds. v. Ent. xx. p. 11, pl. iv. fig. 4, ♂ (1877).

Euproctis mülleri, Snellen, l. c. fig. 6, ♀ only.

Type, Java, in B.M.; Talaut Isl.; type, *mülleri*, Sumatra, in Coll. Snellen.

484. *Nygmia marginata*.

Cherotricha marginata, Moore, Lep. Atk. p. 49 (1879).

Cherotricha quadrangularis, Moore, l. c. p. 50, pl. ii. fig. 23.

Type, Darjiling, in B.M.; type, *quadrangularis*, Manipur, in Coll. Rothschild; Khasia Hills.

485. *Nygmia uniformis*.

Cherotricha uniformis, Moore, l. c. p. 49 (1879).

Type, ♀, Darjiling, in Coll. Rothschild; Khasia Hills.

486. *Nygmia lativitta*.

Chærotricha lativitta, Moore, *l. c.* p. 40, pl. ii. fig. 18 (1879).

Type, Darjiling, in B.M. ; Khasia Hills.

487. *Nygmia innotata*.

Adullia (?) *innotata*, Walker, xxxii. p. 393 (1865).

Chærotricha conspersa, Felder, Reise Nov. pl. xcvi. fig. 12 (1868).

Adullia innotata, Swinhoe, Cat. Het. Mus. Oxon. i. p. 185, pl. vi. fig. 1 (1892).

Type, Ternate, in Mus. Oxon. ; type, *conspersa*, Moluccas, in Coll. Rothschild ; Philippines.

488. *Nygmia linta*.

Artaxa linta, Moore, Cat. Lep. E. I. Co. ii. p. 351 (1859).

Type, Java, in B.M. ; Sumatra, Borneo.

489. *Nygmia pallifrons*.

Euproctis pallifrons, Semper, Het. Philipp. ii. p. 466 (1898).

Type, ♀, Luzon, in Coll. Semper.

490. *Nygmia nigrofasciata*.

Euproctis nigrofasciata, Semper, *l. c.* p. 467.

Type, ♂, Mindanao, in Coll. Semper.

491. *Nygmia grisea*.

Euproctis grisea, Semper, *l. c.*

Type, ♂, Luzon, in Coll. Semper.

492. *Nygmia unifascia*.

Euproctis unifascia, Wileman, Entom. xliii. p. 287 (1910).

Type, Formosa, in Coll. Wileman.

493. *Nygmia lyclene*.

Euproctis lyclene, Swinhoe, Trans. Ent. Soc. 1904, p. 144.

Type, Kuching, Borneo, in B.M.

494. *Nygmia innotabilis*.

Euproctis innotabilis, Walker, Entom. v. p. 124 (1870).

Arabia.

495. *Nygmia rana*.*Euproctis rana*, Moore, P. Z. S. 1865, p. 806.

Type, Sylhet, in B.M.

496. *Nygmia geometrica*.*Adullia geometrica*, Semper, l. c. p. 471, pl. liv. fig. 7, ♀.

Type, ♀, W. Mindanao, in Coll. Semper.

497. *Nygmia albovenosa*.*Adullia albovenosa*, Semper, l. c. p. 472, pl. liv. fig. 4, ♀.

Type, ♀, S. Mindanao, in Coll. Semper.

498. *Nygmia renifera*.*Euproctis renifera*, Swinhoe, Trans. Ent. Soc. 1895, p. 12, ♀; Swinhoe, Ann. & Mag. Nat. Hist. (7) xii. p. 196, ♂ (1903).

Types, ♂ ♀, Khasia Hills, in B.M.

499. *Nygmia dirtea*.*Euproctis dirtea*, Swinhoe, Ann. & Mag. Nat. Hist. (7) xv. p. 151 (1905).

Type, ♂, Kuching, Borneo, in B.M.

500. *Nygmia distincta*.*Charotricha distincta*, Felder, Reise Nov. pl. xcvi. fig. 15 (1868).

Type, ♂, Moluccas, in Coll. Rothschild.

501. *Nygmia chlorospila*.*Euproctis chlorospila*, Joicey & Talbot, Ann. & Mag. Nat. Hist. (8) xx. p. 55, pl. i. fig. 8 (1917).

Type, ♂, Dutch N. Guinea, in Coll. Joicey.

502. *Nygmia sipibana*.*Euproctis sipibana*, Semper, Het. Philipp. ii. p. 470 (1898).

Type, ♂ ♀, Sipiban, S.E. Mindanao, in Coll. Semper.

503. *Nygmia sibulana*.*Euproctis sibulana*, Semper, l. c. p. 471, pl. liv. fig. 5, ♀.

Type, ♀, Sibulan, S.E. Mindanao, in Coll. Semper.

504. *Nygmia angusta*.

Euproctis angusta, Semper, *l. c.* pl. liv. fig. 8, ♀.

Type, ♀, Sibulan, in Coll. Semper.

505. *Nygmia celebensis*.

Adhullia (?) *signata*, Walker, xxxiii. p. 393 (1865) (præocc.); Kirby, *l. c.* p. 497.

Euproctis celebensis, Swinhoe, Ann. & Mag. Nat. Hist. (8) xviii. p. 215 (1916).

Type, Menado, Celebes, in Mus. Oxon.

506. *Nygmia præcurrens*.

Adhullia præcurrens, Walker, xxxiii. p. 392 (1865), ♂.

Charotricha globifera, Felder, Reise Nov, pl. xcvi. fig. 13 (1868), ♀.

Euproctis guttulata, Snellen, Notes Leyden Mus. viii. p. 7 (1886), ♀;
Snellen, Tijd. v. Ent. xxix. p. 36, pl. i. fig. 3 (1886).

Type, ♂, Celebes, in Mus. Oxon.; type, ♀, *globifera*, in Coll. Rothschild; type, ♀, *guttulata*, in Leyden Mus.

Genus HOPLOPSEUSTIS, Meyrick, Trans. Ent. Soc.
1902, p. 34.

Acnissa, Turner, Trans. Roy. Soc. S. Australia, 1902, p. 180.

507. *Hoplopseustis erythrias*.

Hoplopseustrias erythris, Meyrick, *l. c.*

Acnissa pyrthias, Turner, *l. c.*

Port Darwin, Queensland.

Genus PARAPROCTIS, Beth.-Baker, Ann. & Mag. Nat.
Hist. (8) vii. p. 543 (1911).

508. *Paraproctis osiris*.

Paraproctis osiris, Beth.-Baker, *l. c.*

Type, ♀, Lokoja, W. Africa, in Coll. Bethune-Baker.

Genus EUPROCTOIDES, Beth.-Baker, *l. c.* p. 544.

509. *Euproctoides miniata*.

Euproctoides miniata, Bethune-Baker, *l. c.*

Type, Africa, in Coll. Bethune-Baker.

Genus *PARAXENA*, Beth.-Baker, *l. c.*510. *Paraxena esquamata*.*Paraxena esquamata*, Bethune-Baker, *l. c.* p. 545.

Type, ♀, N'Dalla Tondo, in Coll. Bethune-Baker.

511. *Paraxena angola*.*Paraxena angola*, Beth.-Baker, *l. c.*

Type, ♂, Malanga, West Africa, in Coll. Bethune-Baker.

Genus *PIGETERA*, Kirby, *l. c.* p. 446 (1892).*Cataphractes*, Felder, Reise Nov. pl. xcix. fig. 8 (1868) (præocc.).512. *Pigetera boldingii*.*Cataphractes boldingii*, Felder, *l. c.**Pigetera boldingii*, Kirby, *l. c.*

Type, Cape, in Coll. Rothschild.

Genus *PERINA*, Walker, iv. p. 966.513. *Perina nuda*.*Bombyx nuda*, Fabr. Mant. Ins. ii. p. 119 (1787).*Stilpnotia subtincta*, Walker, iv. p. 843, ♀.*Perina basalis*, Walker, iv. p. 843, ♂.*Euproctis combinata*, Walker, xxxii. p. 347, ♀ (1865).*Acanthopsyche ritseme*, Heylert's Notes Leyden Mus. iii. p. 89 (1881).*Perina nuda*, Moore, Lep. Ceylon, ii. p. 94, pl. cxiv. figs. 1 a, b (1883).Type, ♀, *subtincta*, in Mus. Oxon.; type, ♂, *basalis*, Nepal; type, ♀, *combinata*, Hong Kong: both in B.M.Larva feeds on the leaves of *Ficus indicus* and *Ficus religiosa* pupa suspended in a net on the trunk of the tree or on an adjacent wall.514. *Perina pura*.*Perina pura*, Walker, Char. Undescr. Lep. Het. p. 17 (1869).

Type, without locality, in Coll. Norris; Crehar, Calcutta.

Genus *DAPLASA*, Moore, Lep. Atk. p. 51 (1879).515. *Daplusa irrorata*.*Daplusa irrorata*, Moore, *l. c.* p. 52, pl. ii. fig. 17; Leech, Trans. Ent. Soc. 1899, p. 128.

Type, Darjiling, in Coll. Staudinger, Japan.

516. *Daplasa variegata*.*Euproctis variegata*, Moore, *l. c.* p. 48, pl. ii. fig. 24.

Type, Darjiling, in Coll. Staudinger.

GENUS MICROMORPHE, Felder, *Reise Nov.*
pl. xcvi. fig. 18 (1868).517. *Micromorphe chærotricha*.*Micromorphe chærotricha*, Felder, *l. c.*; Kirby, *l. c.* p. 455.

Type, Moluccas, in Coll. Rothschild.

GENUS NOLECA, Walker, v. p. 1079 (1855).

518. *Noleca basigutta*.*Noleca basigutta*, Walker, v. p. 1080; Kirby, *l. c.* p. 489.

Africa.

519. *Noleca melanthiata*.*Noleca melanthiata*, Mab. *Bull. Soc. Ent. France*, lx. p. cxxvii (1891);
Kirby, *l. c.* p. 924.

Gaboon.

GENUS ORNITHOPSYCHE, Wallgrn. *k. Vet.-Akad. Handl.*
(2) v. (4) p. 35 (1865).520. *Ornithopsyche hypoxantha*.*Ornithopsyche hypoxantha*, Wallgrn. *l. c.* p. 36; Felder, *Reise Nov.*
pl. c. fig. 4 (1874); Kirby, *l. c.* p. 496.

Caffraria.

521. *Ornithopsyche anthora*.*Ornithopsyche anthora*, Felder, *l. c.* fig. 3; Kirby, *l. c.*

Grahamstown.

GENUS ETOBEMA, Walker, xxxii. p. 388 (1865).

Bimara, Butler, *Trans. Linn. Soc.* (2) i. p. 560 (1879).Differs from *Pantana* in having veins 8, 9, and 10 stalked near tip of wing; hind wing with vein 3 one-third before lower angle of cell, 4 from the angle, 5 from very close above it.

522. *Etobema circumdata*.*Etobema circumdata*, Walker, *l. c.*

Type, N. Guinea, in Mus. Oxon.

523. *Etobema lineosa*.*Etobema lineosa*, Walker, xxxii. p. 389.*Bimara nubila*, Butler, *l. c.*Type, Singapore, in Mus. Oxon.; type *nubila*, Malacca, in B.M.; Johore, Nias, Sumatra.Genus *CISPIA*, Walker, iv. p. 857 (1855).524. *Cispia punctifascia*.*Cispia punctifascia*, Walker, *l. c.*; Butler, Ill. Het. v. p. 53, pl. xc. fig. 6 (1880).

Types, ♂ ♀, Sikkim, in B.M.; Sylhet, Khasia Hills, Ceylon, Bhutan.

525. *Cispia venosa*.*Cispia venosa*, Walker, Trans. Ent. Soc. 1862, p. 264.

Type, India, in Mus. Oxon.; Sikkim, Khasia Hills.

526. *Cispia charma*.*Cispia charma*, Swinhoe, Ann. & Mag. Nat. Hist. (7) iii. p. 112 (1899).

Types, ♂ ♀, Karwar, in B.M.

527. *Cispia unicolor*.*Cispia unicolor*, Felder, Sitz. Akad. Sci. Wien, xliii. p. 34, no. 74 (1881).

Type, Amboina, in Coll. Rothschild.

528. *Cispia dichroa*.*Cispia dichroa*, Felder, *l. c.* no. 75.

Type, Amboina, in Coll. Rothschild.

529. *Cispia suffusa*.*Cispia suffusa*, Felder, *l. c.* no. 76.

Type, Amboina, in Coll. Rothschild.

530. *Cispia pumila*.*Cispia pumila*, Felder, *l. c.* no. 77.

Type, Amboina, in Coll. Rothschild.

531. *Cispia fasciata*.

Cispia fasciata, Semper, Het. Philipp. ii. p. 476, pl. lv. figs. 2 ♂, 3 ♀ (1899).

Types, ♂ ♀, Mindanao, in Coll. Semper.

532. *Cispia grisea*.

Cispia grisea, Semper, *l. c.* p. 477, pl. lv. fig. 4, ♂.

Types, ♂ ♀, Mindanao, in Coll. Semper.

Genus PIDA, Walker, xxxii. p. 399 (1865).

Lacharna, Moore, Lep. Atk. p. 53 (1879).

533. *Pida lativitta*.

Pida lativitta, Moore, Lep. Atk. p. 49 (1879).

Type, Darjiling, in B.M.

534. *Pida apicalis*.

Pida apicalis, Walker, *l. c.* p. 400; Butler, Ill. Het. v. p. 52, pl. lxxxix. fig. 15 (1880).

Type, Darjiling, in B.M.; Khasia Hills.

535. *Pida decolorata*.

Cyclidia (?) *decolorata*, Walker, Char. Undescr. Lep. Het. p. 96 (1869).

Type, Benares, in Devon and Exeter Mus.; Khasia Hills, Subathu.

536. *Pida strigipennis*.

Lacharna strigipennis, Moore, Lep. Atk. p. 53, pl. iii. fig. 11 (1879).

Type, Khasia Hills, in Coll. Staudinger; Burma, Shan States, Omeishan, Ichang, Chang-Yang.

Genus HERACULA, Moore, P. Z. S. 1865, p. 804.

537. *Heracula discivitta*.

Heracula discivitta, Moore, *l. c.* pl. xliii. fig. 2.

Type, Sikkim, in Coll. Russell.

538. *Heracula leonina*.

Heracula leonina, Turner, Trans. Roy. Soc. S. Australia, xxvii. p. 17 (1903).

Type, North Queensland, in Coll. Turner; N. Guinea.

GENUS FODINOIDEA, Saalm. Madag. i. p. 154 (1884).

539. *Fodinoidea staudingeri*.

Fodinoidea staudingeri, Saalm. l. c. pl. v. figs. 63, 63 a.

Madagascar.

540. *Fodinoidea vectigera*.

Eusemia vectigera, Mab. Le Nat. ii. p. 100 (1882).

Fodinoidea maculata, Butler, Ent. Mo. Mag. xxi. p. 198 (1885).

GENUS NUMENES, Walker, iii. p. 662 (1855).

Pseudomesa, Walker, iv. p. 923 (1855).

541. *Numenes siletti*.

Numenes siletti, Walker, iii. p. 663, ♀.

Pseudomesa quadriplagiata, Walker, iv. p. 923, ♂; Butler, Ill. Het. v. p. 54, pl. xc. fig. 6 (1880).

Types of both, Sylhet, in B.M.; Sikkim, Cachar, Burma, Hué, Annam, Khasia Hills, Malay Peninsula.

542. *Numenes patrana*.

Numenes patrana, Moore, Cat. Lep. E. I. Co. ii. p. 367 (1859), ♀.

Numenes partita, Walker, xxxi. p. 290 (1864), ♂.

Type, ♂, Bhutan, in B.M.; type, *partita*, Darjiling, in Coll. Staudinger; Khasia Hills.

543. *Numenes insignis*.

Numenes insignis, Moore, l. c. p. 367, pl. x. a. fig. 6, ♀.

Pseudomesa læta, Walker, xxxv. p. 1916, ♂ (1866).

Both types, Java, in B.M.

544. *Numenes disparilis*.

Numenes disparilis, Staud. Rom. sur Léop. iii. p. 200, pl. xi. figs. 2 a, b (1887); Strand, l. c. p. 126, pl. ccviii.

Numenes disparilis, var. *separata*, Leech, Entom. xxiii. p. 112 (1890).

Lymantria albofascia, Leech, P. Z. S. 1888, p. 629, pl. xxxi. fig. 8, ♂.

Numenes albofascia, Strand, l. c. pl. xx. c.

Type, *separata*, Chang-Yang; type, *albofascia*, Oliyama: both in B.M. Chia-kow-ho, Kiu-kiang, Moupin,

545. *Numenes separata*.

Numenes separata, Leech, Entom. xxiii. p. 111.

Ab. *biseparata*, Strand, l. c. pl. xxii. g.

Type, Chang-Yang, in B.M.; type, *biseparata*, Shiohuela, Japan, in Coll. Seitz.

546. *Numenes contrahens*.

Numenes contrahens, Walker, Journ. Linn. Soc. vi. p. 122 (1862).

Type, Sarawak, in Mus. Oxon.

547. *Numenes præstans*.

Numenes præstans, Saalm. Lep. Madag. i. p. 187 (1884).

Numenes (?) *præstans*, Kirby, Cat. Moths, i. p. 455 (1892).

Madagascar.

548. *Numenes libyra*.

Aroa libyra, Druce, Ann. & Mag. Nat. Hist. (6) xvii. p. 352 (1896).

Heteronygmia flammeola, Distant, *ibid.* (7) vii. p. 360 (1897).

Type, ♂, Dar-es-Salam, E. Africa, in Coll. Joicey; type, *flammeola*, Transvaal, in Coll. Distant.

549. *Numenes hypoxantha*.

Heteronygmia hypoxantha, Holland, Psyche. vi. p. 416, ♀ (1893).

Ogove River.

Genus SCARPONA, Walker, Journ. Linn. Soc. vi. p. 123 (1862); *Ciaca*, Walker, xxxii. p. 397 (1865).

550. *Scarpona ennomoides*.

Scarpona ennomoides, ♀, Walker, *l. c.*

Ciaca urapteroides, Walker, xxxii. p. 397.

Type, ♀, Sarawak, in Mus. Oxon.; type, ♂, Sumatra, in Mus. Oxon.; Sula.

Genus CASSIDIA, Walker, Journ. Linn. Soc. vi. p. 129 (1862).

551. *Cassidia obtusa*.

Cassidia obtusa, Walker, *l. c.* p. 130; Kirby, Cat. Het. i. p. 583 (1892); Swinhoe, Cat. Het. Mus. Oxon. i. p. 205 (1892).

Type, Sarawak, in Mus. Oxon.

Genus MARDARA, Walker, xxxii. p. 402 (1865).

Mahoba, Moore, Lep. Atk. p. 52 (1879).

552. *Mardara calligramma*.

Mardara calligramma, Walker, *l. c.*

Type, Darjiling, in B.M.; Kursejong, Sikkim.

553. *Mardara plagidotata*.

Cyclidia (?) *plagidotata*, Walker, xxv. p. 1483 (1862), ♀.
Mahoba plagidotata, Moore, *l. c.* pl. iii. fig. 6, ♂.

Types, ♂ ♀, Darjiling, in B.M.

554. *Madara irrorata*.

Mahoba irrorata, Moore, *l. c.*

Type, Darjiling, in B.M.

555. *Mardara ruficeps*.

Madara ruficeps, Hampson, Moths of India, iv. p. 489 (1896).

Type, ♂, Bhutan, in B.M.

556. *Madara africana*.

Lepasta africana, Holland, Ent. News Phil. p. 343, pl. xv. fig. 11 (1893).

Sierra Leone, River Niger.

GENUS NYCTEMERA, Hübner, Verz. bek. Schmett.
 p. 178 (1816).

Otræda, Walker, ii. p. 402 (1854).

557. *Nyctemera hesperia*.

Geometra hesperia, Cram. Pap. Exot. iii. pl. celi. figs. A, B (1780).

Nyctemera hesperia, Hübner, *l. c.*

Otræda hesperia, Walker, *l. c.*

W. Africa, Oil River.

558. *Nyctemera jonesi*.

Otræda jonesi, Sharpe, Ann. & Mag. Nat. Hist. (6) vii. p. 134 (1891).

Congo, W. Africa.

559. *Nyctemera manifesta*.

Nyctemera manifesta, Swinhoe, Trans. Ent. Soc. 1903, p. 434.

Type, Congo, in B.M.

560. *Nyctemera cafra*.

Bombyx cafra, Drury, Ill. Exot. Ins. iii. pl. v. fig. 1 (1780).

Nyctemera cafra, Swinhoe, *l. c.*

Sierra Leone, River Niger, S. Nigeria.

561. *Nyctemera nerina*.*Bombyx nerina*, Drury, App. l. c. pl. v. fig. 2. †*Callimorpha* (?) *nerina*, Westw. ed. Drury, iii. (6) pl. v. fig. 2.*Otræda nerina*, Walker, ii. p. 404 (1854).

Sierra Leone.

562. *Nyctemera occidentis*.*Otræda occidentis*, Walker, l. c. p. 403.

Type, ♂, Sierra Leone, in B.M.; Cameroons, River Gaboon, Rio del Rey, Nigeria.

563. *Nyctemera vesperina*.*Otræda vesperina*, Walker, l. c.

Type, ♂, Congo, in B.M.

564. *Nyctemera varunea*.*Otræda varunea*, Druce, P. Z. S. 1882, p. 780.

Type, Congo, in Coll. Joicey.

565. *Nyctemera tenuimargo*.*Otræda varunea tenuimargo*, Prout, Ann. & Mag. Nat. Hist. (9). i. p. 318 (1918).

Type, ♂, N. Rhodesia, in Coll. Joicey.

Genus *RAJACOA*, Swinhoe, Trans. Ent. Soc. 1903, p. 434.566. *Rajacoa forbesi*.*Cypra* (?) *forbesi*, Druce, Ann. & Mag. Nat. Hist. (9) iii. p. 469 (1899).

Type, ♂, Fergusson Isl., in Coll. Joicey; Milne Bay, N. Guinea.

567. *Rajacoa antra*.*Rajacoa antra*, Swinhoe, Ann. & Mag. Nat. Hist. (7) xii. p. 194 (1903).

Type, ♂, Humboldt Bay, in B.M.

Genus *CIMOLA*, Walker, iv. p. 817 (1855).568. *Cimola opalina*.*Cimola opalina*, Walker, l. c.*Anomætes thymiathis*, Druce, Ent. Mo. Mag. xx. p. 156 (1883).

Type, ♂, Natal, in B.M.; Delagoa Bay.

569. *Cimola eleuteria*.

Bombyx eleuteria, Stoll, Suppl. Cram. pl. xxxvi. fig. 13 (1791).
Sierra Leone, Ashanti, Benue River.

Genus *PIRGA*, Auriv. Ent. Tidsk. xiii. p. 192 (1892).

570. *Pirga mirabilis*.

Pirga mirabilis, Auriv. l. c. xii. p. 228, pl. ii. fig. 2 (1892).
Type, W. Africa, in Upsala Mus.

571. *Pirga lasea*.

Xenosoma (♀) *lasea*, Druce, Ann. & Mag. Nat. Hist. (7) iii. p. 468 (1899).
Pirgalasea, Swinhoe, Trans. Ent. Soc. 1903, p. 435 (note).
Type, ♀, Sierra Leone, in Coll. Joicey.

572. *Pirga magna*.

Pirga magna, Swinhoe, l. c. p. 436.
Types, ♂ ♀, Kikuyu, B.E. Africa, in B.M.

Genus *MARBLA*, Swinhoe, l. c.

573. *Marbla divisa*.

Eloria divisa, Walker, iv. p. 815 (1855).
Hylemera tenera, Holland, Ent. News Phil. iv. p. 61, pl. iii. fig. 7 (1893).
Type, without locality, in B.M.; Sierra Leone, Lagos.

Genus *PANTANA*, Walker, iv. p. 819 (1855).

574. *Pantana visum*.

Liparis visum, Hübner, Zutr. iii. p. 32, figs. 543, 544 (1825).
Pantana dispar, Walker, iv. p. 820 (1855).

Type, *dispar*, Moulmein, in B.M.; Rangoon, Shan States,
Tonkin, Hué, Annam, Hainan, Malay Peninsula.

575. *Pantana ampla*.

Pantana ampla, Walker, l. c.; Butler, Ill. Het. iii. pl. xliii. fig. 9 (1879);
Strand, l. c. p. 125, pl. xx. b.
Type, ♂, Hongkong, in B.M.; Hainan.

576. *Pantana droa*.

Pantana droa, Swinhoe, Ann. & Mag. Nat. Hist. (7) xvii. p. 543 (1906).
Type, ♂, Hongkong, in B.M.

577. *Pantana bicolor*.

Orgyia bicolor, Walker, iv. p. 787 (1855).

Pantana bicolor, Strand, l. c. pl. xx. b.

Genusa delineata, Walker, iv. p. 818 (1855).

Genusa circumdata, Walker, iv. p. 819.

Stilpnolia sordida, Walker, vii. p. 1732 (1856).

Lælia circumdata, Butler, Ill. Het. v. p. 50, pl. lxxxix. fig. 7 (1881).

Genusa comparata, Walker, xxxii. p. 340 (1865).

Type, India, in Mus. Oxon. ; types, *delineata* and *sordida*, Sylhet ; type, *circumdata*, Darjiling : all in B.M. Bhutan, Simla, Kulu, Chin Hills, Sikkim, Khasia Hills.

578. *Pantana pluto*.

Gynæphora pluto, Leech, Entom. xxiii. p. 111 (1890).

Type, ♂, Ichang, in B.M. ; Moupin, Kiwi-chow.

579. *Pantana eurygania*.

Pantana eurygania, Druce, Ann. & Mag. Nat. Hist. (7) iii. p. 470 (1899).

Type, Szechuen, W. China, in Coll. Joicey ; Chang-yang.

580. *Pantana semilucida*.

Pantana semilucida, Swinhoe, Trans. Ent. Soc. 1903, p. 439.

Pantana bicolor, Walker, iv. p. 820 (1855) (præocc.).

Types, ♂, without locality, in B.M. ; Cambogia, Siam, Penang, Sarawak.

581. *Pantana simplex*.

Pantana simplex, Leech, Trans. Ent. Soc. 1899, p. 122.

Type, W. China, in B.M.

582. *Pantana terminata*.

Genusa terminata, Walker, xxxii. p. 340 (1865).

Type, ♂, India, in B.M. ; Burma, Beeling.

583. *Pantana nigrolimbata*.

Pantana nigrolimbata, Leech, l. c. p. 121.

Type W. China, in B.M.

584. *Pantana sinica*.

Pantana sinica, Moore, Ann. & Mag. Nat. Hist. (4) xx. p. 92 (1877).

Ab. *limbifera*, Strand, l. c. p. 125.

Type, ♂, Shanghai, in B.M. ; Chekiang, Fouchou.

585. *Pantana albifascia*.

Orygia albifascia, Walker, xxxii. p. 325 (1865).

Type, Darjiling, in Coll. Staudinger; Sikkim, Khasia Hills, Jaintia Hills.

586. *Pantana subfascia*.

Orygia subfascia, Moore, P. Z. S. 1865, p. 803.

Type, ♂, Bengal, in B.M.

587. *Pantana interjecta*.

Pantana interjecta, Swinhoe, Trans. Ent. Soc. 1891, p. 478, pl. xix. fig. 2.

Type, ♂, Khasia Hills, in B.M.

588. *Pantana luteiceps*.

Pantana luteiceps, Swinhoe, Ann. & Mag. Nat. Hist. (6) xvii. p. 361 (1896).

Type, Khasia Hills, in B.M.

589. *Pantana ochrota*.

Pantana ochrota, Hampson, Journ. Bombay Nat. Hist. Soc. 1904, p. 198, pl. D. figs. 33, 34.

Types, ♂ ♀, Pirmad, Travancore, in B.M.

590. *Pantana mindanensis*.

Pantana mindanensis, Semper, Het. Philipp. ii. p. 457 (1898).

Types, ♂ ♀, Mindanao, Philippines, in Coll. Semper.

591. *Pantana visaga*.

Pantana visaga, Semper, *l. c.*

Type, ♂, Cebu, Leyte, Philippines, in Coll. Semper.

592. *Pantana luzonensis*.

Pantana luzonensis, Semper, *l. c.* p. 458.

Type, ♂, Luzon, in Coll. Semper.

593. *Pantana baswana*.

Pantana baswana, Moore, Cat. Lep. E. I. Co. p. 336, pl. ix. a, fig. 1 (1859).

Type, ♂, Java, in B.M.

594. *Pantana* (?) *destituta*.*Genusa destituta*, Walker, xxxii. p. 341 (1865).*Pantana* (?) *destituta*, Kirby, Cat. Moths, i. p. 465 (1892).

Type, Cambodia, in B.M.

Genus *LÆLIA*, Steph. Cat. Brit. Ins. ii. p. 52 (1827);
type, *cænosa*, Hübner.*Charnidas*, Walker, iv. p. 797 (1855); type, *litura*, Walker.*Repena*, Walker, iv. p. 799; type, *cervina*, Walker.*Anthora*, Walker, iv. p. 801; type, *subrosea*, Walker.*Lacida*, Walker, iv. p. 802; type, *antica*, Walker.*Procodeca*, Walker, iv. p. 812; type, *quadrata*, Walker.*Ricine*, Walker, l. c.; type, *suffusa*, Walker.*Odagra*, Walker, xxxii. p. 401 (1865); type, *devestita*, Walker.*Harapa*, Moore, Lep. Atk. p. 47 (1879); type, *testacea*, Moore.*Lælioides*, Moore, Lep. Ceylon, ii. p. 83 (1883); type, *fasciata*, Moore.*Houdella*, Moore, l. c. p. 144; type, *juvenis*, Walker.595. *Lælia* *obsoleta*.*Bombyx obsoleta*, Fabr. Ent. Syst. iii. (i.) p. 463 (1793).*Lælia obsoleta*, Turner, Proc. Linn. Soc. N.S.W. xlv. (4) p. 498 (1920).*Procodeca quadrata*, Walker, iv. p. 812 (1855).*Lælia eremæta*, Meyrick, Trans. Roy. Soc. S. Australia, xv. p. 103
(1891).Chandie River, N. Queensland, Cairns, Herberton,
Duaranga, Nambour, Brisbane, Mt. Tambourine, N.S.W.,
Sydney.596. *Lælia* *adalia*.*Lælia adalia*, Swinhoe, Ann. & Mag. Nat. Hist. (7) vi. p. 307 (1900).

Types, ♂ ♀, Jaintia Hills, in B.M.

597. *Lælia* *suffusa*.*Ricine suffusa*, Walker, iv. p. 824 (1855), ♀.*Procodeca angulifera*, Walker, iv. p. 919, ♂.*Lælia subrufa*, Snellen, Tijd. v. Ent. xxii. p. 105, pl. viii. fig. 6 (1879).Type, ♀, Java; type, ♂, Moulmein: both in B.M.
Sumatra.598. *Lælia* *subrufa*.*Lælia subrufa*, Snellen, Tijd. v. Ent. xv. p. 39 (1872).

Type, Lower Guiana, in Coll. Snellen.

599. *Lælia devestita*.

Odagra devestita, Walker, xxxii. p. 402 (1865).

Lælia pallida, Moore, Trans. Ent. Soc. 1884, p. 358.

Lælioides lactea, Moore, *l. c.*

Type, Darjiling, in Coll. Staudinger; types, *pallida*, Bombay, and *lactea*, Punjab, in B.M.; Karachi.

600. *Lælia fasciata*.

Lælioides fasciata, Moore, Lep. Ceylon, ii. p. 84, pl. cx. fig. 6 (1882).

Procodeca testacea, Moore, P. Z. S. 1872, p. 574 (præocc.).

Lælioides rubripennis, Moore, Trans. Ent. Soc. 1884, p. 358.

Type, ♀, Ceylon; type, ♂, *rubripennis*, Burma: both in B.M. Type, ♀, *testacea*, in Mus. Oxon.

601. *Lælia figlina*.

Lælia figlina, Distant, Ann. & Mag. Nat. Hist. (7) iv. p. 361 (1899).

Type, Transvaal, in Coll. Distant; B.E. Africa.

602. *Lælia marginepunctata*.

Lælia marginepunctata, Beth.-Baker, Ann. & Mag. Nat. Hist. (8) ii. p. 261 (1908).

Type, ♂, Fort Jameson, N.E. Rhodesia, in Coll. Beth.-Baker.

603. *Lælia prolata*.

Lælia prolata, Swinhoe, Cat. Het. Mus. Oxon. i. p. 195 (1892).

Type, India, in B.M.; Moulmein, Siam, Koni, Shan States, Borneo, Kangra, Sikkim, Khasia Hills, Malay Peninsula.

604. *Lælia venosa*.

Lælia venosa, Moore, P. Z. S. 1877, p. 601, pl. lix. fig. 1.

Type, Andamans, in B.M.; Khasia Hills, Singapore.

605. *Lælia atestacea*.

Lælia atestacea, Hampson, Moths, India, i. p. 443 (1892).

Harapa testacea, Moore, Lep. Atk. p. 47, pl. ii. fig. 15, ♀ (1879) (præocc.).

Type, ♀, Darjiling, in B.M.; Khasia Hills.

606. *Lælia calamaria*.

Lælia calamaria, Hampson, Journ. Bombay Nat. Hist. Soc. xiii. p. 234, pl. B. fig. 19 (1900).

Types, ♂ ♀, Nilgiris, in B.M.

607. *Lælia subroséa*.

Anthora subrosea, Walker, iv. p. 801.

Lælia subrosea, Schaus & Clements, Sierra Leone Lep. p. 26, pl. i. fig. 5, ♂ (1893).

Lælia subrufa, Snellen, Tijds. v. Ent. xv. p. 39 (1872).

Type, Sierra Leone, in B.M.; type, *subrufa*, Lower Guinea, in Coll. Snellen; Natal.

608. *Lælia lilacina*.

Lælia lilacina, Moore, Trans. Ent. Soc. 1884, p. 357.

Type, ♂, Nilgiris, in B.M.

609. *Lælia litura*.

Charnidas litura, Walker, iv. p. 707 (1855).

Type, ♂, Nepal, in B.M.; Sultanpore, Kangra, Subathu, Kasaoli, Simla, Dhera Dhun, Khasia Hills.

610. *Lælia juvenis*.

Ptilomacra juvenis, Walker, v. p. 1099 (1855).

Houdella juvenis, Moore, Lep. Ceylon, ii. p. 144, pl. cxxxvii. fig. 4 (1883).

Type, Ceylon, in B.M.

611. *Lælia hemippa*.

Lælia hemippa, Swinhoe, Ann. & Mag. Nat. Hist. (7) xvii. p. 543 (1906).

Type, ♂, Machakos, in B.M.

612. *Lælia lavia*.

Lælia lavia, Swinhoe, Trans. Ent. Soc. 1903, p. 443.

Type, ♂, Lavi, B.E. Africa, in B.M.; Bene, Angola.

613. *Lælia punctulata*.

Lopera punctulata, Butler, Ann. & Mag. Nat. Hist. (4) xvi. p. 400 (1875).

Type, ♂, Natal, in B.M.

614. *Lælia setinioides*.

Lælia setinioides, Holland, Psyche, vi. p. 431 (1893).

Type, Ogove River, in Coll. Holland: Natal, Kaniss Mts., E. Africa, Shambo.

615. *Lælia heterogyna*.

Lælia heterogyna, Hmps. Moths of India, i. p. 403 (1882); Strand,
l. c. p. 123, pl. xxii. e.

Types, ♂ ♀, Dras, Kashmir, in B.M.
The female has aborted wings.

616. *Lælia acuta*.

Lælia acuta, Beth.-Baker, Ann. & Mag. Nat. Hist. (8) ii. p. 261 (1908).

Type, ♀, Damba Isl., Uganda, in Mus. Oxon.

617. *Lælia cardinalis*.

Lælia cardinalis, Hampson, Ill. Het. ix. p. 74, pl. clviii. figs. 29-30
(1893).

Type, Ceylon, in B.M.

618. *Lælia buana*.

Phragmatobia buana, Moore, Cat. Lep. E. I. Co. ii. p. 358 (1859).

Type, ♂, Java, in B.M.

619. *Lælia fracta*.

Lælia fracta, Schaus & Clements, Sierra Leone, p. 26, pl. i. fig. 12
(1893).

Sierra Leone.

620. *Lælia adara*.

Procodeca adara, Moore, Cat. Lep. E. I. Co. ii. p. 337 (1859).

Aroa adara, Semper, Het. Philipp. ii. p. 457 (1898).

Type, ♀, Java, in B.M.; Luzon, Philippines.

621. *Lælia amabilis*.

Lælia amabilis, Auriv. Œfvers. Vet.-Akad. Forhandl. xxxvi. (7) p. 58
(1879).

Damara Land.

622. *Lælia unipunctata*.

Lælia unipunctata, Mösch. Abhandl. Senck. Ges. xv. p. 74 (1887).

Lælia (?) *unipunctata*, Kirby, l. c. p. 460.

Aburi.

623. *Lælia sordida*.

Lælia sordida, Mösch. l. c.; Kirby, l. c.

Aburi.

624. *Lælia paupera*.

Anthora (?) *paupera*, Walker, xxxiii. p. 335 (1865); Kirby, *l. c.* p. 465.

Type, Cambodia, in B.M.

625. *Lælia infracta*.

Lælia infracta, Beth.-Baker, Ann. & Mag. Nat. Hist. (8) vii. p. 547 (1911).

Type, ♂, N'Dalla-Tondo, 2700', in Coll. Bethune-Baker; after *fracta*.

626. *Lælia flava*.

Lælia flava, Beth.-Baker, Ann. & Mag. Nat. Hist. (8) vii. p. 548 (1911).

Type, ♀, Oni, Lagos, in Mus. Oxon.

627. *Lælia rogersi*.

Lælia rogersi, Beth.-Baker, *l. c.* (8) xii. p. 64 (1913).

Type, ♀, Kikuyu, in Mus. Oxon.

628. *Lælia cænosa*.

Bombyx cænosa, Hübner, Eur. Schmett. Bomb. figs. 218, 323-325 (1804).

Lælia cænosa, Strand, *l. c.* p. 122, pl. xix. *i*.

Forma *candida*, Leech, Trans. Ent. Soc. 1899, p. 121.

Type, ♂, *candida*, Chang-Yang, in B.M.; Germany, France, England, Hungary, Bukovina, Bulgara, Catalonia, N. China, Ussuri, Amur, Corea, Japan.

629. *Lælia sangaica*.

Lælia sangaica, Moore, Ann. & Mag. Nat. Hist. (4) xx. p. 92 (1877).

Ab. *paucipuncta*, Strand, *l. c.* pl. xix. *i*.

Type, Shanghai, in B.M.; Ningpo, Nikko, Asama-Yama.

630. *Lælia sinensis*.

Lælia sinensis, Walker, iv. 829 (1855).

Leucoma brevicornis, Walker, vii. p. 1729 (1856).

Types of both, Hong-Kong, in B.M.; Corea, Amur.

631. *Lælia gigantea*.

Lælia gigantea, Butler, Cist. Ent. iii. p. 117 (1885).

Type, Japan, in B.M.; Yokohama, Nikko, Asama-Yama.

632. *Lælia umbrina*.

Procodeca umbrina, Moore, P. Z. S. 1888, p. 398.

Charnidas umbrina, Butler, Ill. Het. vii. p. 36, pl. cxxiii. fig. 8 (1889).

Type, ♂, Kulu, in B.M.; Subathu, Dharmsala, Dalhousie, Kangra, Sultanpore.

633. *Lælia japonibia*.

Lælia japonibia, Strand, l. c. pl. xix. i, ♂.

Type, Japan, in Coll. Seitz.

634. *Lælia exclamatoris*.

Euprepia exclamatoris, Kollar, Hugel's Kasch. iv. p. 469 (1844).

Lælia exclamatoris, Strand, l. c. pl. xix. i.

Repena cervina, Walker, iv. p. 800 (1855).

Lacida rotundata, Walker, iv. p. 802.

Cyenia rubida, Walker, xxxi. p. 297 (1864).

Lymantria disjuncta, Walker, xxxii. p. 366 (1865), ab.

Lælia rotunda, Moore, Lep. Ceylon, ii. pl. cx. figs. 4, 4a (1883).

Type, *cervina*, India, in Mus. Oxon. Type, *rotundata*, Ceylon; type, *disjuncta*. S. India: both in B.M. Type, *rubida*, in Layard's lost coll. Type, *rotunda*, Ceylon, in B.M.; Bombay, Poona.

635. *Lælia testacea*.

Cyenia testacea, Walker, iii. p. 683 (1855).

Lælia testacea, Strand, l. c. pl. xx. a.

Lælia uniformis, Hmps. (♀ only), Ill. Het. viii. p. 56, pl. cxl. fig. 20 (1861).

Charnidas colon, Hmps. l. c. figs. 3, 19.

Type, ♀, India; types, *uniformis* and *colon*, Nilgris: all in B.M. Allahabad, Khasia Hills, Mhow, Bombay, Travancore.

636. *Lælia æthiopica*.

Lælia æthiopica, Beth.-Baker, l. c. (8) ii. p. 261 (1908).

Type, ♂, Fort Jameson, N.E. Rhodesia, in Coll. Bethune-Baker. Uganda, Nigeria.

637. *Lælia fulvata*.

Lælia fulvata, Hmps. Journ. Bombay Nat. Hist. Soc. xx. (i.) p. 112 pl. F. fig. 29 (1910).

Type, ♀, Ceylon, in B.M.

Genus RHODESANA, Beth.-Baker, *l. c.* p. 260.638. *Rhodesana crenulata*.*Rhodesana crenulata*, Beth.-Baker, *l. c.* p. 261.

Types, ♂ ♀, Fort Jameson, N.E. Rhodesia, in Coll. Bethune-Baker.

Genus DACTYLORHYNCHA, Hampson, Moths, India,
i. p. 470 (1892).639. *Dactylorhyncha pallida*.*Charnidas pallida*, Hmps. Ill. Het. viii. p. 56, pl. cxl. fig. 10 (1891).

Type, ♂, Nilgiris, in B.M.

640. *Dactylorhyncha luteifascia*.*Dactylorhyncha luteifascia*, Hmps. Trans. Ent. Soc. 1895, p. 292.

Type, ♂, Pank Yaw, Burma, in B.M.

Genus AROA, Walker, iv. p. 791 (1855).

Baziza, Walker, xxxii. p. 398 (1865).*Crinola*, Leech, Entom. xxiii. p. 111 (1890).641. *Aroa maxima*.*Aroa maxima*, Hmps. Ill. Het. ix. p. 74, pl. cxix. fig. 9 (1893).

Type, ♂, Ceylon, in B.M.

642. *Aroa major*.*Aroa major*, Hmps. *l. c.* figs. 3, 5.

Types, ♂ ♀, Pundaloya, Ceylon, in B.M.

643. *Aroa simplex*.*Orgyia simplex*, Walker, xxxii. p. 325 (1865).*Aroa simplex*, Hmps. Ill. Het. viii. p. 6, pl. cxliii. fig. 17 (1890).

Type, ♂, India, in B.M. ; Nilgiris.

644. *Aroa xerampelina*.*Gynæphora xerampelina*, Swinhoe, P. Z. S. 1885, p. 299, pl. xxi.
figs. 8, 9.

Types, ♂ ♀, Poona, in B.M. ; Ahmednagar.

645. *Aroa ochracea*.*Charnidas ochracea*, Moore, Lep. Atk. p. 44 (1879).

Type, ♀, Calcutta, in B.M. ; Nilgiris, Trevandrum, Ceylon.

646. *Aroa sienna.*

Aroa sienna, Hmps. Ill. Het. viii. p. 55, pl. cxl. fig. 29 (1891).

Types, ♂ ♀, Nilgiris, in B.M.; Ceylon, Khasia Hills.

647. *Aroa subnotata.*

Lacida subnotata, Walker, iv. p. 803 (1855).

Type, ♂, Ceylon, in B.M.; Nilgiris.

648. *Aroa campbelli.*

Aroa campbelli, Hmps. Journ. Bombay Nat. Hist. Soc, 1904, p. 198, pl. D. fig. 8.

Type, ♂, Palni Hills, Madras, in B.M.

649. *Aroa lithosioides.*

Amsacta lithosioides, Walker, Journ. Linn. Soc. vi. p. 127 (1862).

Type, Sarawak, in Mus. Oxon.

650. *Aroa atrella.*

Aroa atrella, Hmps. Moths of India, i. p. 439 (1892).

Type, Margharita, Assam, in Coll. Rothschild; Khasia Hills.

651. *Aroa atrescens.*

Aroa atrescens, Hmps. Journ. Bombay Nat. Hist. Soc. xi. p. 294 (1897).

Type, ♂, Khasia Hills, in B.M.

652. *Aroa sagrara.*

Aroa sagrara, Swinhoe, P. Z. S. 1885, p. 299, pl. xx. fig. 13.

Type, ♂, Belgaum, in B.M.; Karwar, Jubbulpore, Rajputana.

653. *Aroa cometaris.*

Aroa cometaris, Butler, Ann. & Mag. Nat. Hist. (3) xix. p. 223 (1887).

Type, ♂, Ali, in B.M.; Guadalcanar Island.

654. *Aroa umbrata.*

Aroa umbrata, Beth.-Baker, l. c.

Type, ♂, N'Dalla-Tondo, in Coll. Bethune-Baker.

655. *Aroa tomisa*.

Aroa tomisa, Druce, Ann. & Mag. Nat. Hist. (8) xvii. p. 353 (1896).

Type, ♂, Dar-es-Salaam, in Coll. Joicey.

656. *Aroa sulphurea*.

Aroa sulphurea, Plötz, Stett. ent. Zeit. xli. p. 84 (1880); Mösch. Abhandl. Senck. Ges. xv. p. 75, fig. 10 (1887); Kirby, l. c. p. 463.

W. Africa.

657. *Aroa* (?) *xanthospila*.

Aroa xanthospila, Plötz, l. c.

Aroa (?) *xanthospila*, Kirby, l. c.

W. Africa.

[To be continued.]

VII.—New or little-known Tipulidæ (Diptera).—XIII. *Australasian Species*. By CHARLES P. ALEXANDER, Ph.D., F.E.S., Amherst, Massachusetts, U.S.A.

THE new species described in this paper are all from New Zealand and were collected by Messrs. Curtis, Fenwick, Harris, and Howes, to whom the writer's sincere thanks are due for the privilege of retaining the types.

Dicranomyia seducta, sp. n.

Head grey; disk of mesonotal præscutum and the scutal lobes brownish black; wings with a faint brownish tinge; stigma oval, pale brown; vein *Sc* long; spines on rostrum of male hypopygium heteromorphous.

Male.—Length 5 mm.; wing 5·7 mm.

Female.—Length 6·5 mm.; wing 6·5 mm.

Rostrum reddish brown, nearly as long as the head; palpi dark brown. Antennæ brownish black. Head grey.

Pronotum dark brown. Mesonotal præscutum obscure brownish yellow with three confluent, subshiny, brownish-black stripes; scutal lobes brownish black; remainder of the mesonotum brown. Pleura pale brownish testaceous. Halteres dark brown, the basal half of the stem yellow. Legs with the coxæ concolorous with the pleura; trochanters

yellow; remainder of the legs dark brownish black, the femoral bases very narrowly pale. Wings faintly tinged with brown; stigma oval, pale brown; veins dark brown. Venation: *Sc* long, *Sc*₁ ending beyond mid-length of *Rs*, *Sc*₂ from once to twice its length from the tip; inner ends of cells *R*₃ and 1st *M*₂ arcuated, especially the former; basal deflection of *Cu*₁ at or beyond the fork of *M*.

Abdominal tergites dark brown; basal sternites obscure yellow, the terminal sternites passing into dark brown. Male hypopygium with the spines of the rostrum of two sizes and shapes, the elongate one arising from a small papilloid base. Ovipositor with slender valves.

Hab. New Zealand (North Island).

Holotype, ♂, Ohakune, altitude 2060 feet, December 25, 1921 (*T. R. Harris*).

Allotopotype, ♀.

Paratopotype, ♂; *paratype*, ♂, Taumarunui, December 12, 1921 (*T. R. Harris*).

Rhamphidia harrisi, sp. n.

General coloration shiny black; pleura silvery grey; wings subhyaline with a broad seam along the cord and the apex brown.

Female.—Length, excluding rostrum, 8 mm.; wing 7.8 mm.; rostrum alone, about 0.9 mm.

Rostrum black, pale beneath; palpi dark brown. Antennæ black, the incisure between the scape and flagellum obscure yellow. Head black, sparsely silvery pruinose.

Pronotum with a pubescent pruinosity. Mesonotal præscutum and the scutal lobes shiny black; median area of scutum and the scutellum pollinose; postnotum dark, the basal half pruinose. Pleura shiny black with a conspicuous, silvery-grey, pubescent pruinosity, the sternum glabrous. Halteres yellow, the knobs darker. Legs with the fore coxæ black, grey pruinose; other coxæ obscure yellow; trochanters obscure yellow; femora testaceous yellow, the tips broadly dark brown; remainder of the legs black. Wings subhyaline; a faint brown cloud at arculus; a broad seam along the cord from the stigma, completely traversing the wing; wing-tip broadly infuscated, the area basad of it completely encircled by brown; veins black. Venation: cell *R*₁ about one-half wider at the wing-margin than cell *R*₃; cell 1st *M*₂ gently narrowed distally; *m* about one-third the outer

deflection of M_3 ; basal deflection of Cu_1 about two-thirds its length beyond the fork of M ; prearcular cells large.

Abdominal tergites indistinctly bicolorous, dark brown, the segments obscure yellow sublaterally and less distinctly along the caudal margins; basal sternites more or less yellowish; subterminal sternites uniformly black. Ovipositor with the valves horn-coloured.

Hab. New Zealand (North Island).

Holotype, ♀, Ohakune, altitude 2060 feet, December 1, 1921 (*T. R. Harris*).

Rhamphidia harrisi is named in honour of the collector, Mr. T. R. Harris, to whom I am indebted for many favours. It is the first true *Rhamphidia* to be described from New Zealand, the *Rhamphidia levis*, Hutton, being a species of *Ceratocheilus*.

Molophilus hilaris, sp. n.

General coloration pale brownish yellow; legs yellow, variegated with black; wings grey, the costal region yellowish, the disk traversed by three dark bands; distal pleural appendage of male hypopygium bifid.

Male.—Length about 2.2 mm.; wing 2.6 mm.

Rostrum and palpi pale brown. Antennæ short, pale brown throughout, with long verticils. Head pale brownish yellow.

Mesonotum uniformly pale brownish yellow. Pleura more uniformly yellowish. Halteres pale. Legs with the coxæ and trochanters yellow; femora yellow, the tips black; tibiæ yellow, the tips black; hind tibiæ at from one-third to one-fourth the length with a black ring; tips of the basal tarsal segments dark; terminal two tarsal segments uniformly dark; the legs are provided with a conspicuous erect trichiation which is coloured as described above. Wings grey, the costal region conspicuously yellowish; dark cross-bands on the wing are produced chiefly by conspicuous, dark brown macrotrichia; a band at the origin of R_s ; a second at the cord; the third at the wing-apex; along the medial veins the dark coloration continues more basad, so the dark areas are more or less connected; vein 2nd A with dark macrotrichia; veins yellow, darker in the infuscated areas. Venation: basal section of R_{2+3} short.

Abdomen yellow. Male hypopygium with the basal pleural appendage straight, slightly curved at the tip; distal appendage deeply bifid; apex of pleurite a slender spine.

Hab. New Zealand (North Island).

Holotype, ♂, Ohakune, altitude 2060 feet, January 24, 1922 (*T. R. Harris*).

Molophilus hilaris bears a slight resemblance to *M. variegatus*, Edwards, in the coloration of the legs and wings. It is more closely related to *M. cruciferus*, *M. plagiatus*, and allied forms.

Molophilus flavidulus, sp. n.

Size small (wing of ♂ 3 mm.); general coloration light yellow; male hypopygium with the basal pleural appendage gently curved toward apex, terminating in a few large teeth.

Male.—Length about 2.4 mm.; wing 3 mm.

Rostrum and palpi pale brown. Antennæ with the first segment yellow, the second pale brown; flagellum broken. Head light yellow.

Mesonotum and pleura light yellow. Halteres pale yellow, covered with appressed white setæ. Legs yellow, the terminal segments darker. Wings relatively broad, pale yellow with pale veins and macrotrichia. Venation: vein 2nd *A* elongate, ending beyond the level of the fork of *Rs*.

Abdomen yellow. Male hypopygium with the basal pleural appendage pale at base, the apex blackened, the appendage straight, at the tip curved a little mesad and here provided with a few apical teeth and less distinct appressed subapical denticles; distal pleural appendage bifid and blackened at apex, the lateral arm dilated at outer end.

Hab. New Zealand (North Island).

Holotype, ♂, Ohakune, altitude 2060 feet, January 18, 1922 (*T. R. Harris*).

Molophilus luteipennis, sp. n.

Size large (wing of ♂ over 5 mm.); general coloration light reddish yellow; wings strongly tinged with yellow; anal veins convergent; basal pleural appendage a strongly curved black spine.

Male.—Length about 4.4 mm.; wing 5.3 mm.

Rostrum and palpi pale brown. Antennæ short, pale brown. Head dull grey.

Mesonotum and pleura uniformly reddish yellow. Halteres yellow. Legs with the coxæ and trochanters yellow; remainder of the legs yellow, the terminal tarsal segments darker. Wings broad, strongly tinged with yellow, the

veins slightly darker yellow; macrotrichiæ pale brown. Venation: petiole of cell R_4 short; petiole of cell M_3 about one and two-thirds the length of the basal deflection of Cu_1 ; vein 2nd A elongate, sinuous, the anal veins convergent.

Abdominal tergites pale brown, the sternites light yellow. Male hypopygium with two pleural appendages, the basal appendage a strongly curved black arm, the base straight, the distal third bent at a right angle and directed laterad, acute at apex, before which are borne a few weak setæ; distal pleural appendage bifid at apex, the lateral arm larger and weakly denticulate at apex.

Hab. New Zealand (South Island).

Holotype, ♂, Otago (*Geo. Howes*).

Molophilus denticulatus, sp. n.

General coloration obscure yellow; antennæ short; wings pale brownish subhyaline; anal veins convergent; basal pleural appendage of hypopygium a straight black rod that bears a conspicuous erect spine on the lateral face before the apex.

Male.—Length about 4 mm.; wing 4.6 mm.

Rostrum and palpi brown. Antennæ short, pale brown, the basal segments tinged with reddish, this latter condition probably abnormal. Head pale brown.

Mesonotum obscure yellow. Pleura brownish yellow; sternum yellow. Halteres pale. Legs with the coxæ and trochanters concolorous with the sternum; remainder of the legs pale brown, the femoral bases paler. Wings pale brownish subhyaline, the veins slightly darker, with brown macrotrichiæ. Venation: anal veins convergent.

Abdomen brownish yellow. Male hypopygium with two pleural appendages, the two pairs of either side approximated; the more basal appendage a powerful black rod that is almost straight, at about three-fourths the length on the lateral face with an erect black spine; between this spine and the subacute apex, on the mesal face, a small setiferous area, the apex slightly twisted; distal pleural appendage bifid; apex of pleurite a high blackened blade.

Hab. New Zealand (South Island).

Holotype, ♂, Otago (*Geo. Howes*).

Paratype, ♂, Queenstown, Otago, altitude 1500 feet, February 15, 1922 (*L. Curtis*).

The paratype is slightly smaller than the type.

Molophilus quadrifidus ohakunensis, subsp. n.

Male.—Length about 4 mm. ; wing 4·6–4·8 mm.

Generally similar to *M. quadrifidus*, differing as follows:—

Male hypopygium with the lateral and mesal arms much more compact, the lateral arm very powerful, the outer margin microscopically serrulate ; the lateral and mesal arms are separated only by a small oval notch ; the median arm terminates in two small laterally-directed points ; the basal arm is shorter and more densely provided with setæ. Distal pleural appendage with the apex more abruptly truncate.

Hab. New Zealand (North Island).

Holotype, ♂, Ohakune, altitude 2060 feet, February 9, 1922 (*T. R. Harris*).

Paratopotype, 1 ♂, March 10, 1922 ; *paratype*, 1 ♂, Taihape, March 1, 1922 (*T. R. Harris*).

Molophilus brevinervis, sp. n.

General coloration pale brown ; antennæ of male elongate ; petiole of cell R_4 elongate ; vein *2nd A* short ; mesal pleural appendage of hypopygium with a long, straight, lateral spine.

Male.—Length about 3 mm. ; wing 4·2 mm.

Rostrum and palpi brown. Antennæ of the male elongate, brown ; when entire at least as long as the body, the flagellar segments with conspicuous erect setæ. Head pale brown.

Mesonotum uniformly pale brownish testaceous. Pleura pale brownish yellow. Halteres dark brown, the base of the stem paler. Legs with the coxæ and trochanters concolorous with the pleura ; remainder of the legs pale brown with the terminal tarsal segments darker. Wings tinged with pale brown, the veins darker with dark brown macrotrichia. Venation : petiole of cell R_4 one-third longer than the petiole of cell M_3 ; basal deflection of Cu_1 arcuated near mid-length, situated on R_3 a short distance beyond the fork of M ; vein *2nd A* short and straight, ending far before the fork of Cu , the cell *2nd A* being long and narrow.

Abdomen brown, the hypopygium a trifle brighter. Male hypopygium with two appendages, both basal in position ; lateral appendage a powerful black hook, strongly curved at apex ; mesal appendage deeply bifid, the lateral arm appearing as a very long straight spine, the mesal arm as a

powerful flattened blade; apex of pleurite chitinized and terminating in a few teeth.

Hab. New Zealand (North Island).

Holotype, ♂, Ohakune, altitude 2060 feet, December 22, 1921 (*T. R. Harris*).

Molophilus sepositus, sp. n.

General coloration brown, the præscutum dark brown with three paler brown stripes; pleura dark brown; antennæ short; male hypopygium with the bifid pleural appendage having the lateral arm very small, spine-like, and remote from the tip of the mesal arm.

Male.—Length about 2.6 mm.; wing 3.2 mm.

Rostrum and palpi dark brown. Antennæ short, pale brown, the flagellar segments with very conspicuous erect white setæ. Head brown.

Pronotum brown. Mesonotal præscutum dark brown with three lighter brown stripes; remainder of the mesonotum light brown, the postnotum darker brown beyond the base. Pleura uniformly dark brown. Halteres pale yellow. Legs with the coxæ and trochanters brownish testaceous; remainder of the legs yellow, the terminal tarsal segments darker. Wings tinged with greyish brown, the base and costal region a little more yellowish; veins pale brown with dark macrotrichia. Venation: vein 2nd *A* ending opposite the fork of *Cu*.

Abdomen dark brown, the hypopygium obscure brownish yellow. Male hypopygium with the pleurites short, the lateral apical angle produced caudad into a long fleshy lobe that juts caudad beyond the appendages; pleural appendages two, arising close together at the base of the fleshy lobe; one appendage simple, gently curved, broad at base, narrowed to the long apex; second appendage bifid, the lateral arm being a small, slender spine remote from the tip of the mesal arm which terminates in a small cylindrical point. Gonapophyses appearing as two long, straight, divergent arms, gradually narrowed to the acute tips, their surface sparsely provided with appressed setæ.

Hab. New Zealand (North Island).

Holotype, ♂, Ohakune, altitude 2060 feet, December 22, 1921 (*T. R. Harris*).

Molophilus paululus, sp. n.

General coloration dark brown; vein 2nd *A* short; male

hypopygium with a single pleural appendage—this flattened, ear-shaped, and terminal in position.

Male.—Length about 2·6 mm.; wing 3·2 mm.

Female.—Length about 3 mm.; wing 3·3 mm.

Rostrum and palpi pale brown. Antennæ with the first segment pale brown, the second segment darker; flagellum broken. Head dark brown.

Pronotum dark brown. Mesonotum dark brown, the humeral region brighter. Pleura dark brown. Halteres dark brown, the extreme base obscure yellow. Legs with the coxæ and trochanters obscure yellow; remainder of the legs black; only the middle legs remain, and these show faint indications of narrow pale rings on the tibiæ and tarsi, possibly due to the removal of trichiæ. Wings tinged with brown, the veins a little darker and clothed with long, dark brown macrotrichiæ. Venation: vein *2nd A* short, ending some distance before the level of the fork of *Cu*.

Abdomen dark brown. Male hypopygium with the pleurites short and stout; a single pleural appendage—this terminal in position, flattened, ear-shaped, pale yellow in colour. Penis-guard and apophyses forming a chitinized mass between the pleurites, the guard jutting caudad as two slender parallel points.

Hab. New Zealand (North Island).

Holotype, ♂, Ohakune, altitude 2060 feet, January 18, 1922 (*T. R. Harris*).

Allotopotype, ♀.

Molophilus paululus is related to *M. gourlayi*, Alex.

Rhabdomastix (Sacandaga) optata, sp. n.

General coloration grey, the præscutum with two submedian brown stripes; pleura dark grey; wings whitish subhyaline, handsomely variegated with brown, the costal region more yellowish; abdominal segments pale brown, the bases of the segments darker brown.

Male.—Length about 4·8 mm.; wing 6 mm.

Female.—Length 6·8 mm.; wing 7·2 mm.

Rostrum and palpi dark brown. Antennæ dark brown throughout, the flagellar segments with an abundant, erect, white pubescence. Head grey.

Mesonotum dull grey, the præscutum with two submedian brown stripes; in the female, the lateral stripes are also indicated. Pleura dark grey. Halteres pale. Legs with the fore coxæ dark, the other coxæ obscure brownish

yellow; trochanters yellow; fore and middle coxæ elongate; remainder of the legs brown. Wings whitish subhyaline, the costal region more yellowish; stigma dark brown, sending a conspicuous brown cloud along the cord to $r-m$, wing-tip faintly darkened; other brown clouds in the base of cells C and Sc , along vein Cu , the outer end of cell 1st M_2 ; cell 2nd A largely dark; prearcular region abruptly pale; veins dark brown, paler in the costal region. Venation: Sc_1 ending about opposite three-fourths the length of Rs , Sc_2 not far from the tip; R_2 short, a little more than its length from the tip of R_1 ; basal deflection of Cu_1 about two-thirds its length beyond the fork of M . No macrotrichia on veins R_{2+3} or 2nd A .

Abdomen indistinctly bicolorous, pale brown, the bases of the segments darker brown; subterminal segments uniformly darkened; hypopygium obscure yellow. Valves of the ovipositor elongate, horn-colour.

Hab. New Zealand (North Island).

Holotype, ♂, Ohakune, altitude 2060 feet, January 24, 1922 (*T. R. Harris*).

Allotopotype, ♀, February 8, 1922.

Rhabdomastix (Sacandaga) vittithorax, sp. n.

General coloration yellow, the mesonotal præscutum with four brown stripes; head grey; wings tinged with grey; Sc ending opposite two-fifths the length of Rs ; macrotrichia on veins R_{2+3} and 2nd A .

Female.—Length 4.2 mm.; wing 4.9 mm.

Rostrum brown, the palpi dark brown. Antennæ dark brown, the first scapal and the first flagellar segments paler. Head grey.

Pronotum yellow, slightly darker medially. Mesonotal præscutum yellow with four conspicuous brown stripes, the intermediate pair confluent anteriorly; remainder of the mesonotum yellow, the scutal lobes brown. Pleura yellow. Halteres yellow. Legs with the fore coxæ slightly darkened; other coxæ and the trochanters yellow; remainder of the legs dark brown. Wings tinged with grey, the base and costal region indistinctly yellowish; stigma faintly indicated, pale brown; veins dark brown, those in the costal area more yellowish. Venation: Sc short, Sc_1 ending opposite two-fifths the length of Rs , Sc_2 indistinct; distance between the tips of R_1 and R_2 at margin greater than R_2 alone. Macrotrichia on R_{2+3} basad to the fork of Rs and on vein 2nd A .

Abdominal tergites uniformly brown, the sternites paler; genital segment and ovipositor paler. Abdomen of type gravid with large eggs.

Hab. New Zealand (North Island).

Holotype, ♀, Ohakune, altitude 2060 feet, January 28, 1922 (*T. R. Harris*).

Rhabdomastix vittithorax is most closely related to *R. otagana*, Alex.

ZELANDOMYIA, gen. nov.

Antennæ with at least 15, probably with 16, segments, the segments with conspicuous verticils that exceed the segment in length. Legs clothed with very long, coarse setæ; tibial spurs elongate. Wings with *Sc* ending about opposite two-thirds the length of the long *Rs*, *Sc*₂ at the tip of *Sc*₁; *Rs* long, straight; *r* lacking; *R*₂₊₃ nearly as long as *R*₂ alone; *R*₂ somewhat oblique in position; cell *R*₂ wide at the wing-margin; inner ends of cells *R*₃, *R*₅, and 1st *M*₂ in oblique alignment; cell 1st *M*₂ open by the atrophy of *m*; cell *M*₁ present, but small; basal deflection of *Cu*₁ about its own length beyond the fork of *M*; vein 2nd *A* ending opposite the origin of *Rs*; arculus complete. Ovipositor with acicular valves.

Genotype, *Zelandomyia pygmæa*, sp. n. (Maorian Sub-region).

The tiny fly that is made the type of this new generic group is the smallest Hexatomine fly known, with the exception of certain species of *Polymera* which are of about the same size. Its general appearance is more like a species of *Gonomyia* than a *Limnophila*, to which genus it is most closely allied. The medial field of the wing suggests certain Pediciine Tipulidæ, such as *Dicranota* and *Rhaphidolabis*.

Zelandomyia pygmæa, sp. n.

General coloration pale brownish yellow; size very small (wing of ♀ 3.5 mm.); wings greyish yellow; cross-veins *r* and *m* lacking; vein *R*₂ oblique in position; cell *M*₁ present.

Female.—Length 3.5 mm.; wing 3.5 mm.

Rostrum and palpi pale brown. Antennæ short, testaceous. Head pale brown.

Mesonotum and pleura pale brownish yellow, unmarked. Halteres pale, the knobs large. Legs with the coxæ and trochanters yellow; remainder of the legs pale brown,

scarcely darkened distally. Wings with a faint greyish-yellow tinge; veins pale brown. Venation as discussed under the generic characterization.

Abdomen pale brownish yellow, the sternites a little paler.

Hab. New Zealand (North Island).

Holotype, ♀, Ohakune, altitude 2060 feet, January 28, 1922 (*T. R. Harris*).

Gynoplistia eluta, sp. n.

General coloration grey, the præscutum with three darker stripes; antennæ with seventeen segments; wings tinged with pale brown, the pattern very pale and diffuse; pleurites of male hypopygium with spinous basal lobes.

Male.—Length 12.5 mm.; wing 9.2 mm.

Female.—Length 15.5 mm.; wing 12 mm.

Rostrum pale brown, the palpi dark brown. Antennæ with the scape yellow, first flagellar segment light brown; remainder of the antennæ, including all the pectinations, black; antennal formula in ♂ 2+3+8+4, the pectinations of moderate length; formula in ♀ 2+3+6+6. Head brown, the front and orbits pruinose.

Mesonotum pale brown with three rather indistinct, darker brown stripes; pseudosutural foveæ reddish; remainder of mesonotum weakly pruinose; the scutal lobes darker. Pleura pruinose. Halteres obscure yellow, the knobs a little darker. Legs with the coxæ yellow, weakly pruinose; trochanters yellow; femora pale brown, the tips broadly yellow, enclosing a narrow brown subterminal ring; in the ♀ the femora are uniformly pale brown; tibiæ and metatarsi pale brown, the terminal tarsal segments black. Wings tinged with pale brown (♂) or yellowish brown (♀) with a very diffuse, pale brown pattern, so that at first sight the wings appear almost unicolorous; stigma oval, brown, sending a paler brown seam along the cord and outer end of cell 1st M_2 ; a pale brown spot at origin of Rs . Venation: Sc_1 ending beyond the end of Rs , Sc_2 at its tip; cell 1st M_2 relatively small, the basal deflection of Cu_1 beyond mid-length; petiole of cell M_1 two and one-half to three times m .

Abdominal tergites brown, the subterminal segments scarcely darkened; hypopygium a little paler. Male hypopygium with conspicuous, blackened, spinous, basal lobes on the mesal face of pleurites; outer pleural appendage bifid and blackened at apex, the smooth arm shorter than the denticulate arm; inner pleural appendage with an obtuse tooth near mid-length of the lower face.

Hab. New Zealand (North Island).

Holotype, ♂, Ohakune, altitude 2060 feet, December 25, 1921 (*T. R. Harris*).

Allotopotype, ♀.

Paratopotype, ♂, December 20, 1921; *paratypes*, 2 ♀ ♀, Waimarino, January 1922 (*Mr. Fenwick*).

Cerozodia hiemalis, sp. n.

Coloration in alcohol dark brown; antennæ with seventeen segments, the terminal segment elongate; wings and halteres subequal in length (in ♀).

Female.—Length 24 mm.; wing 2·5 mm.

Described from an alcoholic specimen.

Rostrum and palpi dark brown. Antennæ dark brown, with apparently only seventeen segments, the terminal segment being a composite that is as long as the preceding three taken together; the formula is 2 + 10 + 5, interpreting the terminal segment as being a unit; longest pectination about as long as the segment. Head dark brown.

Thorax dark brown, the pseudosutural foveæ pale. Halteres and wings subequal in length, pale brown, the latter slightly curved, strap-like. Legs brown, covered with conspicuous erect brown setæ.

Abdomen brown, the ovipositor passing into horn-colour. Ovipositor with the tergal valves elongate, gently upcurved.

Hab. New Zealand (North Island).

Holotype, ♀, Ohakune, altitude 2060 feet, July 1921 (*T. R. Harris*).

The reference of this fly to *Cerozodia* is somewhat provisional, and it may prove to belong to *Gynoplistia* when the male sex is discovered.

Macromastix longioricornis, sp. n.

Male.—Length 11·5–12 mm.; wing 14·4–15 mm.; antenna 17–17·5 mm.

Described from alcoholic material.

Bearing a general resemblance to a small *M. binotata*, Hutton, from which it is readily told by the elongate antennæ and the coloration of the wings and abdomen.

Compared with *binotata*, the present species differs as follows:—

Antennæ of male approximately one-half longer than the body. Vertical tubercle more prominent. Wings with the ground-colour yellowish grey, the ocellate spot at mid-length

of vein *M* not touching the origin of *Rs*; the band along the cord that occurs in *binotata* is here much broken up, represented chiefly by a vague clouding cephalad of *r-m* and a conspicuous dark brown spot at the fork of *Cu*. Venation: cell 1st *M*₂ more elongate; cell *M*₁ short-petiolate to sessile. Second abdominal segment not yellow on the basal half.

Hab. New Zealand (North Island).

Holotype, ♂, Ohakune, altitude 2060 feet, July 1921 (*T. R. Harris*).

Paratopotypes, 8 ♂♂, with the type; 1 ♂, May 17, 1922; *paratype*, 1 ♂, Owhango, July 1, 1922 (*T. R. Harris*).

Macromastix halterata, sp. n.

General coloration dark brown; antennæ short; halteres very long; wings strongly tinged with brown; basal deflection of *Cu*₁ far before the fork of *M*; abdominal sternites bicolorous.

Male.—Length 7 mm.; wing 8·3–8·5 mm.

Described from alcoholic material.

Frontal prolongation of the head short, light brown; nasus lacking; palpi short, pale brown. Antennæ short, pale brown, the basal flagellar segments narrowed basally, a little produced apically on the ventral face, the terminal five segments elongate, cylindrical or nearly so, gradually becoming more elongate to the end. Head dark brown, the anterior part of the vertex paler.

Mesonotal præscutum dark brown with three yellowish-brown stripes, the medial stripe further subdivided by a capillary dark vitta; remainder of mesonotum brown. Pleura obscure brownish yellow, with no distinct markings. Halteres very long and slender (2·5 mm.), brown. Legs with the coxæ concolorous with the pleura; trochanters a little darker; remainder of the legs dark brown, the extreme femoral bases paler. Wings with a strong dark brown tinge, the stigma even darker brown; obliterative areas before the stigma and across the base of cell 1st *M*₂. Wing-base subpetiolate, so the basal half of cell 2nd *A* is very narrow. Venation: cell 2nd *R*₁ small; petiole of cell *M*₁ variable, from about equal to *m* to almost lacking; basal deflection of *Cu*₁ before the fork of *M*, the fusion variable, from about equal to *m* to almost at the fork of *M*; fusion of *M*₃ and *Cu*₁ about equal to the fusion of *M* and *Cu*₁.

Abdominal tergites dark brown, the sternites yellow, with the bases of the segments narrowly infuscated.

Hab. New Zealand (North Island).

Holotype, ♂, Ohakune, altitude 2060 feet, July 1921 (T. R. Harris).

Paratopotypes, 6 ♂♂, with the type; 9 ♂♂, May 21, 1922; 3 ♂♂, May 28, 1922 (T. R. Harris).

Macromastix angusticosta, sp. n.

General coloration grey, the præscutum with three dark brown stripes, the median one fulvous at anterior end; wings subhyaline, cells *C* and *Sc* dark brown; abdominal tergites deep reddish brown, the lateral margins broadly pale.

Male.—Length about 15 mm.; wing 18.4 mm.

Frontal prolongation of the head brown, darker brown beneath, the nasus very short and broad; palpi dark brown. Antennæ short, the first segment yellow, the second segment pale brown; flagellum dark brown. Head brown, dark brown on the genæ, fulvous on the low vertical tubercle and on the orbits, the vertex when viewed obliquely with a silvery sheen.

Mesonotal præscutum light brownish grey with three velvety dark brown stripes, the median stripe fulvous-orange anteriorly, forming a very conspicuous triangular area; median stripe indistinctly split by a pale line; humeral region and lateral margins light yellow; scutal lobes obscure orange, the median area broadly pruinose; a small brown spot on latero-caudal portion of each scutal lobe; scutellum obscure fulvous, sparsely pruinose, the lateral margins of the median lobe greenish yellow; postnotum brown, paler caudally, the surface sparsely pruinose. Pleura dark brown, sparsely pruinose, with a broad, ventral, longitudinal, grey stripe. Halteres brown, the knobs greenish. Legs with the coxæ pruinose; trochanters obscure yellow; femora light yellowish brown, the tips conspicuously but rather narrowly blackened; tibiæ uniformly yellowish brown; tarsi similar, the terminal segments black; legs elongate. Wings subhyaline, cells *C* and *Sc* dark brown; wing-base, before the arculus, tinged with yellowish brown; stigma conspicuous, dark brown, preceded and followed by indistinct yellowish areas; veins dark brown, slender. Venation: cell 2nd *R*₁ small, rectangular; petiole of cell *M*₁ shorter than *m*; *m-cu* obliterated by fusion; cell 2nd *A* moderately broad.

Abdominal tergites deep reddish brown, the lateral margins broadly whitish, this coloration decreasing in extent

distally, margined internally by a deep blackish area; sternites uniformly dark brown, the hypopygium more reddish brown.

Hab. New Zealand (North Island).

Holotype, ♂, Ohakune, altitude 2060 feet, December 23, 1921 (*T. R. Harris*).

VIII.—*A Note on the Species as a Gene-complex.*

By GUY C. ROBSON, M.A.

UP to the present no very satisfactory solution of the "species question" has been offered by the geneticist. He has indeed supplied some very just criticisms of the taxonomist's attitude towards the "species," particularly on the question of their origin; but he has nevertheless produced no constructive solution of the problem. The effect of genetic studies in the field of taxonomy has been, in fact, similar to that of the Selection theory. Bateson has pointed out (I, p. 10) the falsification of Darwin's prediction that, when his interpretation was adopted, "the disputes whether or not some fifty species of British brambles are good species or not will cease," only to admit on another page (*l. c.* p. 3), "I cannot assert that we are already in a position to answer this important question" (What is a species?).

In the following note I venture to indicate a method by which at least some precision might be introduced into the discussion. I do not wish to claim originality for these views. They are partly a restatement in a different terminology of those held by other people. I venture to think that such a restatement is necessary at the present time.

We are offered two mutually exclusive views on the nature of species. One is that a species is a purely arbitrary association of individuals agreeing in respect of certain characters, an association justifiable on pragmatical grounds as affording a working basis for the task of classification. The other view is that the species is a biological reality, though no means at present are available for arriving at a satisfactory criterion or of unifying the species-concept as it is applied to the various groups of animals and plants. A number of suggestions have been made as to what such a criterion might

be, ranging from the crude concept of the individual taxonomist's "*flair*" or "eye for a species" to a more serious attempt to synthesize a number of correlated characters after a careful biometrical study of variation in the group.

The latter method seems to offer at least a means of bridging the gap between the taxonomist and the geneticist. We owe to Morgan (5) the concept of the species as a gene-complex. At present this is only a suggestion unelaborated and undeveloped; but it seems to be precisely parallel to the view of certain taxonomists who lay stress on the importance of a number of closely correlated characters.

When animals representative of a "species" are studied intensively by the taxonomist there is revealed a large complex of structural features which exhibit the effects of "specific" differentiation. According to my own experience it is hard to find a system which is not capable of showing the latter. Even glandular structures may be found to exhibit differentiation in two closely related forms, as Kleiner (3) has shown.

It is the composition and fate of the character-complex that has been most neglected in discussions on the nature of species. In practice it has been recognized, but its implications have not been followed up by intensive work on genetic and morphological lines.

We have to ask ourselves, if a species is a complex of constantly associated characters, how does the complex behave in heredity? Are the various characters affected by linkage*? If so, can we ascertain the degree of linkage and thus obtain a standardization of the species? If there is no linkage, what is the nature of the association of characters? Is it purely fortuitous and susceptible of dissociation by crossing? Have we, finally, an advance from unstable character-associations to systems exhibiting linkage in various degrees?

We are certainly not in the position to answer these questions yet; and to suggest lines of research and hint at problems to be solved is perhaps a poor sort of policy. But in the present case any sort of criticism of method is desirable, especially if it affords a *liaison* between two types of research. The writer is constantly impressed in his taxonomic studies of the Mollusca with the instability of the character-complexes conventionally known as "species" and

* The term *linkage* is used here in the general sense of a tendency on the part of certain characters "to keep together rather than to assort freely," Morgan (5, p. 80).

the varying degree to which the characters composing the complex are represented in the individual (*cf.* 6, p. 263). It seems, therefore, that a division of labour is desirable. The anatomist should indicate various types of character-association, and the experimentalist should analyse such cases and assign to them a correct genetic interpretation.

One can imagine that the result of such a study of character-associations might yield one of the results suggested above, *viz.*, every degree of association from the most unstable to the most complete linkage. Would we in such a case be any nearer our goal? The "species" would still be a concept only—a projection of our minds in their search for a *point d'appui* in the perplexing multitude of types of association. We would, however, have arrived at a clearer conception of the way in which the associations originally distinguished as "species" are built up, maintained, or dissociated. We would concentrate less upon the association itself than on the way it is represented in the individual.

In practice we find it increasingly difficult, as animals are subjected to a more intensive study, to make our rigid concepts fit the facts of Nature. Not only species but genera and families appear to be mere abstractions which form a sort of "Bed of Procrustes" in which the affinities of animals are often painfully distorted in order to fit the inelastic framework. On the other hand, it is obvious that we cannot relapse into a passive acceptance of an animal kingdom wholly anarchic in the relationship of its units. The observations of competent field-naturalists and taxonomists show us that some associations at least are permanent. The fault of taxonomy in the past seems to have been not that its units are unreal, but that it has extended them unwarrantably. A well-known case may make the above generalizations clearer.

The two species of snail, *Tachea hortensis* and *T. nemoralis*, are widely distributed in West and Central Europe. They have been the objects for many years of a solicitous examination usually made in order to answer the questions: "Are they two species, and, if so, what is the real difference?"

These studies were originally conchological, but the number of structures examined has been increased and breeding experiments have been conducted with the animals. One of the chief results for our purpose is that places are known where the pure *hortensis* shell-form is obtained either with or without the pure *nemoralis* shell-form, and *vice versâ*. On

the other hand, we find localities where "intermediates"* occur. Examination of these various types have been principally conchological, and it has been concluded that all the shell-characters are completely "transgressive"*. A more limited examination of the genitalia indicates that these organs are also transgressive. An exception has been invariably made in the case of the *dart*. It is usually stated that the latter is the only criterion of distinctness. There now appears to be doubt even on this subject.

We have also cases where the *hortensis* and *nemoralis* complexes are modified so as to render distinction impossible. Information is less plentiful about the relation of these "species" to the other *Tacheas*. But it is possible that they have the same indeterminate relationship with *T. austriaca*.

Before completing our review of this case we must briefly consider the *dart* as a criterion of distinctness. As we have pointed out above, there is some doubt whether it is not also transgressive. A new difficulty is, however, created by the discovery by Lang (4), Kleiner (3), and Boettger (2) that the *dart* itself behaves not as a unit but as a complex. Eight characters can easily be distinguished in it, and, according to the results of Lang and Kleiner, the darts of the F_1 hybrids are a "mosaic" of *hortensis*, *nemoralis*, and intermediate characters! Furthermore, all the hybrids did not exhibit the same combination.

We thus see that in this case the search for an absolute criterion breaks down. Our gene-complex appears to be a constant association only in certain cases. At one time we find an association of extreme *hortensis* or *nemoralis* characters; and we might be justified in recognizing such compact groups of characters as "species." But in other cases we find groupings which we can only assign to one or the other of the two extreme types by an obvious *petitio principii*—an appeal to the *dart*. In assigning such forms to one or another of the two "species" we are certainly not indicating their real relationship, which is one that cannot be expressed by crudely contrasted names. What we require is some system that expresses the different modes of character-combination.

It is very much to be regretted that up to the present no satisfactory F_2 results have been obtained from crossing the extreme forms. If an increased knowledge of the necessary vital conditions is successful in producing a third generation,

* The terms "intermediate" and "transgressive" have been used in this note without qualification. In the circumstances, a discussion of the precise meaning of such types of variation seems to be unnecessary.

we shall be in a better position to discuss the behaviour of the various characters and to decide whether linkage is present.

In the meantime, the discussion whether there are two "species" or one in this case is probably placed in its true perspective. In the first place, we see that the species-concept is too rigid to apply to such a variety of indeterminate character-associations. Even if we single out the extreme associations and oppose them under different names, we are merely confusing the issue by stressing the extremes and ignoring the more indeterminate combinations. In the second place, we do not know whether these particular extreme associations are analogous to others in which linkage occurs, though we might be tempted to predict from the combinations found in the field that they are not.

SUMMARY.

(1) There is urgent necessity for the investigation of the "species" as a character-complex. The subject should be studied both from its genetic and its morphological aspect.

(2) The character-complex is a fact of common knowledge. Viewed at the morphological level it varies extensively in its components, exhibiting a correlated system of non-transgressive characters or showing a large variety of combinations which include transgressive characters.

(3) The future method of investigation should be an attempt to discover whether linkage occurs in such associations, and, if so, to what extent.

(4) Improved morphological and genetic investigation of the degree to which the complex is represented in *individuals* is likely to show that any attempt to distinguish rigid categories among associations of such variable constitution is a very imperfect representation of the relations between organisms. The "species" concept, as far as we can see without further investigation along these lines, appears to be applicable to only a certain type of combination.

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IX. — *Diptera* (*Orthorrhapha Brachycera* and *Cyclorrhapha*) from Spitsbergen and Bear Island. *Results of the Oxford University Expedition to Spitsbergen, 1921.*—No. 22.
By J. E. COLLIN, F.E.S.

THE small collection of *Diptera* placed in my hands by Prof. E. B. Poulton for purposes of identification contained only eight species. Of the seven collected in Spitsbergen, six have previously been recorded from that island, while all seven appear to have a wide range of distribution in the north. The eighth species, collected in Bear Island, appears to be an undescribed species; its association with gulls' nests, and the fact of its having been found also in the island of St. Kilda, makes it probable that it will also be found to have a wide distribution in northern regions.

Empididæ.

Rhamphomyia caudata, Zett.

1 ♂, south side of Ice Fiord, Advent Bay, 0–100 feet. On flowers of *Dryas octopetala* and *Cerastium alpinum*. C. S. Elton, July 18th, 1921.

This brightly shining black species with pilose legs and remarkable male hypopygium was recorded from Spitsbergen by Holmgren in 1869. It has been confused by some writers with *R. æthiops*, Zett., a species whose range of distribution extends much farther south; consequently it is not possible to record accurately the distribution of *caudata* beyond the fact of its occurrence in Northern Scandinavia and Spitsbergen. If, as I believe, *longestylata* is a synonym of this species, it also occurs in the Kanin Peninsula, North Russia.

Syrphidæ.

Syrphus tarsatus, Zett. (*dryadis*, Holmgr.).

1 ♀, south side of Ice Fiord, Advent Bay, 0–100 feet. On flowers of *Dryas octopetala* and *Cerastium alpinum*. C. S. Elton, July 18th, 1921.

This female is certainly the same as Holmgren's *dryadis*, the type of which was also found frequenting the flowers of *Dryas* in Advent Bay. The face is obscurely yellowish, with the jowls and mouth-edge black, the dark colour spreading upwards at the sides to include the facial foveæ, and with three brownish-black stripes extending upwards from the front

mouth-edge towards antennæ (a broader stripe each side of the facial protuberance and a narrower ill-defined stripe over it). Frontal lunule immediately over the base of antennæ yellow. Abdomen ovate, with narrow, transverse, ill-defined, reddish bands on third and fourth segments only; these bands are near the base of each segment and do not reach the side-margins, and are broadly separated at the middle. Hind margin of the fourth segment reddish yellow, of the fifth segment more narrowly yellow. The four anterior tibiæ and the apical third of their respective femora yellowish, the tip of hind femora and basal third of hind tibiæ more obscurely yellowish.

Syrphus tarsatus, Zett., var.

A second female taken at head of Ice Fiord, Gyps Valley, 100–200 feet, on slope with *Dryas* and *Saxifraga*, on June 26th, 1921, by C. S. Elton, appears to be a variety or possible distinct species. The face is practically without any trace of yellow ground-colour except between the base of each antenna, though dusted greyish, most conspicuously so at sides and below antennæ, leaving the facial protuberance, clypeus, and extreme margin of mouth-edge more shining black. Abdomen narrower, without any trace of bands. Legs darker, the anterior tibiæ very obscurely yellowish and only the tip of femora yellowish. Holmgren recorded the capture of females of his *dryadis* without pale markings on the abdomen.

S. tarsatus (of which *S. dryadis* is now considered a synonym) occurs in Greenland, Iceland, Northern Scandinavia, Spitsbergen, Nova Zembla, and North-west Siberia.

Anthomyidæ.

Acroptena frontata, Zett.

1 ♀, head of Ice Fiord, Gyps Valley, 100–200 feet, on slope with *Dryas* and *Saxifraga*. C. S. Elton, June 26th, 1921.

This species has previously been recorded from Spitsbergen by Holmgren; it also occurs in Greenland, Scandinavia, and the mountains of Central Europe, but in the last locality a closely allied species has certainly sometimes been mistaken for the true *frontata*.

Limnophora hyperborea, Bohem.

The genus *Limnophora*, sens. lat., which has its headquarters in the north, is well represented within the Arctic

Circle; even from Spitsbergen alone some dozen supposed species have been described or recorded by Boheman and Holmgren. These early writers failed to describe the important chætotactic characters by which the different species may be best recognized, and this omission, coupled with the fact that specimens from the Arctic region are seldom brought home in good condition, has been the cause of great confusion in connection with the species concerned.

In Kertész's 'Katalog' the Spitsbergen species stand as follows:—

1. *Limnophora denudata*, Holmgr., ♂ ♀.
ranunculi, Holmgr., ♀.
2. *L. dorsata*, Zett., ♂ ♀.
hyperborea, Bohem., ♂ ♀.
labiosa, Bohem., ♀.
megastoma, Bohem., p.p.
3. *L. fuliginosa*, Holmgr., ♂.
4. *L. illota*, Holmgr., ♂.
5. *L. megastoma*, Bohem., ♂ ♀.
ludibunda, Holmgr., ♂.
triangulifera, Bohem. (1865), nec Zett.
? *conspurcata*, Holmgr., ♂ ♀.
6. *L. pauxilla*, Holmgr., ♂ ♀.
7. *L. vitticollis*, Zett., ♂ ♀.

Ringdahl, who has done much to clear up the Swedish species of *Limnophora*, gives (after an examination of Zetterstedt's types) *vitticollis*, Zett., as a synonym of *triangulifera*, Zett., but it is not certain that this applies to Holmgren's *vitticollis*. More recently (1917) Lundbeck has varied the synonymy of some of the Spitsbergen species by quoting *denudata*, Holmgr., as a synonym of *contractifrons*, Zett. & Stein, and the above *dorsata* of Holmgren (NOT of Zetterstedt) as a synonym of *triangulifera*, Zett. & Stein, with *pauxilla*, Holmgr., and *ranunculi*, Holmgr., as doubtful synonyms. I very much doubt the correctness of this latter synonymy of Lundbeck's. *L. triangulifera*, Zett., has clear wings, while Holmgren's *dorsata* was described as having:—"Alæ . . . costam versus præsertim infuscatæ, areis basalibus quibusdam et macula ad apicem nervi auxiliaris ut plurimum fuscis; nervo transverso ordinario umbra fusca, plus minusve distincta."

A species captured in some numbers by Mr. Elton answers admirably to this description, and is certainly NOT *triangulifera*, Zett., nor is it *dorsata*, Zett., as interpreted by Ringdahl. As Holmgren quoted *hyperborea*, Bohem., as being "most certainly" a synonym of the species he called *dorsata*, and Mr. Elton's specimens are not *dorsata*, Zett., it would appear that *L. hyperborea* is the correct name for this Spitsbergen species. I have compared specimens received from Ringdahl of his *L. frigida* (described in 1920 from specimens captured in the mountains of Northern Sweden) with the Spitsbergen *hyperborea*, and consider them identical. The synonymy may therefore be quoted as follows:—

L. hyperborea, Boheman (1865), ♂ ♀.

dorsata, Holmgr. (1869), nec Zett., ♂ ♀.

frigida, Ringdahl (1920), ♂ ♀.

? *labiosa*, Bohem. (1865), ♀.

? *megastoma*, Bohem. (1865), p.p.

Details of the capture of the five males and seven females in the collection from Spitsbergen (all but one being taken at head of Klass Billen Bay, Bruce City, shingly raised beach, 25-50 feet) are as follows:—

A male on July 19th about huts on shingle of raised beach. A male and female on July 22nd flying over shingle with tundra and ponds. A male on July 30th and a female on Aug. 14th on hut-window pane or ledge below. A male on Aug. 1st on flowers of *Dryas octopetala* near pond. Another male on Aug. 2nd on flowers of *Silene acaulis*. Three females on Aug. 2nd on flowers of *Saxifraga hirculus* near pond. The above all captured by C. S. Elton. The last at this locality being found by J. Walton on a poppy-head on Aug. 2nd, dead, with ovipositor extended. A female was also taken at about 60 feet on north side of Ice Fiord, Cape Boheman, on July 12th by C. S. Elton flying over a strip of marshy land among the rocky tundra near coast.

I find nothing to add to Ringdahl's description of *frigida* in Ent. Tidskr. 1920, pp. 27-28, and the species can be recorded with certainty from only Northern Scandinavia and Spitsbergen.

Limnophora megastoma, Bohem.

Of this species there are six females in the collection, all taken by C. S. Elton—four at Klass Billen Bay, Bruce City, shingly raised beach, 25-50 feet, viz., one on July 22nd on

shingly raised beach with *Dryas* &c., one on Aug. 2nd on flowers of *Silene hirculus* near pond, one on Aug. 4th on tundra on shingly raised beach, and one on Aug. 14th on hut-window or ledge below. A single female was captured on July 10th on Prince Charles Foreland, 30-80 feet (island west of Spitsbergen), Freshwater Bay district N.E. of island, amid flowers of *Silene acaulis* on rock on hill. Also a single female on July 18th from south side of Ice Fiord, Advent Bay, 0-100 feet, on flowers of *Dryas octopetala* and *Cerastium alpinum*.

All these specimens (except that from Advent Bay) are dwarfed (about 3.5 mm.), and possess usually only three pairs of strong postsutural dorso-central bristles on thorax, the second pair behind suture absent or only represented by a stiff hair. Moreover, the discal cell is somewhat pointed at the lower outer angle as in *pauvilla*, Holmgr., and *illota*, Holmgr.; nevertheless, I cannot consider them in the absence of the male as anything more than a variety of the *megastoma*, Bohem., recognized by Ringdahl as occurring in Northern Scandinavia. The same species also occurs in the island of Jan Mayen.

MUSCIDÆ ACALYPTRATÆ.

Scatophaga varipes, Holmgr.

A pair taken by C. S. Elton, Aug. 14th, on human dung just above high tide on the raised shingly beach at head of Klass Billen Bay, Bruce City.

This species differs primarily from *squalida* in having in the male more pilose legs, without the antero-dorsal row of strong bristles on hind femora, at most with only 1-2 such bristles towards tip; the hind tibiæ are more curved, the fine hairs on thorax rather longer, and the two rows of acrostichal hairs somewhat nearer each other. In the female, though the row of bristles is present above hind femora, the legs (especially the hind tibiæ) are longer-haired than in *squalida*. Both cross-veins of each wing are strongly infuscated.

The northern species of *Scatophaga* are not well known. *S. varipes* was described from specimens caught in Nova Zembla, and has not previously been recorded from Spitsbergen. I have seen specimens from the island of Jan Mayen. It appears to vary (as its name indicates) in the colour of its legs.

Fucomyia frigida, Fln.

A single male from Prince Charles Foreland (island west of Spitsbergen), Freshwater Bay district, N.E. of island; captured on July 4th at Pt. Carmichael at about 40 feet on sandy zone of shingly raised beach.

The specimen is one of the larger forms (7.5 mm.) with strongly pilose middle tarsi, but has no indication of yellow markings on the abdomen. *F. frigida* is a species of wide distribution.

Leria septentrionalis, sp. n., ♂ ♀.

Small, uniformly dark grey species, with extensively darkened frons, antennæ, and legs; only one pair of vibrissæ and only one strong sterno-pleural bristle.

♂. Head with slightly wider space between hind margin of eyes and postocular ciliation than in allied species, and face with a fairly distinct central keel, continued upwards between antennæ. Occiput, vertex, and narrow frontal orbits dull grey, the frontalia dull brownish black, becoming a lurid red only towards front margin. Face and the deep jowls so densely dusted greyish as to completely obscure the reddish-yellow ground-colour. Antennæ with the first two joints reddish, but the almost circular third joint dull brownish black, with reddish tinge at least on inner side about base; base of arista (apparently the first two joints) conspicuously dilated, the rest slender and microscopically pubescent; the whole arista short, the distance from tip of arista to base of antenna being conspicuously shorter than frons from base of antennæ to vertical ridge. The front orbital bristle quite as long as the hind one (one male specimen is abnormal in having only two orbital bristles in all, and these not placed exactly opposite each other). Only a single strong bristle at vibrissal angle, and a single row behind it (along side of mouth-edge) of quite small bristles. Clypeus dusky. Palpi reddish yellow.

Thorax uniformly dull dark grey like the occiput and vertex, without darker stripes on disc. A distinguishing feature lies in the shortness of the three anterior of the four pairs of dorso-central bristles; the hind (prescutellar) pair are moderately long, but the others are hardly twice the length of the short hairs on disc of thorax, though these short hairs are certainly rather longer than usual. Only one strong sterno-pleural bristle; mesopleura and prothoracic sternum bare.

Abdomen the colour of thorax, with a slight reddish-brown tinge on at least the lower part of the somewhat globular hypopygium. Genital lamellæ rather slender and pointed, more like those of *inscripta* than those of *serrata* or *modesta*. Hind-marginal bristles short, fine, and inconspicuous.

Legs coloured much as in *modesta*—*i. e.*, with the trochanters, extreme base and tip of femora, tibiæ (except for more or less extensive darkening about middle), and base of at least the four anterior tarsi obscurely yellowish. No bristles above hind femora towards tip. Middle tibiæ with a slight dilation or projection at extreme tip beneath, on which 1–2 apical spurs are placed (there is a somewhat similar dilation in true *ruficauda*, Zett., and *inscripta*, Mg.). No hook or projection at tip of basal joint of either front or hind tarsi. Wings rather short and narrow, with the costal spines very inconspicuous, hardly longer than the other costal pubescence. Halteres yellow, with slightly dusky knobs.

♀. Closely resembling the male, but abdomen more pointed, terminating in a pair of long yellowish-brown papillæ, clothed with short dark hairs and each with a pair of quite long hairs at the tip. Middle tibiæ without the projection at tip beneath of male. Wings rather longer than in male.

Length 3–4 mm.

2 ♂♂ and 3 ♀♀ taken by C. S. Elton at south-east corner of Bear Island (between North Cape and Spitsbergen) near South Harbour, in moss of glaucous gull's nest, on June 22nd, 1921; also taken in the island of St. Kilda in June–July 1905 by Rev. J. Waterston; the latter being the "No. 90, *Blepharoptera* sp.!, 4 ♂♂ and 2 ♀♀ undetermined," mentioned in Grimshaw's paper on the Diptera of St. Kilda in 'Annals of Scottish Natural History,' 1907, p. 156.

Several species of *Leria* have been described or recorded from the extreme north, such as *serrata*, L., *modesta*, Mg., *inscripta*, Mg., *geniculata*, Zett., *tibialis*, Zett., *minuta*, Zett., *borealis*, Bohem., and *maculipennis*, Beck. Of these the first three are distinct species well known to me; *geniculata* was described by Zetterstedt as having "setis mystacinis utrinque pluribus" like *serrata*; *tibialis*, Zett., is placed by modern writers as a small variety of *serrata*, and I have a note made many years ago of a male in Zetterstedt's collection that the genital lamellæ resembled those of *serrata*; in any case, it appears to differ from *septentrionalis* in having paler antennæ, frons, and tibiæ, and a slightly infuscated cross-vein; *minuta*, Zett., with "antennis, fronte . . . pedibusque rufo-testaceis," must be a paler species than *septen-*

trionalis; *borealis*, Bohem.*, with "setis mystacinis utrinque pluribus . . . Thorax lineolis sub-quinis fuscis. Abdomen cinereum . . . segmentis margine apicali anguste pallidis," is probably, as indicated in Kertesz's 'Katalog,' a synonym of *modesta*, Mg. Finally, *maculipennis*, Becker, is distinguished primarily by the strongly infuscated middle cross-vein.

X.—New Sarcophagidæ from Asia, with Data relating to the *dux* Group †. By R. R. PARKER, Bozeman, Montana.

DR. G. BÖTTCHER, writing in 1912 (1, pp. 735-736), considered *Sarcophaga tuberosa*, Pandellé, *S. harpax*, and *S. exuberans*, Pand., to be varieties of *S. tuberosa*. In previous papers the writer has followed this practice, treating these and other related forms, more recently described, first as subspecies of *S. tuberosa* and later as subspecies of *S. dux*, Thomson (2). This grouping has been due to the similar structure of the genital apparatus, especially of the penes, and the constant occurrence of a certain group of external characters in all these species. Furthermore, the grouping has seemed advisable as an indication of relationship. Including the three new forms described in this paper, the number of recognized members of the group is ten, each added member indicating more strongly the really specific value of the differentiating external characters. In future, therefore, the writer believes these forms should be recognized as distinct species belonging to a group within the genus. This group should be known as the *dux*-group, *S. dux* being the first described member.

In his last paper dealing with this group (2) the writer designated two forms as "subspecies *a*" and "subspecies *b*" respectively—the one being *S. shermani*, sp. n., herein described, and the other *S. exuberans*. Which name belonged to which species could not be stated, because of reasons then noted. It is now possible, however, to make the above designations, thanks to Dr. J. Villeneuve, who kindly forwarded a specimen of *exuberans*, which he had compared with Pandellé's type. It was further apparent that a

* This species was first described by Boheman in 1865 (Öfv. K. Vet.-Akad. Förh. Stockholm, xxii. p. 573), and not, as given in Kertesz's 'Katalog,' by Holmgren in 1872.

† Contribution from the Entomological Laboratory of the Montana State College, Bozeman, Montana.

European specimen in my collection which I had thought to be the same as "subspecies *a*" (*shermani*) was in reality undescribed, and is herein given the name *S. marshalli*, sp. n.

Sarcophaga shermani, sp. n.

Holotype (male), collection of R. R. Parker.

Allotype (female), collection of R. R. Parker.

Length 11-14 mm.

Male.—Three rows of black cilia behind eyes; cheek-vestiture black; anterior profile outline of forceps-prong gently sinuate near tip; the two pairs of distal processes of penis very slender (longer and more slender than in any other known species of the group); posterior spur-like projection of the distal sclerite of penis very prominent (largest and longest of any species of the group); first genital segment usually brownish, sometimes brownish posteriorly shading into dull orange anteriorly, less commonly dull orange throughout; second genital segment dull orange. For illustration of genitalia, see 2 (p. 45, figs. 6 & 13), and for separation of *shermani* and *sarracenoïdes*, Aldrich, see 2 (p. 42).

Female.—The female presents no characters which permit an accurate separation from that of *sarracenoïdes*, though knowledge of the locality of collection will often make identification reasonably certain.

Described from fifteen male and three female specimens.

CANADA: Savary Island, British Columbia, 5. vii. and 12. viii. 1918 (*R. S. Sherman*); Ottawa, Ontario, 25. v. 1896; Kentville, Nova Scotia, 7. viii. 1914 (*C. R. G.*); Boule River Camp, Riordan Limits, N.S., 31. vii. 1910 (*C. ? H.*). UNITED STATES: Lunenburg, Mass., 14. vi. 1914 (*R. T. Webber*); Magdalena, New Mexico; Northport, Mich., viii. 1903 (*Will Bailey*); Berkeley, Calif., 18. v. 1915 (*M. C. Van Duzee*); Redwood Canyon, Alameda Co., Cal., 29. v. 1915; Gallatin Mts., Mont., 30. vi. 1914 (*R. R. Parker*).

A specimen taken on Savary Island on 12th Aug., 1918, by R. H. Sherman, in whose honour the species is named, is the holotype.

The specimen taken at Magdalena, New Mexico, lacks prescutellar acrostichal bristles, but this is possibly an individual variation.

Sarcophaga exuberans, the form previously designated "subspecies *b*" (2), may easily be separated from both *shermani* and *sarracenoïdes* by the presence of but two rows of black cilia behind the eyes and of white vestiture on the

posterior portion of the cheek. *S. exuberans* is also smaller and less robust than these other two species. It is less easily separated from *craggi* (see paragraph following description of *craggi*).

Sarcophaga ceylonensis, sp. n.

Holotype (male), collection of R. R. Parker.

Allotype (female), collection of R. R. Parker.

Length 8–11½ mm.

The characters of the penis at once place this species in the *dux*-group, and it is then separated from the other members of the group by the following characters:—One row of black cilia behind eyes; cheek-vestiture white (few anteriormost hairs may be black); fourth abdominal notum with at least posterior margin dull orange; in profile basal portion of fifth ventral plate presents a straight line (not raised posteriorly); forceps-prong sinuate at tip (not toothed); both genital segments dull orange. In the female the above characters

Fig. 1.

Fig. 2.

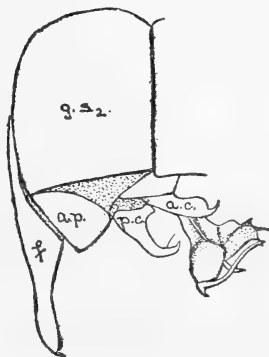
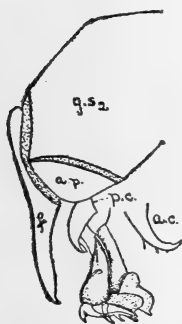


Fig. 1.—*Sarcophaga ceylonensis*, sp. n., male genitalia.

Fig. 2.—*Sarcophaga craggi*, sp. n., " "

(other than sexual) hold good, except that fourth notum is not dull orange posteriorly; the fifth notum is typically *dux*-shaped (fig. 1).

Described from nineteen male and twenty-one female specimens.

CEYLON: Peradenyia, 28. vii. 1920 (*J. C. Hutson*); Colombo, 29. xii. 1914 (record No. 3936). INDIA: Guindy, Madras (*J. Cragg*); Coimbatore, 9. x. 1913 (*T. B. Fletcher*). MALAY PENINSULA: Singapore (*Bryant & Palmer*).

The specimens from Peradenyia, Ceylon, were reared from a dead snail, *Achatina fulica*, and a single specimen from Colombo is recorded as having a "sheep" for its "host." The specimen from Coimbatore is labelled "from a dead snake."

Sarcophaga craggi, sp. n.

Holotype (male), collection of R. R. Parker.

Allotype (female), collection of R. R. Parker.

Length 9-12 mm.

The male of this species is differentiated from its near relatives by the following characters:—Two rows of black cilia behind eyes; cheek-vestiture white, except that of most anterior portion; in profile basal portion of fifth ventral plate presents a straight line (not "humped" posteriorly); forceps-prong toothed at tip (fig. 2, *f.*); claspers specific (*a.c.* and *p.c.*); penis; first genital segment brownish or blackish, pollinose, second segment dull orange. In the female the above characters (other than sexual) hold good, except the colour of the genital segments; these are dull orange throughout.

Described from five male and two female specimens.

INDIA: Guindy, Madras. NYASALAND: Blantyre, 30. iii. 1914 (*Dr. J. B. Davey*). LIBERIA: Mt. Coffee, iv. 1897 (*R. P. Currie*).

The holotype is from India; the allotype from Nyasaland.

S. craggi can be easily confused with *exuberans*, and separation can only be safely made from the characters of the forceps and claspers. The specimens from Nyasaland are labelled "from pupa."

This species is named in honour of Major F. W. Cragg.

Sarcophaga marshalli, sp. n.

Holotype (male), collection of R. R. Parker.

The following characters serve to distinguish *marshalli* from its group-relatives:—Three rows of black cilia behind eyes; cheek-vestiture black; middle femur without "comb"; in profile basal portion of fifth ventral plate presents a straight line (not "humped" posteriorly); forceps-prong scarcely toothed at tip, in profile the anterior and posterior edges parallel for a short distance back of tip (fig. 3, *f.*); claspers and penis specific (*p.c.*); first genital segment dark

brownish or blackish, pollinose, second genital segment dull orange.

Described from one male specimen.

EUROPE: the holotype bears the following label—"S. vito d. Norm.," 31. v. 1905.

This species is named in honour of Dr. G. A. K. Marshall of the Imperial Bureau of Entomology, and the holotype is the specimen mentioned by the writer (2, p. 42) as received from Dr. Bezzi, and at that time thought to be the same as *shermani*.

Sarcophaga hutsoni, sp. n.

Holotype (male), collection of R. R. Parker.

Allotype (female), collection of R. R. Parker.

Male.—Length 8–9½ mm. Two rows of black cilia behind eyes; vestiture of anterior portion of cheek black, of posterior portion white; frontals extending well below base of vitta; section iii. of costa longer than section v.; leg-vestiture short; posterior face of hind femur without ventral bristles; anterior acrostichals absent, four or more pairs of posterior dorsocentrals, only posterior two strong; vestiture of fourth ventral plate short and appressed; first genital segment without marginal bristles, second dull orange.

Head.—Viewed from front, parafrontals and genæ silvery-grey. Breadth of front at narrowest part about two-fifths eye-width; cheek-height about one-third that of eye. At its narrowest part, frontal vitta about twice width of each parafrontal, its sides not parallel. Second antennal segment dark; third about twice length of second; arista long, plumose to beyond middle. Two rows of black cilia behind eyes, otherwise vestiture of back of head white. Vestiture of anterior portion of cheek black, that of posterior portion white. Gena with row of hairs near lower eye-orbit, otherwise bare. Palpi dark.

Chaetotaxy.—Lateral verticals absent; vibrissæ inserted slightly above line of oral margin; each row of frontals extending beyond base of vitta, usually with eleven to thirteen bristles, lower end scarcely divergent from inner edge of gena.

Thorax.—Mesonotum clothed with short reclinate bristles. Epaulettes black.

Wings.—Bend of fourth vein a right angle or slightly less; anterior cross-vein more basal than end of first longitudinal; third vein with bristles; section iii. of costa longer than section v.; costal spine vestigial; calyptera whitish.

Legs.—Dark, vestiture short. Anterior face of posterior

femur usually with three rows of bristles, those of intermediate row few in number and sometimes almost lacking; posterior face without lower row of bristles; tibia straight; tarsus not shorter than tibia. Anterior and posterior ventral rows of bristles of middle femur present, former with only scattered bristles proximally, latter present on distal half only; submesotibial bristle present, anterior face of tibia with but a single bristle close to median dorsal ridge.

Chaetotaxy.—Anterior dorso-centrals about twice length of vestiture of prescutum; acrostichals absent; inner presuturals present; four or more pairs of posterior dorso-centrals, only posterior two strong; prescutellar acrostichals present; scutellar apicals present; three sterno-pleurals; lower sterno-pleura with bristles only.

Abdomen.—Clothed above with short reclinate bristles, beneath with somewhat longer, almost erect hairs. Vestiture of fourth ventral plate short and appressed.

Chaetotaxy.—Second segment without dorsal marginal bristles; third with two dorsal marginals and usually with two pairs of laterals.

Genital Segments.—First segment dark, without marginal bristles; second segment dull orange. Forceps (fig. 4, *f*.) darker than second segment, in profile anterior and posterior edges parallel on distal third, tip slightly curved forward with an angular tooth at extremity, prongs approximated for slightly more than basal half. Structure of penis very similar to that of *S. fuscicauda*, Böttcher.

Female.—Differs from male in following essential characters:—Breadth of front at narrowest part two-thirds eye-width; cheek-height about one-fourth that of eye; at its narrowest part frontal vitta scarcely wider than width of each parafrontal; row of hairs on gena near eye extends up on to parafrontal; vestiture of abdomen of short reclinate bristles except that that of ventral surface of fourth notum is erect and hairy; fifth abdominal notum (first genital) of same colour and pollinosity as those preceding; third abdominal notum dorsally and laterally with complete or nearly complete row of marginal bristles.

Described from six male and six female specimens.

CEYLON: Peradenya, 1. viii. 1919 (*J. C. Hutson*). SOUTH INDIA: Guindy, Madras, 18. iii. 1915 (*C. K. S.*).

Nine of the twelve specimens were taken from *Aristolochia* sp., at Peradenya, Ceylon, and from the appearance of the specimens they seem to have been reared (record no. 4426). Two specimens from South India are labelled "Par. on

grasshopper, on cumbu" (collection of Imperial Bureau of Entomology).

This species is close to *S. fuscicauda*, Böttcher. However, it had two rather than three rows of black cilia behind the eyes. The forceps are essentially alike and the penes quite similar. The fifth abdominal notum in the female of *hutsoni* is folded on the middle point of the posterior margin, so that the edges on either side of this point are either approximated along the median ventral line or are nearly so and parallel. This closely resembles the condition in *fuscicauda*, except that in the latter there are two points of fold, slightly separated, so that, while the two edges posterior to the points of fold are essentially parallel, they are normally separated and not approximated.

Both holotype and allotype were selected from the specimens taken from *Aristolochia*.

The species is named in honour of Mr. J. C. Hutson, Entomologist for Ceylon.

Fig. 3.

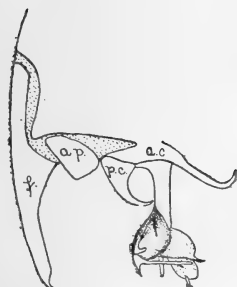


Fig. 3.—*Sarcophaga marshalli*, sp. n., male genitalia.

Fig. 4.



Fig. 4.—*Sarcophaga hutsoni*, sp. n., " "

Abbreviations in figs. 1-4:—*a.c.*, anterior claspers; *p.c.*, posterior claspers; *a.p.*, accessory plate; *g.s.* 2, second genital segment; *f.*, forceps.

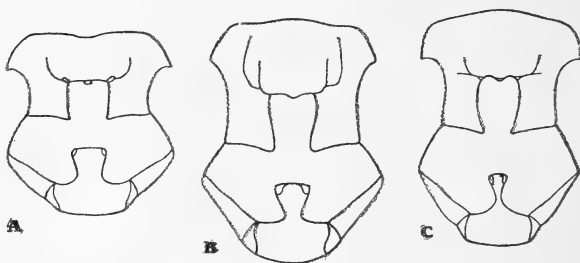
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- (1) G. BÖTTCHER. "Die männlichen Begattungswerkzeuge bei dem Genus *Sarcophaga*, Meig., und ihre Bedeutung für die Abgrenzung der Arten." *Deutsche Entomologische Zeitschrift*, 1912, Heft 5, pp. 525-544; Heft 6, pp. 705-736; 1913, Heft 1, pp. 1-16; Heft 2, pp. 15-130; Heft 3, pp. 239-254; Heft 4, pp. 351-377.
- (2) R. R. PARKER. "Concerning the Subspecies of *Sarcophaga durv.* Thomson." *Bulletin Brooklyn Entomological Society*, vol. xiv. no. 2, Apr. 1919, pp. 41-46.

XI. — *A Revision of the Old World Cyrtacanthacrini (Orthoptera, Acrididæ).—I. Introduction and Key to Genera.* By B. P. UVAROV, F. E. S., Assistant Entomologist, Imperial Bureau of Entomology.

THE group Cyrtacanthacrini comprises mostly large, or middle-sized, grasshoppers, characterised by the presence of a well-developed prosternal spine, by the lack of the outer apical spine of the hind tibiæ, and, more particularly, by the inner angles of the mesosternal lobes being straight or acute, but not rounded, and their inner margins rectangular or concave, but never convex (see figs. 1 A, B, C). Practically all authors have considered this peculiar shape of the mesosternal lobes as a generic character, and all the species possessing it, no matter how unlike each other they may be

Fig. 1.



Sternum : A, *Acridoderes crassus*, Bol. ; B, *Valanga nigricornis* (Burm.) ; C, *Pantanga succincta* (L.). $\times 4$.

in other characters, have been treated as congeneric and identified as *Acridium* spp., according to Serville's vague definition of the genus. As a consequence, more than one hundred species have been described under *Acridium*, many of them strikingly dissimilar and obviously not congeneric. This made the identification of species very difficult and uncertain, and as the majority of species, owing to their large size, have already been described long ago by older authors, who paid little attention to morphological characters and founded their species almost solely on coloration, the confusion of species has become quite overwhelming and a thorough revision is indispensable, the more so that the group includes also some of the most important swarming

locusts. In this work, however, I have restricted myself to a study of the Old World representatives of the group only, because of a lack of sufficient material from the New World*.

The rich collections of the British Museum, containing numerous types of the species described by Walker, have served as a basis for this work, but it could not have been successfully accomplished without the generous loan of types and other materials from practically all the European museums. A most obliging assistance in this respect has been given by the following persons, all of whom I should like to thank here once more:—Dr. L. Berland and Dr. L. Chopard (Paris Museum; Finot's types); Prof. Y. Sjöstedt (Stockholm Museum; types of species described by himself and by Stål); Prof. R. Ebner (Vienna Museum; types of species described by H. Krauss, K. Holdhaus, and H. Karny); Dr. C. Bolivar (Madrid Museum; I. Bolivar's types); Dr. de Witte (Museum of the Belgian Congo; I. Bolivar's types); Dr. G. Severin (Belgian Museum; I. Bolivar's types); Dr. L. Péringuey (S. African Museum, Cape Town); Prof. E. B. Poulton (Oxford Museum); Prof. M. Bedot and Dr. J. Carl (Geneva Museum). To Mr. J. H. Durrant I am greatly obliged for his valuable assistance in settling some most entangled and doubtful questions of synonymy.

Up to the year 1870, when Walker established his genus *Cyrtacanthacris*, all the species belonging to the group under revision were known under the generic name *Acridium*, which is being used even at present by some authors. The following history of generic names, however, shows most clearly that *Acridium* can only be applied to members of this group if we deliberately chose to preserve the evident mistake made by Serville in the application of the name.

The genus *Acrydium* was established by Geoffroy in 1762 (Hist. abr. des Insectes, i. p. 390) to include all short-horned grasshoppers, of which he records six species as occurring in the vicinity of Paris, none of them belonging to the subfamily Catantopinae (= Acridiinae, auct.) characterised by the armed prosternum. There is no indication whatever as to which of the six species mentioned by Geoffroy should be regarded as the genotype of *Acrydium*, but there is certainly no

* There is also much confusion in the systematics and synonymy of numerous American representatives of the group, and it is to be hoped that American orthopterists will soon clear it up, although this cannot be done without consulting European collections.

reason to treat as such the first species mentioned by Geoffroy, which, quite incidentally, happens to be *Locusta germanica*, Roesel (= *Sphingonotus cærulans*, L.), as is suggested by Sjöstedt (K. Sven. Vet.-Akad. Handl. lxii. No. 3, pp. 256-257, 1921). On the other hand, Fabricius (Syst. Entom. p. 278) in 1775 restricted the genus *Acrydium* to only two of the species mentioned by Geoffroy, viz. *bipunctatum* and *subulatum*, while he separated all other short-horned grasshoppers into the Linnean genera *Tryxalis* and *Gryllus*. The same two species are mentioned by Latreille (Hist. Nat. Crust. Ins. iii. 1802, p. 284) as "exemples," i. e., types of his genus *Tetrix*, which makes this name a pure synonym of *Acrydium* (Geoffr.), Fabr.*

It was Serville who in 1831 first applied Geoffroy's name *Acrydium*, which he corrected into *Acridium*, in an altogether different sense, while he included in his genus under that name several larger species of short-horned grasshoppers with armed prosternum (Ann. Sci. Nat. xxii. p. 282); the genotype was not indicated. Serville's conception of *Acrydium* (or *Acridium*, which is, of course, the same word differently spelt) has been, most unfortunately, adopted by all subsequent authors of standard works on Orthoptera (Burmeister, Stål, Brunner v. Wattenwyl, etc.), while *Acrydium* (Geoffr.), Fabr., has been quite incorrectly replaced by *Tetrix*, Latr. Kirby in 1890 (Scient. Proc. R. Dublin Soc. p. 592) restored the correct interpretation of the genus *Acrydium* (Geoffr.), Fabr., and this has been accepted, especially after the publication of his Catalogue, by many authors, but some of them are still using the name in Serville's sense. Prof. Sjöstedt recently proposed to use both names—*Acrydium*, Geoffr., for *Tetrix*, Latr., and *Acridium*, Serv., for certain members of Catantopinae; but this opinion, based upon a different Latin transliteration of the same letter in the original Greek word, cannot be accepted †;

* A definite fixation of the single genotype of *Acrydium* (Geoffr.), Fabr., was made in 1815 by Leach (Edinb. Encycl. ix. p. 120), who quotes under it *A. subulatum* only. Later on, in 1833, Curtis (Brit. Ent. x. pl. 439) formally indicated *bipunctatum* as the genotype of *Acrydium*, but it makes no difference in the conception of the genus, as the two species are congeneric.

† It may be mentioned also that Serville himself in his next book (Hist. Nat. Ins. Orth. 1838) wrote the name as *Acrydium* (p. 640), while in the descriptions of species on the succeeding pages (pp. 642, 643, etc.) he spells it *Acridium*, which makes it quite clear that he did not mean to describe a new genus, but simply used Geoffroy's generic name in a different sense.

still less convincing is Sjöstedt's proposition to regard *ruficornis* as the genotype of *Acridium*, Serv., on the false principle that the first species mentioned under the genus is the genotype.

It is obvious, therefore, that there has been no acceptable name for the genus described by Serville under the preoccupied name *Acridium*, until Walker (Cat. Derm. Salt. Brit. Mus. iii. p. 550) established in 1870 the genus *Cyrtacanthacris*, which partly covered *Acridium*, Serv.; the genotype of *Cyrtacanthacris* was fixed only in 1910 by Kirby (Cat. iii. p. 446), as *Gryllus Locusta ranaceus*, Stoll, which is conspecific with *Gryllus Locusta tartaricus*, L. (see below). Walker's name, however, has never been recognised by other authors.

The next genus of the group described was *Schistocerca*, Stål (Rec. Orth. i. p. 64, 1873), established as a subgenus of the genus *Acridium*, Serv., to include *Acridium peregrinum*, Oliv. (= *Gryllus gregarius*, Forsk.; see below), and its American allies. There can be hardly any doubt as to the genotype of this genus, though it was formally fixed only in 1910 by Kirby (Catalogue, iii. p. 454) as *Gryllus Locusta tartaricus*, L., which he incorrectly (see below) applied to *Gryllus gregarius*, Forsk.

L. Bolivar in 1889 (Jorn. Sci. Lisboa, i. p. 163) founded another new genus of the group, *Acridoderes*, with a single species *A. crassus*, which thus automatically becomes the genotype, but several other species described by the same author under that generic name later on do not belong to the genus.

In 1896 Karsch (Stett. Ent. Ztg. lvii. p. 303) established the genus *Orthacanthacris*, again for a single species, *O. humilicrus*, Karsch, which is therefore the genotype. As, however, he did not give a proper description of the genus, the latter has been interpreted by subsequent writers incorrectly. Thus, Karny (Sitz. Akad. Wiss. Wien, cxvi. 1907, p. 304) included in the subgenus *Orthacanthacris* of the genus *Locusta**, besides *humilicrus*, *moesta* of Serville (described by him as *wernerella*), which is clearly not congeneric with it. A still more vague and indefinite conception of the genus

* He followed the incorrect conception of the genus *Locusta* advanced by Krauss, who worked on the false principle of elimination and fixed *Gryllus Locusta tartarica*, L., as the genotype of *Locusta* in 1902, although the genotype had been fixed as early as 1815 by Leach as *G. Locusta migratoria*, L. (see my paper on the genus *Locusta*, L., in Bull. Ent. Res. xii. 1921, p. 136).

Orthacanthacris may be found in Kirby's Catalogue (iii. p. 444), he having included in it as many as eleven species belonging to three genera, according to our present views. Later on, in 1914 (Fauna Brit. India, Acrid. p. 224), he gave his own extremely vague description of the genus *Orthacanthacris*, which does not even fit the genotype, *O. humilicrus*; it is obvious that his idea of the genus originated not from the study of the genotype, but merely from the name of the genus, as he simply included in it all species of "*Acridium*" with the prosternal spine straight.

More recently, three more genera, all rather aberrant from the general type, have been described, viz., *Phyxacra*, Karny (1907), *Congoa*, Bolivar (1911), and *Loiteria*, Sjöstedt, but no attempt has ever been made to clear up the generic classification of the group. C. Willemse, who has recently (1921) tabulated the Oriental and (partly) Australian genera of the subfamily Catantopinae (Zoolog. Meded. vi. 1, p. 15), followed Kirby in the conception of the two genera *Cyrtacanthacris* and *Orthacanthacris*. Prof. Sjöstedt, in his just-published monograph of the Australian Acrididae (K. Sven. Vet.-Akad. Handl. lxii. No. 3, 1921), goes back to the adoption of a single genus, *Acridium* (besides *Loiteria*, which is a very aberrant insect), as accepted by Serville, Stål, etc.; his reasons for this have been discussed above*, and there is no need of further criticism.

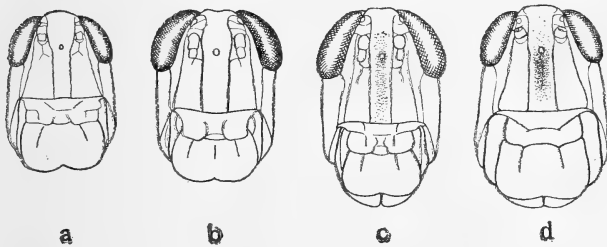
I have deliberately omitted in the foregoing outline of the history of the group to mention the comparatively recent revision of the genus "*Acridium*, Serville," by Finot (Ann. Soc. Ent. France, lxxvi. 1907, pp. 247-354), as it deserves a special discussion, being regarded as a standard work by all the modern orthopterists who use it for the identification of species. It has been, however, greatly over-estimated, and its chief fault is that the author lacked not only critical judgment, but even the correct knowledge and appreciation of characters, as his classification of the species of the genus "*Acridium*" (in which he included indiscriminately all insects described under this name by old writers) is based exclusively on colour-characters without any reference to

* Prof. Sjöstedt objects also to alterations in the family-names of certain groups of Orthoptera, and especially to transferring the name Locustidae from long-horned grasshoppers to the short-horned ones, which have been called Acridiidae; this was a mistake on the part of Kirby, who correctly removed *Locusta* from the long-horned grasshoppers, Tettigoniidae, but quite unnecessarily altered the name Acridiidae into Locustidae, whereas the family must be called Acrididae after *Acrida*, L.

morphology, and even his detailed descriptions of the species he had before him are remarkable for their vagueness and superficiality, rendering them to a large extent useless and even misleading, as I am able to state after a study of the majority of his types.

A superficial glance at a collection of "*Acridium*"-species is sufficient to show the impossibility of keeping them all in one genus, or even in three or four genera, while a careful study of all morphological characters reveals a number of very important differences between groups of species which must be treated as genera. Of those characters, one of quite special value is the structure of the head, particularly of the frontal ridge (fig. 2), which enables us to make

Fig. 2.



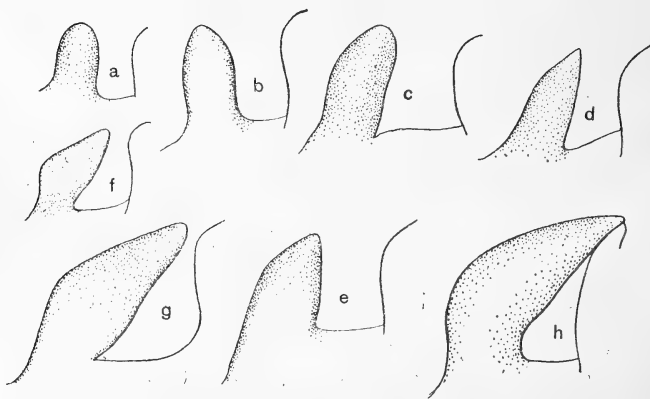
Front view of head; a, *Acridoderes crassus*, Bol.; b, *Anacridium egyptium* (L.); c, *Valanga nigricornis* (Burm.); d, *Patanga succincta* (L.). $\times 4$.

the primary division of the group. Further, the shape of the elytra and their reticulation (but not the venation, *i. e.* the position and form of the principal veins, which is fairly uniform throughout the group) supply some excellent characters of doubtless generic value. The shape of the prosternal spine (fig. 3) is also, as a rule, of generic value, although the variations in its structure are limited, and accordingly it is used for separating groups of genera. A very great importance is attached by me to the shape of the external genitalia, especially of the male sex, as this is a character, or rather a complex of characters, not likely to be influenced by the external conditions. In some particular cases, genera are aberrant from their nearest allies in other respects, as, for instance, *Orthacanthacris*, which has very peculiarly shaped hind legs. As a rule, the type of coloration is also

of generic value, although I have tried to avoid the introduction of this character, which may be misleading, into my key to genera. The number of spines on the hind tibiæ is not quite constant in the subfamily, but in some cases it is a generic character.

The number of genera thus separated out by purely morphological characters may seem too large, and the genera too restricted, but generic classification will be always to a certain extent a matter of personal opinion, and I believe that in a preliminary work like this revision (which is by no means an exhaustive monograph) it is better to split the

Fig. 3.



Prosternal tubercle: a, *Bryophyma debilis* (Karsch); b, *Anacridium ægyptium* (L.); c, *Patanga japonica* (Bol.); d, *P. succincta* (L.); e, *Valanga nigricornis* (Burm.); f, *Finotina radama* (Brancs.); g, *Acanthacris ruficornis citrina* (Serv.); h, *Glaphyra cyanea* (Stoll). $\times 6$.

group into many small, but well-defined, genera than to distinguish only a few genera with vague diagnoses.

The specific classification, and especially synonymy, proved to be the most difficult part of the work, as the majority of the species had been founded on colour-characters only. I think, however, that I have managed to clear up the confusion in the synonymy of most species in a fairly satisfactory way; this proved to be possible only because I have had before me practically all the species of the group and a great majority of the existing types. A very great advantage

in clearing up synonymy and in establishing a natural classification of species has been gained by adopting the idea of geographical races, or subspecies, which are in many cases distinct from each other both in coloration and in morphology, and have been described accordingly as independent species, but, in fact, are connected by transitional forms inhabiting the intermediate geographical areas; their separate treatment by other writers has swollen enormously the total number of species in the group.

As a result of my revision, the number of genera is increased from seven to twenty-six, while the number of species has been reduced from 130 mentioned by Finot, or from ninety-two of Kirby's Catalogue, down to sixty species and twenty-five additional subspecies; the true meaning of the latter figures will be best realised from the fact that as many as 140 different specific names came into consideration.

The number of new species and subspecies described in this paper is very small, which shows that the group is already fairly well known, and further novelties may be expected only from such places as the interior of Africa, and especially from Australia, New Guinea, and other Indo-Malayan islands.

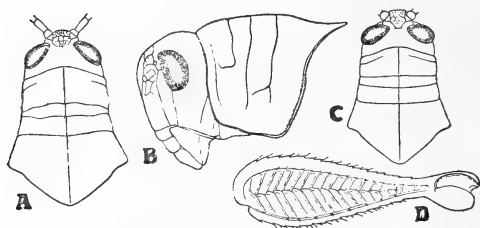
The following abbreviations are used in the text:—B.M., British Museum; C.M., South African Museum, Cape Town; G.M., Muséum d'Histoire Naturelle de Genève; M.M., Museo Nacional de Ciencias Naturales, Madrid; O.M., Hope Department, University Museum, Oxford; P.M., Muséum National d'Histoire Naturelle de Paris; S.M., Naturhistoriska Riksmuseet, Stockholm; W.M., Naturhistorisches Staatsmuseum, Wien. One asterisk before a name in the synonymy means that the species is known to me by authenticated specimens; two asterisks, that the type has been studied.

Key to the Genera.

- 1 (50). Pronotum with the median keel more or less developed (in *Melicodes* and *Gowdeya* almost obliterated, but still perceptible), with three transverse sulci. Hind wings, when present, distinctly elongated.
- 2 (9). Frontal ridge very strongly dilated above the ocellum (and not constricted again at the fastigium), narrowed below it and obliterate about halfway between

- ocellus and clypeus; its surface convex or flat; margins not raised (fig. 2, a). Elytra obliquely truncate apically; the reticulation in the basal half dense, with the cellules elongate (fig. 5, A, B).
- 3 (8). Elytra extending to the apex of the abdomen or even longer. Prozona not or scarcely shorter than metazona. Prosternal spine straight, not at all or scarcely inclined towards mesosternum, but not touching it.
- 4 (7). Temporal foveolæ distinct (fig. 4); margins of the fastigium slightly raised. Prozona subequal to metazona; its hind angle rounded (fig. 4). Elytra with the veinlets in the apical part not dense, fairly regular, oblique (fig. 5, a).

Fig. 4.



A, B, *Acridoderes crassus*, Bol.; C, D, *Phyxacra strenua* (Walk.)
× 2.

- 5 (6). Distance between the eyes * narrower or only slightly broader than the frontal ridge between antennæ (fig. 4, C); eyes at least twice as high as long †; subocular distance ‡ subequal to their length. Frontal ridge below the ocellus slightly impressed. (Africa: genotype, *Caloptenus strenuus*, Walk. (= *Coptacra variolosa*, Krauss)..... 1. *Phyxacra*, Karny.
- 6 (5). Distance between the eyes distinctly broader than frontal ridge between

* Seen from above.

† By the length of an eye I mean its horizontal diameter.

‡ Subocular distance is the distance between the lowest point of an eye and the base of the mandible; as a rule, this line is indicated by a sulcus, which may be called the subocular sulcus.

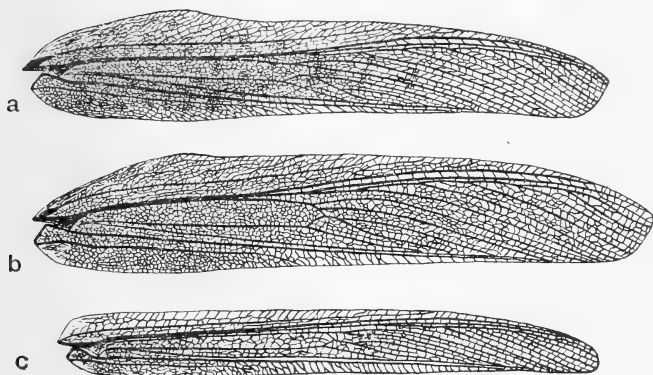
antennæ (fig. 4, A); eyes distinctly less than twice as high as long; subocular distance subequal to their height (fig. 4, B). Frontal ridge below the ocellus not impressed. (Africa: genotype, *Acridoderes crassus*, Bol.).....

7 (4). No trace of temporal foveolæ; fastigium strongly convex, its margins not at all raised. Prozona much shorter than metazona; hind angle of pronotum acute. Elytra with the reticulation in the apical part dense and irregular (fig. 5, *b*). (Africa: genotype, *Acridoderes levigatus*, Bol.)

2. *Acridoderes*, Bol.

[gen. nov.
3. *Anacridoderes*,

Fig. 5.



a, *Phyxacra strenua* (Walk.); *b*, *Anacridoderes crassus* (Bol.);
c, *Rhadinacris schistocercoides* (Brancs.). × 2.

8 (3). Elytra in the ♀ (the ♂ not known) reaching only to the middle of the hind femora. Prosternal spine large, thick, strongly bent towards mesosternum and touching the latter; its apex acute. Prozona much shorter than metazona. (Africa: genotype, *Congoa katangæ*, Bol.).....

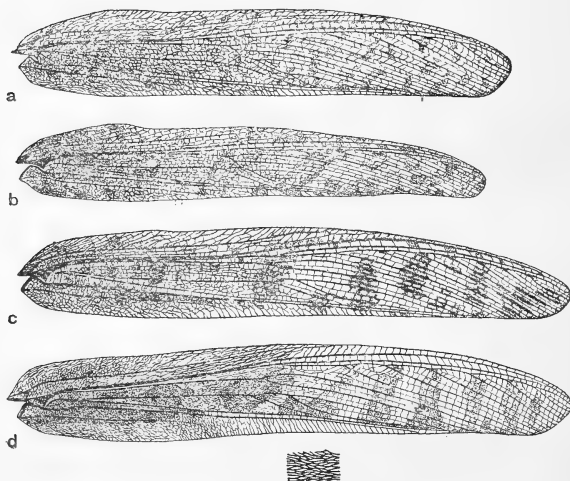
4. *Congoa*, Bol.

9 (2). Frontal ridge above the ocellus not at all (fig. 2, *c*, *d*) or but feebly dilated (in the latter case it is somewhat constricted again at the fastigium (fig. 2, *b*); its margins raised, though sometimes feebly and in certain parts only.

10 (11). Elytra with the apex obliquely truncate; the apical part with regular oblique

- (feather-like) reticulation (fig. 6, a).
 (Asia: genotype, *Acridium violascens*,
 Walk.) 5. *Pachyacris*, gen. [nov.]
- 11 (10). Elytra with the apex rounded or obliquely rounded; veinlets in the apical part more or less perpendicular to the veins.
- 12 (35). Prosternal spine straight, vertical, or only slightly inclined (but never bent) towards mesosternum, but not nearly reaching the latter, and usually compressed laterally (fig. 3, a, b, c, d, e).
- 13 (28). Frontal ridge above the ocellus somewhat dilated, distinctly broader than just below it (fig. 2, b).

Fig. 6.



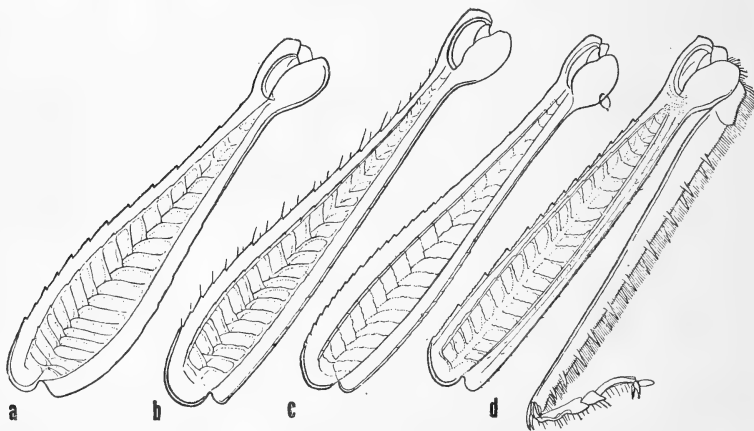
- a, *Pachyacris vinosa* (Walk.); b, *Rhytidacris tectifera* (Karsch); c, *Anacridium melanorhodon* (Walk.); d, *Nomadacris septemfasciata* (Serv.). $\times 1\frac{1}{2}$, except the bottom small figure, representing a strongly enlarged section of the discoidal field of *N. septemfasciata*.

- 14 (15). Frontal ridge rather suddenly lowered below the ocellus and completely obliterated halfway between the latter and clypeus. Median keel of pronotum very low, linear; hind angle about 90° . (Africa: genotype, *Acridoderes amethystinus*, Bol.) 6. *Pachynotacris*, [gen. nov.]
- 15 (14). Frontal ridge gradually lowered towards the clypeus and reaching it.

- 16 (19). Prosternal spine straight, cylindrical, with the apical part inflated (fig. 3, a). Male cerci short, triangular, with the apex strongly incurved.
- 17 (18). Fastigium impressed, moderately sloping, not closed behind; its margins scarcely raised. Elytra broader, with the apex neither attenuate nor bent backwards. (Africa: genotype, *Cyrtacanthacris debilis*, Karsch.) 7. *Bryophyma*, gen. ^[nov.]
- 18 (17). Fastigium impressed, strongly sloping, closed (or almost so) behind; its margins distinctly raised, confluent with the margins of the frontal ridge. Elytra narrower, with the apex attenuate and bent backwards (fig. 6, b). (Africa: genotype, *Cyrtacanthacris tectiferus*, Karsch.) 8. *Rhytidacris*, gen. ^[nov.]
- 19 (16). Prosternal spine either not cylindrical or with the apex not inflated.
- 20 (27). Fastigium impressed, forming (when viewed in profile) a distinct, though rounded, angle with the frontal ridge; the latter well developed throughout, with the margins callous (fig. 3, b).
- 21 (26). Hind femora and tibiae normally built.
- 22 (23). Elytra broad, apically scarcely narrowed and obliquely truncate. Male cerci strongly laterally compressed, parallel-sided, shorter than the anal plate, with the apex broad, subemarginate; male subgenital plate with the apex divided into two triangular lobes. (Africa, Asia, S. America: genotype, *Gryllus gregarius*, Forsk.) 9. *Schistocerca*, St.
- 23 (22). Elytra very narrow (fig. 5, c) or with the apex attenuate (fig. 6, c).
- 24 (25). Face distinctly reclinate. Elytra very narrow, parallel-sided (fig. 5, c). Male cerci short, strongly laterally compressed, triangular; male subgenital plate conical. Wings hyaline. (Madagascar: genotype, *Aceridium schistocercoides*, Brancs.) ^[gen. nov.] 10. *Rhadinacris*,
- 25 (24). Face vertical or practically so. Elytra not very narrow, but with the apex attenuate and bent backwards (fig. 6, c). Male cerci round, narrow, at least as long as the anal plate, curved; male subgenital plate with the apex trilobate. Wings with the base or a submedian fascia infumate. (Africa, S. Europe, Asia: genotype, *Gryllus Locusta aegyptia*, L.) ^[gen. nov.] 11. *Anacridium*,
- 26 (21). Hind femora extremely narrow; hind tibiae strongly laterally compressed at

- the base, densely hirsute between the spines (fig. 7, *d*). Male subgenital plate elongate-cordiform. Elytra very long and narrow. Wings with the base infumate. (Africa: genotype, *Acridium humilicrus*, Karsch.) [Karsch.]
- 27 (20). Fastigium not impressed, sloping and forming a broad bow with the frontal ridge; the latter subobliterated below the ocellum. Wings completely infumate. Male cerci short, somewhat compressed laterally, triangular; subgenital plate conical. Pronotum with the median keel very low, linear. (New Guinea: genotype, *Orthacanthacris bimaculata*, Will.) [gen. nov.]
12. *Orthacanthacris*,
13. *Willemseia**,

Fig. 7.



a, *Valanga nigricornis* (Burm.); *b*, *Patanga succincta* (L.); *c*, *Chondracris asperata* (Bol.); *d*, *Orthacanthacris humilicrus* (Karsch). $\times 2$.

- 28 (13). Frontal ridge not at all dilated above the ocellus, with its margins parallel throughout or feebly divergent downwards (figs. 2, *c*, *d*).
- 29 (34). Hind femora short and broad, with the apical part hardly attenuate (fig. 7, *a*).
- 30 (31). Median keel of pronotum high or, when low, always quite distinct and regular, not interrupted or obliterated between the sulci. Male cerci strongly laterally compressed, with the apex attenuate

* Dedicated to Dr. C. Willemse, an ardent student of Indo-Malayan and Australasian Orthoptera.

- and more or less decurved and incurved. Prosternal spine laterally compressed, slightly bent backwards. (Indo-Malaya, Australasia: genotype, *Acridium nigricornis*, Burm.)
- 31 (30). Median keel of the pronotum very low, obliterate, or practically so, by the rugose sculpturation. 14. *Valanga**, gen. [nov.]
- 32 (33). Wings brightly coloured, non-transparent. Fastigium flat. Prosternal spine not compressed laterally, in the apical half incrassate. (Africa: genotype, *Gowdeya ugandana*, sp. n.) 15. *Gowdeya* †, gen. [nov.]
- 33 (32). Wings hyaline. Fastigium with a longitudinal impression. Prosternal spine compressed laterally, not incrassate before the apex. (Philippines: genotype, *Cyrtacanthacris tenebrosa*, Walk.) 16. *Melicodes*, gen. [nov.]
- 34 (29). Hind femora long and narrow, with the apical part attenuate (fig. 7, b). Elytra long and narrow, with the apex narrow, oval. Male subgenital plate long, conical, pointed. (Asia, Indo-Malaya: genotype, *Gryllus Locusta succinctus*, L.) 17. *Patanga* ‡, gen. [nov.]
- 35 (12). Prosternal spine strongly inclined or angulately bent towards the mesosternum, touching the latter or nearly so; its preapical part more or less incrassate; the apex pointed or obtuse (fig. 3, f, g, h).
- 36 (37). Hind femora more slender, with the apical part distinctly attenuate (almost as in *Patanga*, fig. 7, b). Male cerci strongly laterally compressed, with the apex attenuate and decurved. Male subgenital plate conical, attenuate. (Australia, Oceania: genotype, *Cyrtacanthacris guttulosa*, Walk.) 18. *Austracris*, gen. [nov.]
- 37 (36). Hind femora less slender, scarcely attenuate (as in fig. 7, a).
- 38 (39). Reticulation of the basal half of elytra unusually fine and dense, the cells elongate (fig. 6, d). (Africa: genotype, *Acridium septemfasciatum*, Serv.) 19. *Nomadacris*, gen. [nov.]
- 39 (38). Reticulation of the basal half of elytra normal.

* The native Javanese name for locusts is "Valang" (Dammerman, 'Landbouwdierkunde van Oost-Indie,' p. 94).

† Named after Mr. C. C. Gowdey, late Government Entomologist in Uganda, who has added much to our knowledge of the insect fauna of that country by extensive collecting.

‡ *Patanga*, according to Serville (Ins. Orth. p. 556), is the Sanscrit name for a locust.

- 40 (41). Discoidal field of elytra scarcely transparent, the veinlets being incrassate and confluent, and the membrane corneous. Hind tibiae with 8 outer and 11 inner spines. Male subgenital plate acutely conical. Wings coloured. (Africa; genotype, *Gryllus Locusta cyaneus*, Stoll.) 20. *Glaphyra*, [gen. nov.]
- 41 (40). Discoidal field of elytra more or less transparent, the veinlets being not at all or but slightly incrassate, and the membrane hyaline.
- 42 (49). Pronotum smooth or punctured, but not tuberculate. Upper carina of the externo-median area of hind femora convex (as in fig. 7, a, b). Wings not coloured.
- 43 (44). Median keel of pronotum strongly raised in the prozona and thick. Male subgenital plate trilobate apically. Hind tibiae with 6 outer and 9 inner spines. (Africa: genotype, *Gryllus ruficornis*, F.) 21. *Acanthacris*, gen. [nov.]
- 44 (43). Median keel of pronotum low or but slightly raised, not thick. Male subgenital plate not trilobate.
- 45 (46). Disc of pronotum smooth and velvety. Male subgenital plate acutely conical. (Africa, Asia: genotype, *Gryllus Locusta tartaricus*, L.) 22. *Cyrtacanthacris*, [Walk.]
- 46 (45). Disc of pronotum punctured, not velvety.
- 47 (48). Male subgenital plate pyriform, with the apex acute. (Africa, Arabia: genotype, *Cyrtacanthacris prasina*, Walk.) 23. *Kraussaria**, gen. [nov.]
- 48 (47). Male subgenital plate acutely conical. (Madagascar: genotype, *Acridium ranavaloe*, Finot.) 24. *Finotina* †, gen. [nov.]
- 49 (42). Pronotum densely covered with tubercles and rugosities. Upper carina of the externo-median area of hind femora straight or practically so (fig. 7, c). Hind tibiae with 9 outer and 11 inner spines. Male subgenital plate conical. Wings coloured. (Africa, Asia: genotype, *Acridium roseum*, De Geer.) 25. *Chondracris*, gen. [nov.]
- 50 (1). Pronotum cylindrical, with four transverse sulci. Wings in the shape of a quarter of a circle, scarcely longer than broad. (Australia: genotype, *Loiteria rubripes*, Sjöst.) 26. *Loiteria*, Sjöst.

[To be continued.]

* Dedicated to Dr. Hermann Krauss, leading authority on Orthoptera.
 † In remembrance of A. Finot, first reviser of the group.

XII.—*On the Voles collected by Mr. G. Forrest in Yunnan; with Remarks upon the Genera Eothenomys and Neodon and upon their Allies.* By MARTIN A. C. HINTON.

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IN the 'Annals' for October (p. 391, *supra*), Mr. Oldfield Thomas gave a general account of the fine collection of mammals from the mountains of Western Yunnan made by Mr. G. Forrest, and so generously presented to the British Museum by Colonel Stephenson R. Clarke, C.B., D.S.O. Aware of the interest I have taken in Microtinæ for many years, Mr. Thomas very kindly asked me to work out the voles, of which there are about one hundred specimens in Mr. Forrest's collection. This material forms an important addition to our knowledge of the voles of this region. It comprises six forms, of which no fewer than five are new, belonging to four genera.

Genus EOTHENOMYS.

Eothenomys was established by Miller (N. Amer. Fauna, No. 12, p. 45, 1896) as a subgenus of *Microtus* for the reception of "*Arvicola*" *melanogaster*, Milne-Edw. This species, described originally from Moupin, Western Sze-chwan, remained for many years the only known representative of the genus. In 1911, Thomas described his *M. (E.) melanogaster colurnus* from Western Fokien; and since then many additional forms have been discovered, so that, including those described in this paper as new, twelve or thirteen members of the group have now to be recognized.

Distinguished by a peculiar combination of cranial, dental, and external characters, *Eothenomys* is clearly entitled to full generic rank in any classificatory scheme in which, for example, *Pitymys* and *Arvicola* are treated as genera distinct from each other and from *Microtus* proper. Two other Far-Eastern groups, *Anteliomys*, Miller, and *Caryomys*, Thomas, hitherto treated as subgenera of *Microtus*, are undoubtedly so closely related to *Eothenomys* that it is difficult to decide whether to treat them as subgenera of the latter or as distinct genera. The external characters are alike in all three. In skull, *Eothenomys* and *Caryomys* closely resemble each other, but the cheek-teeth of the latter are distinctly more highly specialized than are those of the former. *Anteliomys* has a dentition combining some of

the primitive features found in *Eothenomys* with peculiarities of its own; and in certain respects its skull differs from those of both *Eothenomys* and *Caryomys*. In my opinion all three should be regarded as distinct genera, of which the leading characters are shown in the following "key":—

Mammæ 0—2=4; sole-pads 6.

Cheek-teeth rootless.

Bony palate simple, essentially as in *Evotomys*.

Auditory bullæ without internal spongy tissue.

A. Interorbital region of skull wide, usually concave transversely between the temporal ridges; the latter marginal, not approaching each other or the middle line in old age.

a. M_1 without closed triangles, its inner and outer dentinal spaces forming more or less confluent transverse pairs

Eothenomys, Mill.

b. M_1 as in true *Microtus*, with five substantially closed and alternating triangles

Caryomys, Thos.

B. Interorbital region of skull narrower; the temporal ridges approximating to form an incipient interorbital sagittal crest in old age. M_1 substantially as in *Eothenomys*

Antelionomys, Mill.

These three genera are of considerable interest, since they appear to be quite closely related to *Evotomys*, and they have, in my opinion, descended from a stock which may well have been directly ancestral to *Evotomys* also. The close affinity is betrayed by the form and structure of the skull, which in *Eothenomys* and *Caryomys* is almost exactly like the skull of *Evotomys*; in one small matter only does the skull of *Caryomys* go a little further—the edges of the post-palatal pterygoid shelves bend down to join the margin of the palatal shelf upon its dorsal surface*. The skull of *Antelionomys* is a little more highly specialized; the anterior portion of the temporal muscle appears to have become slightly stronger, so that the temporal ridges tend to approximate and form a median crest by fusion in the interorbital region, thus foreshadowing the modifications met with in that region in the higher voles; and in adults a median spine, which lies, however, in the same horizontal plane as the rest of the palate, is developed upon the hinder edge of the palatal shelf.

In one respect the present group of genera shows itself to be a little more primitive than *Evotomys*. In the least specialized species of *Eothenomys*, and to a lesser extent in *Caryomys*, the cheek-teeth, particularly m^1 , m^2 , and m_1 , are more complex, retaining in all stages of wear cusps which

* Thomas, P. Z. S. 1908, p. 977.

have either been entirely eliminated from the teeth of *Evo-*
tomys, or which are represented in the latter only by more
or less obscure vestiges visible only in the earlier stages of
wear.

In some other respects *Eothenomys* and its allies have
proceeded much further than *Evo-*
tomys. The cheek-teeth
have become completely hypsodont and rootless, while in
Evo-
tomys they develop roots in adult stages of wear. The
increased hypsodonty is especially well marked in *Caryomys*,
in which the maxillary capsule of m^2 rises up in the floor of
the orbit as a great mound, blocking the mouth of the sphen-
orbital fissure; and in all three genera it results in a marked
lingual displacement of m_3 by the shaft of the incisor, in its
passage from the lingual to the labial side of the molar
bases between m_2 and m_3 . The beginning of such a dis-
placement of m_3 is seen in *Evo-*
tomys; its culmination in
true *Microtus*. Much of that confluency of the dentinal
spaces which is so characteristic of the cheek-teeth of *Evo-*
tomys is retained in *Eothenomys* and *Antelionomys*; but in
Caryomys it is replaced by a more complete alternation of
the inner and outer prisms, the triangles being rather tightly
closed, as in adult teeth of the higher voles.

Externally, the only noteworthy advance upon the con-
dition found in *Evo-*
tomys seems to be shown by the reduction
of the mammary formula from $2-2=8$ to $0-2=4$, the
pectoral mammæ being completely obliterated, as in
Pitymys.

Two other genera related to *Evo-*
tomys may be briefly
mentioned, viz., *Craseomys* and *Aschizomys*. *Craseomys*
should be regarded, perhaps, as a mere subgenus of *Evo-*
tomys; its species show a great increase in size, with large
massively built skulls and powerful teeth. The cheek-teeth
have become very hypsodont, although they still develop
roots in old age. At that moment when the molar crowns
have attained their greatest vertical development (*i. e.*, just
before the roots begin to be formed) the capsule of m^2 pro-
trudes from the floor of the orbit, exactly as in *Caryomys*;
but later, as the crown wears away, the bony mound is re-
absorbed and sinks, the maxilla then resuming the appearance
it has in ordinary *Evo-*
tomys. No character has been found
to indicate that *Craseomys* is other than a relatively highly
specialized offshoot from normal *Evo-*
tomys.

Aschizomys, Miller, represented by a single species from
the Siberian shore of Bering Strait, is apparently a most
remarkable descendant from some old species of *Evo-*
tomys. In skull and in the pattern and lightness of the cheek-teeth

it is practically identical with *Evotomys*. But, living in the high north, it has acquired the outward form of a lemming; and subsisting apparently upon a diet which rapidly wears away the crowns of the cheek-teeth, the latter have become hypsodont and rootless as in the higher voles. As in *Caryomys*, the capsule of m^2 rises as a conspicuous hump upon the floor of the orbit, while m_3 is strongly displaced lingually by the shaft of the lower incisor.

The Species and Subspecies of Eothenomys.

The known forms of *Eothenomys* may be referred, in my opinion, to four species; and they afford an interesting series of dental gradations. In each of the several forms which are represented by fairly long series of specimens in the material now before me, the enamel pattern of the cheek-teeth appears to be very constant—and in this genus, it would appear, therefore, a fairly safe guide to the species and subspecies. Of the species recognized in this paper, *E. melanogaster* and *E. fidelis* are dentally the most primitive; in them m^1 and m^2 (figs. 1–3) always possess a large extra postero-internal angle (“cusp n ”^{*}), while m^3 varies considerably in complexity in different subspecies, although its pattern seems to be tolerably constant in any given form.

E. fidelis, one of the new species described below, is distinguished from *melanogaster* by its large size and by its massive, narrow, and strongly ridged skull. It is apparently confined to the Lichiang Range, where it is associated with *E. proditor*, a new species, which seems to constitute the other extreme of the genus. *E. melanogaster* is a widely distributed species, ranging from Southern Kansu eastwards to Western Fokien, and southwards and westwards, through Sze-chwan and Yunnan, into Assam and Burma. It is split up into a considerable number of local subspecies, differing from each other more or less in colour, in the complexity of m^3 , and in the relative sizes of the teeth and bullæ, which vary inversely with each other, large bullæ being correlated with small molars and large molars with small bullæ.

E. olitor, Thos., described from Chao-tung-fu, Yunnan, is less primitive than *fidelis* and *melanogaster*, since in it m^1 (fig. 4) has only three inner angles, having lost cusp n ; the latter is, however, well developed in m^2 ; m^3 , on the other

* For this nomenclature of the cusps of Microtine teeth, see Barrett Hamilton and Hinton, *Hist. Brit. Mamm.* vol. ii. p. 504, pl. xxviii.

hand, with four salient angles on each side, is quite un-reduced. *E. proditor*, described below from the Lichiang Range, is still less primitive, since cusp *n* is practically absent from both m^1 and m^2 (fig. 5), being represented in the latter tooth merely by an obscure vestige. In this species (and occasionally in *E. olitor*, cf. fig. 4) m^3 is of peculiar form, the first outer infold being shallow, so as to leave the anterior loop half confluent with the first outer triangle, as in some species as *Antelionmys*, *Alticola*, and certain other voles. The following is a key to the various species and subspecies:—

- A. Anterior upper cheek-teeth complex; m^1 with four, m^2 with three salient angles on the inner side.
- a. m^3 with four inner angles.
- a¹. m^3 with four outer angles; bullæ small, teeth heavy. Colour bright. [Kachin Prov., W. Burma.] *E. m. cachinus*, Thos.
- b¹. m^3 with three outer angles.
- a². Size normal: condylo-basal length to 26; hind foot to 19 mm.
- a³. Bullæ large, teeth light.
- a⁴. Colour dark. [Yunnan.] *E. m. eleusis*, Thos.
- b⁴. Colour bright. [Hupeh.] *E. m. aurora*, Allen.
- b³. Bullæ small, teeth heavy.
- a⁴. Skull strongly bowed dorsally. Colour rather brighter. [W. of Yung-pi, Yunnan.] *E. m. milctus*, Thos.
- b⁴. Skull normal, not bowed dorsally. Colour rather darker. [Kiu-chiang-Salween divide.] *E. m. confinii*, subsp. n.
- b². Size large: condylo-basal length 28, hind foot 20 mm. Colour bright. [Lichiang Range.] *E. fidelis*, sp. n.
- b. m^3 with three inner and three outer salient angles.
- a¹. Bullæ large, teeth light.
- a². Colour dark, bullæ rather larger. [Moupin, W. Sze-chwan.] *E. m. melanogaster*.
- b². Colour bright, bullæ rather smaller. [N.W. Fokien.] *E. m. columnus*, Thos.
- b¹. Bullæ small, teeth heavy. Colour very dark.
- a². Larger (hind foot 19 mm), with broad brain-case. [W. Sze-chwan.] [Allen.] *E. m. mucronatus*,
- b². Smaller (hind foot 17 mm.), with narrow brain-case. [Mishmi Hills.] *E. m. libonotus*, subsp. n.
- B. Anterior upper cheek-teeth more or less simplified, m^1 with only three inner angles.
- a. Small (condylo-basal length to 24 mm.); m^2 normal, with three inner angles; m^3 complex, with four inner and four outer salient angles. [Chao-tung-fu, Yunnan.] *E. olitor*, Thos.

- b. Large (condylo-basal length to 27.5 mm.);
 m^2 with the third inner angle vestigial;
 m^3 with first outer infold shallow (*alticola*-
 like), with vestigial fourth inner and fourth
 outer angles. Colour bright. [Lichiang
 Range.] *E. proditor*, sp. n.

In addition to the forms enumerated in the above key, Cabrera has described his *E. bonzo* from Fu-chow. I have not seen the type, but, judging from the description and the excellent figure of the teeth, *bonzo* is certainly no more than a subspecies of *melanogaster*, and it may be identical with *M. colurnus*. The hind foot measures only 15.5 mm., and m^3 possesses four outer and three inner angles; these characters may, however, be due to youth.

1. *Eothenomys fidelis*, sp. n.

♂. 454; ♀. 455, 456. Lichiang Range, N.W. flank in lat. 27° 30' N. 14,000'.

♂. 404. Lichiang Range, W. flank, in latitude 27° 30' N. 13,000'.

A large bright-coloured species, with long narrow skull. Dental and external characters essentially as in *melanogaster*.

Size large (hind foot about 20 mm.; condylø-basal length of skull to about 28 mm.). Colour nearly as in brighter subspecies of *melanogaster* (e. g., *colurnus* and *miletus*). Upper parts dark brown (near "mummy-brown"), brightened by rufous hair-tips; under surface slate-grey, with a hoary tinge. Feet and tail dusky above.

Skull very large, long and narrow; with the temporal ridges and postorbital squamosal crests strongly developed. Bullæ relatively small, teeth relatively large (as in *m. libonotus* and *m. miletus*). Cheek-teeth (fig. 2) normal; m^1 with four, m_2 with three inner salient angles; m^3 with three outer and four inner salient angles.

Dimensions of type, measured in the flesh:—Head and body 126 mm.; tail 49; hind foot 18.5; ear 12.

For skull-measurements, see table at p. 153.

Type. Adult female. B.M. No. 22.12.1.8. Original No. 455. Collected on the flank of the Lichiang Range in latitude 27° 30' N. Nov. 1921. Altitude, 14,000'.

Hab. As above.

This the largest known species of *Eothenomys*; three of the specimens are thoroughly adult, with head and body measurements ranging between 126 and 134 mm., the length of the hind foot ranging from 18.5 to 20. As already indicated,

this form is most nearly related to *melanogaster*; but its greater size and peculiar skull seem to justify specific recognition.

2. *Eothenomys melanogaster confinii*, subsp. n.

♂. 173; ♀. 171, 179, 180, 181. Kiu-chiang-Salween divide in latitude 28° N. 11,000' to 12,000'.

Most closely resembling *m. miletus*, but with more normal skull.

Size and external proportions as in *miletus*. Colour a trifle darker. Skull with bullæ still a little smaller and teeth a trifle larger; its dorsal contour less convex; the interorbital region flatter, with distinct, though weak, temporal ridges along its margins. Cheek-teeth (fig. 1) as in *miletus* and *eleusis*; m^3 with three outer and four inner salient angles.

Dimensions of type, taken in flesh by collector:—Head and body 106 mm.; tail 59; hind foot (on skin) 19; ear 13. For skull-measurements, see table at p. 153.

Type. Adult male. B.M. No. 22. 12. 1. 1. Original No. 173. Collected by Mr. G. Forrest, July 25, 1921, upon the Kiu-chiang-Salween divide in latitude 28° N. at an altitude of 11,000'.

Hab. As above.

Five specimens of this vole, one of them a melano, were collected upon the rocky alpine meadows of the Kiu-chiang-Salween divide at heights of from 11,000' to 12,000'. In this series the hind foot measurement (upon the skin) ranges between 18 and 19 mm.; the tail, as measured in flesh by the collector, between 40 and 59. Externally the likeness to *m. miletus* is striking, but the skull is of very different appearance.

While working out Mr. Forrest's specimens, I have had occasion to examine two collected by Mr. Wells in the Mishmi Hills. These prove to belong to a local form of *E. melanogaster*, which may now be described as

Eothenomys melanogaster libonotus, subsp. n.

Closely resembling *m. mucronatus*, but smaller.

Size rather small, hind foot 17 mm., condylo-basal length of skull 24.9 (instead of 19 and 26 respectively, as in *mucronatus*). Colour dark and rich. Upper parts near "clove-brown" of Ridgway, brightened by dull golden or rufous hair-tips. Under surface slaty grey. Feet above scarcely lighter than upper surface of tail.

Skull with small bullæ and large teeth, as in *mucronatus*;

distinguished from that of the latter by its smaller size and narrower brain-case. Cheek-teeth as in typical *melanogaster*, m^3 with only three outer and three inner salient angles.

Dimensions of the type, taken in the flesh by the collector:—Head and body 105 mm.; tail 34; hind foot 17; ear 13.

For skull-measurements, see table at p. 153.

Type. Adult male, B.M. No. 21.12.5.54. Original No. 2063. Collected June 20, 1921, by Mr. H. W. Wells at Dreyi, Mishmi Hills; altitude 5140'. Presented to the British Museum by the Bombay Natural History Society.

Hab. Mishmi Hills, Assam.

3. *Eothenomys proditor*, sp. n.

♂. 4, 5, 7, 8, 9, 11, 14, 19, 20; ♀. 6, 13, 15, 16, 17. Lichiang Range, N.W. Yunnan.

A bright-coloured species, with highly modified teeth.

Size small or medium (hind foot 16 to 18 mm.); tail short, usually between 28 and 38. Soles with six pads, hairy between heel and pads. Mammæ 0—2=4.

Colour of upper parts dark brown, brighter than in *fidelis*; belly usually with well-marked yellowish suffusion.

Feet dark above, concolorous with the upper surface of the tail. Tail dusky above, paler below.

Skull normal, rather smaller than that of *fidelis*; bullæ rather large, teeth rather light. Cheek-teeth much reduced; m^1 with three inner salient angles only; m^2 with only a very slight vestige of the third inner angle (cusp n); m^3 with the first outer infold shallow, as in *Allicola* and some other voles, and with vestigial fourth outer and fourth inner angles. Lower cheek-teeth normal; the outer angle of m_3 well developed.

Dimensions of the type, taken in the flesh by the collector:—Head and body 115 mm.; tail 34; hind foot 18; ear 12.

For skull-measurements, see table at p. 153.

Type. Adult male. B.M. No. 22.12.1.10. Original No. 9. Collected May 27, 1921, by Mr. G. Forrest upon the Lichiang Range, N.W. Yunnan, in latitude $27^{\circ} 30'$ N. Altitude 13,000'.

Hab. As above.

This species is very sharply distinguished from *E. fidelis*, which also inhabits the Lichiang Range, by its smaller general size, shorter tail, and especially by its peculiar teeth. In the reduction of m^1 it resembles *E. olitor*, which in all other respects is very different.

Eothenomys: Skull-measurements in millimetres.

	<i>E. melanogaster</i>										<i>E. oltior.</i>	<i>E. proditor.</i>
	<i>E. fidelis.</i>	<i>eachinus.</i>	<i>eleusis.</i>	<i>miletus.</i>	<i>confanii.</i>	<i>melano-gaster.</i>	<i>colarnus.</i>	<i>libonotus.</i>				
	455. ♀. Type.	404. ♂.	20.8, 7.14. ♀. Type.	11.9, 8.11, 11. ♂. Type.	14.10, 23.32. ♂. Type.	173. ♂. Type.	11.2, 1.227. ♂.	0.5, 8.38. ♂. Type.	21.12, 5.54. ♂. Type.	11.9, 8.122. ♀. Type.	9. ♂. Type.	19. ♂.
1. Condylar-basal length	27.6	..	25.9	24.4	25.3	25.2	24.5	25.6	24.9	23.7	27.3	27.1
2. Zygomatic breadth	16.3	17.2	16	14.7	15.4	14.9	14.8	15.5	15.4	14	16.4	16.6
3. Interorbital constriction	4.6	4.4	4.6	4.3	4.8	4.4	4.2	4.1	4.4	3.9	4.4	4.6
4. Cranial width	12.2	12.3	12.5	11.7	12.6	12	11.4	11.3	11.9	11.2	11.9	12.2
5. Mastoid width	12.2	12.8	12.1	12.3	12	11.5	12.5	11.7	11.4	10.8	11.9	12
6. Occipital depth (median).	7.1	..	6.8	6.2	7	6.7	6.4	6.2	6.3	6	7.1	7.3
7. Dental length	16.8	17.3	16.2	14.5	15.1	15.3	14.7	15.2	15.5	14.2	16.8	16.9
8. Cheek-teeth (crowns).	6.6	6.9	6.4	5.5	6	5.8	6	6.3	6.1	5.5	6.5	6.4

ANTELIOMYS, Miller.

4. *Anteliomys wardi*, Thos.

♂. 90, 91, 92, 94, 154; ♀. 93, 166. Mekong Valley, in latitude 28° N., and at altitudes between 8000' and 12,000'.

♂. 189, 195, 197, 199, 204, 205, 215, 273, 339, 344, 347, 349; ♀. 196, 208, 211, 213, 219, 220. Divide between Mekong and Salween Rivers, in latitude 28° N. and 28° 20' N.; at altitudes between 10,000' and 14,000'.

♂. 310, 316, 318; ♀. 307. Divide between Kiu-chiang and Salween Rivers, in latitude 28° N., at altitudes between 12,000' and 14,000'.

This is a common and widely-distributed species in N.W. Yunnan, where it inhabits the high Alpine meadows. Mr. Forrest trapped many "amongst rocks," and some, at the highest stations, upon snow-clad surfaces.

NEODON, Hodgson.

1849. *Neodon*, Hodgson, Ann. & Mag. Nat. Hist. (2) iii. p. 203; genotype, *N. sikimensis*.

1863. *Bicunedens*, Hodgson in Gray, Cat. Spec. & Drawings Mamm., Birds etc. of Nepal and Tibet, Brit. Mus. ed. 2, p. 2; genotype, *B. perfuscus* (apparently a MS. name for *N. sikimensis*). *Arvicola*, *Microtus*, and *Pitymys* of later authors.

One of the new species discovered by Mr. Forrest belongs to a small group of Asiatic voles, remarkable for combining dental characters hitherto considered to be diagnostic of the genus *Pitymys* (among Old World forms), with cranial and external characters similar to those found in true *Microtus*. By this combination of characters the group in question is sharply defined, and it unquestionably deserves generic recognition. The name *Neodon*, applied long ago by Hodgson to the Flower Mouse of Sikkim (*Microtus sikimensis* of current literature), is available for this genus, since this species proves on examination to be a conspicuous member of the group, although its characters and relationships have hitherto been but imperfectly understood.

The essential characters of the genus *Neodon* may be set forth as follows:—

Skull nearly as in true *Microtus*. Palate normal. Temporal ridges, in fully adult skulls, fusing to form a weak but linear sagittal crest in the interorbital region; the squamosals, frontals, and parietals correspondingly and progressively modified with advancing age. Bullæ with a weak development of spongy bone internally.

Cheek-teeth (figs. 8–12) essentially as in *Pitymys*: m_1

with the posterior loop followed by three substantially closed alternating triangles, which are succeeded by a more or less widely confluent pair of triangles, the tooth being terminated by an anterior loop of variable form and complexity; m^3 with an anterior transverse loop succeeded by three substantially closed triangles, and terminated behind by a posterior loop of variable form. The other teeth of normal *Microtine* form: m_3 without closed triangles; m^1 and m^2 with or without extra postero-internal angles (cusp n).

External characters nearly as in true *Microtus*. Fur soft and full, but not so highly modified for subterranean habits as in *Pitymys*. Ears moderately long, quite evident above the fur. Sole-pads 6 usually, but in one species reduced to 5. Claws of hands and feet about equal. Mammaræ 2—2=8.

The presence of only three closed triangles in m_1 , as in *Pitymys*, instead of five as in true *Microtus*, is perhaps the most significant character of *Neodon*. This dental difference between the *Pitymys*-like and the *Microtus*-like voles is of ancient standing, dating at least from the Upper Pliocene (Cromerian Forest Bed) in Western Europe; and agreement in this respect with *Pitymys* may, in my opinion, be regarded as good evidence of the closer affinity of *Neodon* with *Pitymys* than with the outwardly more similar voles of the genus *Microtus*. In Europe *Pitymys* in competition with *Microtus* has disappeared from the surface, and has become, in the countries in which it still survives, strictly fossorial. All the recent members of the genus in that continent have therefore acquired external and cranial specializations fitting them for life underground; and they lack all trace of that peculiar specialization of the most anterior portions of the temporal muscles which has led to the constriction of the interorbital region and the development of an interorbital sagittal crest in such typical voles as *Microtus arvalis* and *Stenocranius*. But in that great refuge for archaic Microtines formed by the highlands of Central and South-eastern Asia, allies of *Pitymys*, viz., the members of the present genus, have suffered less from competition, and they have been able to linger to our day as surface-dwellers. They have, therefore, not acquired the fossorial peculiarities of recent *Pitymys*; but, on the contrary, they have independently proceeded very far along a path of cranial and external specialization closely parallel to that pursued by *Microtus* in similar conditions.

Five species (including the new one described below) of

Neodon are at present known, and their characters may be tabulated as follows:—

- A. Cheek-teeth more complex: m_1 in general form arvaloid, with two pairs of confluent dentinal spaces in front of its three closed triangles; posterior loop of m^3 long, with well-developed fourth inner angle; m^1 and m^2 with more or less well-developed "supplementary" postero-internal angles. Size large (hind foot to about 20; condylo-basal length to about 28 mm.). Colour dark. Claws long. [Sikkim.] *N. sikimensis*, Hodg.
- B. Cheek-teeth less complex; m_1 nivaloid or ratticepoid, with only one pair of confluent dentinal spaces in front of the three closed triangles; m^3 with posterior loop more or less reduced; m^1 and m^2 with "supplementary" postero-internal angles obsolete or lacking.
- a. Claws not noticeably lengthened. Soles not exceptionally hairy. Colour dark; m_1 nivaloid.
- a*¹. Size large (hind foot to 20; condylo-basal length to 28.5 mm.); m^3 with fourth inner angle comparatively well-developed. [Yunnan.] *N. forresti*, sp. n.
- b*¹. Size small (hind foot to 18; condylo-basal length to 25 mm.); m^3 with fourth inner angle reduced, often obsolete. [Yunnan.] *N. irene*, Thos.
- b*. Claws noticeably lengthened; m_1 ratticepoid.
- a*¹. Colour dark; six sole-pads as usual; cheek-teeth highly reduced; m_1 of extreme ratticepoid form; m^3 with posterior loop very short, the fourth inner angle vestigial. Size smaller (hind foot to 16; condylo-basal length to 22 mm.). [Kansu.] *N. oniscus*, Thos.
- b*¹. Colour pale (buffy-brown); five sole-pads only; cheek-teeth less highly reduced, nearly as in *irene*. Size larger (hind foot to about 17; condylo-basal length to about 25 mm.). [Hisgar Mts.] *N. carruthersi*, Thos.

5. *Neodon forresti*, sp. n.

♂. 108, 120, 124 (juv.), 138, 145; ♀. 115, 117 (juv.), 129, 130 (juv.), 135, 144, 147. Mekong-Yangtze divide in latitude 27° 30' N.

♂. 331; ♀. 329 (juv.). Mekong-Yangtze divide in latitude 28° 28' N.

♀. 152. Mekong Valley, 11,000'–12,000', lat. 28° N.

♂. 188, 193, 194; ♀. 192. Mekong-Salween divide in latitude 28° N.

Like *irene*, but much larger.

General appearance closely resembling *irene*, but size much larger, the head and body in adults averaging 120 instead of about 92 mm. Tail, feet, and ears relatively shorter, averaging respectively about 30, 16, and 12 per cent. of the head and body measurements in adults, instead of about 40, 19, and 14 per cent. as in adult *irene*. Fur soft and fine, longer than in *irene*; hairs of back about 15 mm. in length, instead of about 9 as in *irene* (measured in both cases upon specimens collected in July).

General colour of upper surface dark brown (near "mummy-brown" of Ridgway); of underparts slaty, washed with greyish white. Ears concolorous with back. Hands and feet greyish white; soles with six pads. Tail fully haired, more or less distinctly bicoloured, brownish to dusky above, dirty white on sides and below. Mammæ 2—2=8.

Skull, apart from its conspicuously large size, not essentially very different from that of *irene*. Brain-case rather longer and narrower. Postorbital squamosal processes and temporal crests, including the interorbital sagittal crest, sharply defined in fully adult stages. The skulls of the immature examples before me equal those of adult *irene* in size, but are distinguished from the latter by lacking all trace of the crests and ridges developed in the adults of both species.

Cheek-teeth simpler than in *sikimensis*, but slightly less reduced than in *irene*: m^1 and m^2 without vestiges of cusp n ; fourth outer and fourth inner angles of m^3 vestigial or obsolete; m_1 with the three closed triangles followed by one transversely confluent pair and terminated by an anterior loop of nivaloid form; m_2 normal; m_3 with third outer angle obsolete.

Dimensions of the type, measured in the flesh:—Head and body 134 mm.; tail 43; hind foot 19; ear 14.

For skull-measurements, see table at p. 159.

Type. Adult male. B.M. No. 22.12.1.35. Original No. 145. Collected July 6, 1921, by Mr. G. Forrest, upon the divide between the Mekong and Yangtze Rivers, N.W. Yunnan, in latitude $27^{\circ} 30' N$. Altitude 11,000' to 12,000'.

Mr. Forrest is to be congratulated upon the discovery of this fine vole, which I have pleasure in associating with his name. *N. forresti* is of considerable importance, as the link connecting Hodgson's *sikimensis* with the three much smaller, and at first sight very dissimilar, species described more recently by Thomas.

6. *Microtus clarkei*, sp. n.

♂. 170, 174; ♀. 168, 175. Kiu-chiang-Salween divide; latitude 28° N. Altitude 11,000'.

A large vole related to *M. calamorum*, Thos. Size rather less than in true *calamorum*, and considerably less than in *c. superus*; the hind foot in adults about 21 mm., and condylo-basal length about 28.5.

Essential external characters nearly as in *calamorum*. Fur very soft and fine, though rather short (about 12 mm. on rump). Ears distinctly visible above the fur. Tail about half the length of the head and body. Soles with five plantar pads only, completely naked from the heels forward; claws of hands and feet about equal. A flank-gland sometimes present in males (No. 170, right side).

General colour above nearly as in *calamorum*, viz., dark brown (near "bistre" of Ridgway). Under surface much less white, the ventral hairs having their basal three-fourths deep slate, and only their tips silver. Flank line of demarcation regular, but not sharply defined. Upper surface of tail brownish, not much lighter than the back; its lower surface, together with the upper sides of the hands and feet, dirty white.

Skull smaller than that of either true *calamorum* or *c. superus*, with the brain-case relatively broader and more depressed. Interorbital region narrow with a weak sagittal crest in old age, formed by the fusion of the temporal ridges. Palate with the median posterior sloping septum broader, less well defined, and shorter in adults. Bullæ as in *calamorum*, with a weak development of spongy bone within.

Cheek-teeth essentially as in *calamorum* (figs. 13 & 14).

Dimensions of the type, measured in the flesh:—Head and body 130 mm.; tail 66; hind foot 21; ear 14.

For skull-measurements, see table at p. 159.

Type. Adult female. B.M. No. 22. 12. 1. 46. Original No. 175. Collected by Mr. G. Forrest on July 24, 1921, upon the divide between the Kiu-chiang and Salween Rivers in latitude 28° N. Altitude 11,000'.

Hab. As above.

The discovery of this species, which I have much pleasure in naming after Colonel Stephenson R. Clarke, C.B., D.S.O., is a matter of considerable interest. It and *M. calamorum* belong to a group of voles which seem to link the water-voles *Arvicola* with some of the larger species of "*Microtus*" inhabiting North America. The precise status of these Far-Eastern voles is, however, a matter for further investigation.

Skull-measurements in millimetres.

	Neodon				Microtus			
	<i>forresti</i> .	<i>sikimensis</i> .	<i>wene</i> .	<i>carruthersi</i> .	<i>omiscus</i> .	<i>clarkei</i> .	<i>calamorum</i> .	<i>c. superus</i> .
	145. ♂. Type.	15.9.1.219. ♂.	11.2.1.195. Type.	9.4.3.90. ♂. Type.	11.11.1.1.3. ♂. Type.	175. ♀. Type.	26.21.5. ♀. Type.	11.6.1.45. ♂. Type.
1. Condyllo-basal length	28.5	27.6	28.3	25±	22	28±	29.8	32.6
2. Zygomatic breadth	16.8	17±	16.4	13.8	12.8	16.4	..	17.5
3. Interorbital constriction ..	4	13.5	4.4	3.6	3.2	3.7	4.1	4.3
4. Cranial width	12.6	..	12.5	10.9	10.1	13.5	12.5	13.4
5. Mastoid width . . . . .	..	12.8	12.2	11.3	10.6	12.4	12.5	13.6
6. Occipital depth (median) . . .	..	7.2	7.1	..	5.9	..	8	8
7. Dental length	17.8	17.2	18	16	13.3	17.4	18.7	20.2
8. Cheek-teeth (crowns)	6.3	6.3	6.8	5.8	5.3	6.5	7.2	7.7

* Not fully adult; temporal ridges still separated by 1.7 mm. in interorbital region.

Fig. 1 a.



Fig. 1 b.



Fig. 2 a.



Fig. 2 b.



Fig. 3 a.



Fig. 3 b.



Fig. 4 a.



Fig. 4 b.



Fig. 5 a.



Fig. 5 b.



Fig. 6 a.



Fig. 6 b.



Fig. 7 a.



Fig. 7 b.



Fig. 8 a.



Fig. 8 b.



Fig. 9 a.



Fig. 9 b.



Fig. 10 a.



Fig. 10 b.



Fig. 11 a.



Fig. 11 b.



Fig. 12 a.



Fig. 12 b.



Fig. 13 a.

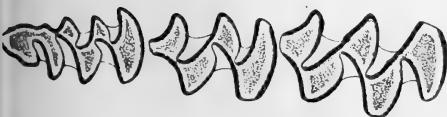


Fig. 13 b.



Fig. 14 a.



Fig. 14 b.



Explanation of Figures.

a, right upper molars; *b*, left lower molars.

- Fig. 1.—*Eothenomys melanogaster confinii*, subsp. n. Type ♂. B.M. No. 22.12.1.1. Original No. 173. Kiu-chiang-Salween divide (Forrest). × 8.
- Fig. 2.—*Eothenomys fidelis*, sp. n. Type ♀. B.M. No. 22.12.1.8. Original No. 455. Lichiang Range, Yunnan (Forrest). × 7.5.
- Fig. 3.—*Eothenomys melanogaster colburnus*, Thos. ♀. B.M. No. 98.11.1.27. Kuantun (*J. de la Touche*). × 7.
- Fig. 4.—*Eothenomys olitor*, Thos. (*4 b*, right lower molars). ♀. B.M. No. 11.9.8.123. Chao-tung-fu, Yunnan (*M. P. Anderson*). × 8.
- Fig. 5.—*Eothenomys proditor*, sp. n. Type ♂. B.M. No. 22.12.1.10. Original No. 9. Lichiang Range, Yunnan (Forrest). × 7.5.
- Fig. 6.—*Anteliomys wardi*, Thos. ♀. B.M. No. 22.12.1.30. Original No. 213. Mekong-Salween divide (Forrest). × 8.
- Fig. 7.—*Caryomys inez*, Thos. ♂. B.M. No. 9.1.1.184. Shensi (*Malcolm Anderson*). × 8.
- Fig. 8.—*Neodon sikimensis*, Hodgson. B.M. No. 15.9.1.218. Lachen, Sikkim (Bombay Nat. Hist. Soc.). × 8.
- Fig. 9.—*Neodon forresti*, sp. n. Type ♂. B.M. No. 22.12.1.35. Original No. 145. Mekong-Yangtze divide (Forrest). × 9.
- Fig. 10.—*Neodon irene*, Thos. ♀. B.M. No. 12.3.18.13. A-tun-tsi, N.W. Yunnan (*F. K. Ward*). × 8.
- Fig. 11.—*Neodon carruthersi*, Thos. ♀. B.M. No. 9.4.3.93. Hissar Mts., Turkestan (*D. Carruthers*). × 8.
- Fig. 12.—*Neodon oniscus*, Thos. Type ♂. B.M. No. 11.11.1.3. Kansu (*M. Anderson*). × 8.5.
- Fig. 13.—*Microtus calamorum superus*, Thos. ♂. B.M. No. 11.6.1.46. Shen-Si (*M. Anderson*). × 8.
- Fig. 14.—*Microtus clarkei*, sp. n. Type ♀. B.M. No. 22.12.1.46. Original No. 175. Kiu-chiang-Salween divide (Forrest). × 8.

XIII.—*The Dental Formula of the Muridæ, with especial reference to the "mp. 4 Theory."* By MARTIN A. C. HINTON.

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WHILE working out a large collection together recently, Mr. Oldfield Thomas and I thought we ought to take the opportunity of expressing an opinion as to the notation that should be used for the three cheek-teeth of the Muridæ, à propos the formula used for certain voles by Mr. R. Kellogg*. Although Mr. Kellogg does not say how far the formula he

* Kellogg, "A Study of the Californian Forms of the *Microtus montanus* Group of Meadow-Mice," Univ. Cal. Publ. Zool. xxi. p. 245 (1922).

uses should be applied to Muridæ other than voles, it is almost self-evident that any formula that may be applied to the voles must apply equally to the Muridæ at large. Having incurred a certain amount of responsibility in the matter, I had to prepare a statement of the theoretical questions involved for the use of my colleague; and in accordance with his desire that statement is recorded in the present paper.

Kellogg's formula, viz., $p. \frac{4}{1}, m. \frac{1.2}{1.2}$, is identical with that used by Owen, who stated* that in the rodents "the first or anterior of the molar series, whether the number be 2—2, 3—3, or 4—4, is a premolar; it has displaced a deciduous predecessor in a vertical direction." But such a replacement is entirely unknown in Muridæ; and Owen's formula, lacking the support of any positive evidence, has been abandoned for many years in favour of that now in common use, viz., $m. \frac{1.2.3}{1.2.3}$.

So long ago as 1872, Forsyth Major† was led to suspect that the anterior cheek-tooth, above and below, in Muridæ is neither a "molar" nor a "premolar" in the ordinary sense of those terms, but is the posterior milk-molar, which in this family has become persistent in each jaw, the permanent premolar ($p. 4$), normally replacing this tooth, having been suppressed. Long afterwards, but independently, while working at Microtinæ, I arrived at a similar conclusion‡. Adopting Hensel's tooth notation (which personally I still prefer, although I realize that convenience now forbids its use), both Forsyth Major and I used for the the Muridæ therefore the formula $dm. \frac{1}{1}, m. \frac{1.2}{1.2}$, which in the more usual notation would be expressed as $mp. \frac{4}{4}, m. \frac{1.2}{1.2}$.

Kellogg cites the views of Forsyth Major and myself, but does not indicate clearly whether he intends to agree with us or not, although he seems to admit that the homologization of the front lower cheek-tooth in Microtinæ with mp_4 would afford an explanation of its complexity.

It is not possible in this place to present fully the case for the homologization of the teeth in question with $mp. \frac{4}{4}$; but a brief outline and a few facts in illustration of the argument

* Owen, 'Anatomy of Vertebrates,' 1868, vol. iii. p. 300.

† Forsyth Major, "Materiali," Atti Soc. Ital. Sci. Nat. xv. p. 112 (1872); "Nagerüberreste," Palæontogr. xxii. p. 75 (1873); "Fossilen Pferde," Abhandl. schweiz. paläontol. Ges. iv. p. 111, footnote 3 (1877).

‡ Hinton, Proc. Geol. Assoc. xxi. 1910, p. 490.

are given in the following paragraphs. I would hasten to say, however, that although this homologization appears highly probable to me (and, I am permitted to say, not improbable to Mr. Thomas), both my colleague and I are strongly of opinion that the conventional formula $m. \begin{smallmatrix} 1.2.3 \\ 1.2.3 \end{smallmatrix}$ should be adhered to, at least in ordinary systematic writing, until such time as definite proof of the "mp. 4 theory" can be supplied. Great difficulty and inconvenience arise in systematic work from too readily following unproved theories of tooth-homology*; and in the present instance, if it turn out that so important a change in the dental nomenclature of this great family becomes necessary, then the innovation should be made in a formal and conspicuous manner and not be merely indicated by eccentricities in the lettering of figures illustrating the teeth of some small local group.

The argument in support of the "mp. 4 theory" may be shortly stated as follows:—In many Muridæ (and particularly among Microtinæ) the lower front cheek-tooth is extremely complex; to a lesser extent this is also true sometimes of its opponent in the maxilla (e. g., *Dicrostonyx*, *Eothenomys*, *Chiruromys*, and *Apodemus epimelas*). Wherever the available material permits us to work out the morphological history of the cheek-teeth, we find that within the Muridæ (and in nearly all the other rodents) a more complex condition of the crown is a primitive character as opposed to a more simple condition, which invariably appears to be the result of specialization. An enormous mass of facts might be cited in support of this statement, but it will suffice to say that clear evidence of the direction of dental progress, from the complex to the simple, in this family is afforded, firstly, by those very rare cases in which it is possible to trace a single phylum forwards in time (e. g., *Miomys* in successive horizons of the Upper Pliocene and Lower Pleistocene of Britain); secondly, by the phenomena manifesting a progressive reduction and simplification of the cheek-teeth in the individuals of many species (e. g., *Arvicola amphibius*) as they pass from extreme youth to maturity; and, lastly, by many living and extinct genera in which the species seem to show a series of gradations from more primitive forms, with relatively complex teeth, to more specialized forms, with a simpler type of dentition. In the last class of case the personal equation is no doubt active; but the observer who has had training in dealing with cases

* Cf. Thomas, Ann. & Mag. Nat. Hist. (9) ix. p. 671, footnote (1922).

of the first two classes runs comparatively little risk of inverting the sequence in cases of the third class. The principle involved in each of the three classes is one and the same. If, for example, we examine an absolutely unworn front lower cheek-tooth of *Mimomys* or *Arvicola* we find that it possesses a tubercular cap, reminiscent of the bunodont and brachyodont ancestors of the group; such a cap occurs, too, in the molars of most other rodents with "prismatic" patterns in the adults. In slightly deeper levels of the crown certain tubercles fuse together in such a way that when the tooth is worn down the characteristic prismatic pattern gradually comes into view. In an earlier species of *Mimomys* (e. g., *M. pliocenicus*) we find that " m_1 " (in the conventional sense) has three re-entrant folds upon its outer border for a considerable portion of the animal's life; but as middle age is approached the walls of the foremost fold knit together at a certain point—the inner part of the fold then being converted into an enamel "islet," while the outer part is represented by a vertical groove which channels the outer surface of the tooth. Gradually the "islet" and the groove die out in deeper levels of the crown, so that in old age, when wear is far advanced, all traces of these vestigial structures are lost. In later species (e. g., *M. intermedius*) exactly the same process, with exactly the same result, is seen—with a difference; the process is hastened, and the last traces ("islet" and external groove) of the third or front outer fold vanish before the animal is fully grown. In *Arvicola amphibius* and *terrestris* we have strictly parallel changes taking place upon the molar crowns within the first few weeks of the individual's existence; in these creatures there is a tubercular cap upon the summit of the tooth; then, in slightly deeper strata, the beginnings of those "prisms" and folds which form the characteristic pattern of the adult tooth, plus other prisms and folds, which, after lingering for a day or two, the transitory memorials of forgotten ancestors, rapidly disappear.

By comparing the results obtained from the three lines of inquiry indicated above, it is possible to form an idea of the minimum amount of complexity which the cheek-teeth must have possessed in the most primitive Muridæ, or at least in those forms directly ancestral to the various living subfamilies. Investigations of this kind, involving the careful examination of many thousands of teeth, closely pursued for more than twenty years, have led me to infer that the anterior cheek-teeth in the ancestral Muridæ were multitubercular structures, consisting in the case of the lower

tooth ("m₁") of at least twenty-one tubercles arranged in three longitudinal rows of seven each; and in the case of its opponent ("m'¹") of at least fifteen tubercles similarly arranged in three longitudinal series of five each. The fate of these primitive elements has been various in the many subfamilies now recognized. In most groups they have suffered considerable numerical reduction (greatest perhaps in Gerbillinæ, least in Microtinæ); and this reduction has, in the normal mammalian manner, affected primarily the inner sides of the upper molars and the outer sides of the lower molars. More or less complete transverse fusions between the surviving tubercles of the three primitive longitudinal rows have taken place in all sections of the Muridæ, such fusions being most complete and most difficult to unravel in genera which have become completely hypsodont, though still apparent in many which have remained brachyodont. Far more important, the fate of the three longitudinal rows differs from section to section. In Murinæ, for example, the tubercles of the median row have grown at the expense of those forming the inner row in upper molars, the outer row in lower molars. In Cricetinæ, on the other hand, the tubercles of the median row are atrophied to a greater or less extent; sometimes to such an extent that even an experienced eye fails to detect the vestiges that usually remain. Lastly, in Microtinæ, the middle tubercles remain important elements, although fusions with those of the outer or inner rows and the general progress towards hypsodonty, which is so marked a feature in this group, have all but completely masked them as independent structures from our view. But, nevertheless, even in this subfamily, more or less clear traces of these median tubercles as recognizable elements of the molar crown are to be found occasionally: sometimes upon the unworn summits of the teeth, as in *Dicrostonyx*; sometimes regularly persisting in adult stages of wear, as in certain species of *Lagurus*; but most frequently cropping up as vestiges of peculiar form in slightly worn teeth, or recurring as atavistic abnormalities in the teeth of quite widely separated genera. In general, widely confluent opposed dentinal spaces (as in the teeth of *Evotomys*, *Eothenomys*, or the well known confluent pair of the "m₁" of *Pitymys*) may be taken as evidence of a relatively strong development of certain of the tubercles of the median row. Whether my estimate of the number of cusps primitively present be substantially accurate or not, there is, on the whole, abundant evidence that a high degree of complication must have characterized the anterior cheek-tooth in each

jaw in the most primitive members of the family; and it is a complexity of which traces are retained to this day by many genera distributed among several of the most widely separated living subfamilies.

Our knowledge of Tertiary Rodentia is still very imperfect, for few have been discovered beyond the limits of Europe and America. On the other hand, those of Europe and North America are fairly well known. In the Tertiary strata of these two continents the Muridæ are comparatively poorly represented, and the known forms include none that can be regarded as even approximately representing the atavus of this great family. Upon reviewing all the molar types so far discovered among the earlier and middle Tertiary rodents, we fail to find one from which it would be possible to derive cheek-teeth possessing the complexity so characteristic of " m_1 " and " m^1 " in so many Muridæ, living and extinct, dating from the Pliocene period onwards—unless, indeed, we make the at present quite inadmissible supposition that new parts have been added to the teeth since the Miocene period. Such a supposition is inadmissible, firstly, because it would contradict all that we have learnt about the direction of dental specialization within the Muridæ from Pliocene times onward; and, secondly, because it would traverse the evidence of the older Tertiary rodents themselves. For even in the Eocene and Miocene periods rodent molars have generally undergone a process of progressive simplification (*e.g.*, Lagomorpha*); and to no order does Kowalevsky's famous comment ("Das kann schon als ein Wink dienen, wie weit wir noch von der primitiven Form des Zahnes sind, denn je tiefer wir in den Schichten dringen, je ältere Formen wir finden, desto complicirtere Gestalten tauchen immer auf"†)—uttered in another connection, it is true—apply with greater force.

The seeming impossibility of deriving these complex teeth from any known rodent permanent molar or premolar led, naturally enough, to the examination of the milk-dentition as the possible source of these organs. In most mammals the posterior milk-molars (and particularly mp_4) are commonly more complex than are either their vertical successors ($p_{\frac{4}{4}}$) or the true molars ($m_{\frac{1-3}{1-3}}$) behind them. And among Tertiary rodents this is also sometimes the case, as, for

* Cf. Forsyth Major, "On Fossil and Recent Lagomorpha," Tr. Linn. Soc. London, (2) vii. p. 433 (1899).

† Kowalevsky, "Anthracotherium," Palæontographica, xxii. p. 230, footnote (1874).

example, in *Theridomys gregarius*, Schlosser, a Hystricomorph from the Oligocene of Quercy, in which species mp_4 , when little worn, has an extremely complex crown of almost arvicoline aspect. The idea, therefore, of homologizing " m_1 " and " m^1 " of Muridæ with mp_4 and mp^4 of normal mammals presented itself successively, at widely different dates, to the minds of Forsyth Major and myself. Such homologies, could they be established, would do much towards bringing the Muridæ into line with other simplicidentate groups; and Forsyth Major, with characteristic insight and acumen, succeeded in showing that his theory was, at all events, not in conflict with the remainder of the evidence. He pointed out that:—

“Nager mit nur zwei ächten Molaren sind nichts Unerhörtes; im Oberkiefer von *Lagomys* z. B. haben wir drei Milchzähne, die gewechselt werden, und zwei ächte Molaren, im Unterkiefer zwei Milchzähne und zwei (beziehungsweise drei) Molaren. Dem vordersten Backzahn der Murinen geht kein anderer Zahn voran; daraus folgt aber noch nicht als Nothwendigkeit, dass es ein Molare sei; denn ein Milchzahn muss nicht nothwendig ersetzt werden” [e. g., the foremost cheek-teeth in the horse and pig]. . . . “Der vorderste Zahn der Murinen hat die complicierte Gestalt des untern Milchzahns (d_1 [i. e., mp_4]) von *Hystrix*, *Dasyprocta*, *Cælogenys*, *Theridomys*, *Lepus* einerseits, sowie andererseits der grossen Mehrzahl der Placentalia überhaupt. Es wäre ohne die von mir vertretene Annahme auffallend, am Anfang einer Reihe von Backzähnen, die auf die geringe Zahl von drei reducirt sind, einen mehr als gewöhnlich ausgebildeten Zahn zu finden, während sonst grade reducirt Zähne die Reihe beginnen. Die Erscheinung findet ihre naturgemässe Erklärung, wenn wir annehmen, dass der unter (beziehungsweise im Oberkiefer über) $d. 1$ [i. e., $mp. 4$] wegziehende Nagezahn die Entwicklung des Ersatzzahns $p. 1$ [i. e., $p. 4$] gehindert, grade dadurch aber zugleich indirect gewissermaassen fördernd auf die Entwicklung des Milchzahns eingewirkt hat, welchem letztern eine längere Existenz gesichert ist, weil kein Ersatzzahn sich unter ihm bildet, und somit kein Druck auf ihn ausgeübt wird. Unter Nagern ist die Zahnreihe am vollständigsten bei *Lepus*, bei welchem die Nagezähne am kürzesten sind und darum mit der Backzahnreihe in keinerlei Berührung kommen.—Wenn der Nagezahn mit seinem offenen Ende immer mehr von innen nach aussen vorrückte, so würde er schliesslich auf den Milchzahn ($d. 1 = mp. 4$) die gleiche Wirkung wie ein Ersatzzahn ausüben, d. h. sein

Ausfallen veranlassen. Nun stellen aber die Nagezähne junger Individuen Segmente eines viel kleineren Kreises dar als die älterer, so dass sich also der Nagezahn bei zunehmendem Alter mit dem offenen Ende von seinem Platz unterbeziehungsweise oberhalb des *d. 1* (*mp. 4*) nach hinten zu entfernen kann. Seiner Wirkung mögen wir dann in manchen Fällen die Verkümmernng des letzten Molaren zuschreiben haben, wie sie beispielsweise bei *Mus* vorkommt.—Ich präntendiere nicht, mit den vorstehenden Bemerkungen meine Ansicht bewiesen, glaube sie aber besser motiviert zu haben, als die allgemein herrschende es ist. Die definitive Antwort auf diese und ähnliche Fragen dürfen wir wohl mit der Zeit von der Palæontologie erwarten." ('Fossile Pferde,' p. 111, footnote.)

Two other little facts—trifles in themselves, no doubt—are worthy of note for the cumulative effect of their evidence. In South America, as Winge records (and as I have seen in a specimen from Cordova), the atrophy of the posterior molars in *Mus musculus* proceeds sometimes to the total suppression of those teeth; in Europe *m. 3* seem to be constantly present. Secondly, in those very rare cases in which an extra tooth is developed in Muridæ it appears at the posterior end of the series (*Microtus agrestis*, Winge; *Saccostomus hildæ**, B.M.); this extra tooth would have to be *m. 4* according to the current notation, but it finds a perfectly natural explanation as *m. 3*, sporadically and atavistically returning, according to the *mp. 4* theory.

To conclude, definite proof of the homologization of the teeth in question with *mp. 4* is not yet forthcoming; and it cannot be expected until palæontological research brings to light really primitive Muridæ from some still unknown old Tertiary horizon, possibly in south-eastern Asia. At present the Microtinæ seem to be the group most likely to afford the desired information; but nothing is yet known of the history of that subfamily before the middle or the late Pliocene. Of the species then existing some belong to still living genera and are dentally, at all events, as highly specialized as are their living representatives; others are, in a measure, primitive, but even they have proceeded too far along the path of dental progress to show us more than the direction of that path and its later portions. Such facts indicate clearly how far we are from the beginning of the

* Schwann, P. Z. S. 1906, p. 110.

story upon which the solution of this and many other interesting problems depends. But, whether this leads us to the ultimate acceptance of the *mp.* 4 theory or not, I can only reiterate my opinion that, in systematic writing, no change in the commonly accepted notation of the cheek-teeth of Muridæ should as yet be adopted.

XIV.—*The Godman Exploration Fund: List of Mammals from North Queensland collected by Mr. T. V. Sherrin.*
By OLDFIELD THOMAS.

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IN this, the first paper dealing with the results of the Godman Exploration Fund, I may put on record that, as a peculiarly suitable memorial to her late husband, the well-known naturalist Mr. F. DuCane Godman, F.R.S., Dame Alice Godman has founded an Exploration Fund for the employment of zoological collectors to obtain specimens for the National Museum. The Trustees of the Fund will be a permanent body, who will be glad to take charge of and utilize for the benefit of the Museum any further sums which patriotic persons may like to give or bequeath for the purpose of similarly benefiting the Museum collections.

By the help of the Fund, Mr. T. V. Sherrin has made a collection of Mammals in the district of Ravenshoe, North Queensland, south-west of Cairns, about 17° 40' S. and 145° 30' E., and these prove to be of so much interest as to deserve a special list. All are presented by the Godman Exploration Trustees to the British Museum.

Among them attention may be drawn to the well-marked species of Marsupial Mouse, which I have named after Mr. Godman *Phascogale godmani*, and to the little Platypus, which seems to represent a peculiar diminutive northern race of *Ornithorhynchus anatinus*.

In addition to the species here recorded, examples believed to be referable to *Æpyprymnus rufescens*, *Pseudochirus herbertensis* and *peregrinus*, *Petauroides volans*, and *Trichosurus vulpecula* were obtained, but, owing to various Customs' formalities, have not yet been received.

1. *Eptesicus pumilus*, Gray.

♂. 53, in spirit. Dinner Creek, Ravenshoe. 2900'.

2. *Hydromys longmani*, sp. n.

♂. 54; ♀. 55, 115. Dinner Creek, Ravenshoe. 2900'.

♂. 172, 178, 179; ♀. 183. Vine Creek. 3000'.

Smaller and darker than *H. chrysogaster*, with the feet not becoming so specially elongated in later life.

Coloration, as compared with *H. chrysogaster reginæ*, the water-rat of the southern part of North Queensland, decidedly darker above, the whole back practically of the same blackish tone as the crown of *reginæ*. Under surface washed with ochraceous-buff, much richer than the creamy-buff of *reginæ*. About one-quarter of the tail white. Hind feet, even of old specimens, of more normal murine proportions to the rest of the animal than is usual in *Hydromys*, the length of the foot usually little exceeding that of the skull.

Skull averaging smaller than in *chrysogaster*, and showing a little less of the usual aquatic modifications. Nasals shorter. Anteorbital foramina less high; palatine foramina usually shorter. Molars markedly and uniformly smaller.

Dimensions of the type:—

Head and body 270 mm.; tail 247; hind foot 58; ear 20.

Skull: greatest length 52; condylo-incisive length 49; zygomatic breadth 27; nasals 17.5; mastoid breadth 20.5; palatilar length 23.5; palatine foramina 5.8; upper molars 7.8.

An older male skull measures approximately 53.5 mm. in condylo-incisive length.

Hab. as above.

Type. Adult male. B.M. no. 22. 12. 18. 2. Original number 172. Collected 17th June, 1922.

This distinct species differs markedly from the various forms of *H. chrysogaster* by the reduction of the special elongation of the hind feet which usually occurs in later life, the feet of the oldest specimens of *longmani* scarcely exceeding those of younger adults. And the molars are decidedly smaller.

I have much pleasure in naming it in honour of my friend Mr. Heber Longman, the well-known Director of the Queensland Museum, to whom the British Museum is indebted in various ways in connection with Mr. Sherrin's collecting expedition.

3. *Uromys sherrini*, sp. n.

♂. 90; ♀. 41, 70, 130. Dinner Creek, Ravenshoe. 2900'.

Externally almost precisely like *U. macropus* of Cape

York, but the colour is rather greyer, especially on the shoulders and flanks, and the belly is more conspicuously white. In the allied species the belly is dull or drabby white, and, owing to the fur being thin and poor, the contrast with the body is less strongly marked.

Skull apparently not reaching quite the size it does in *macropus*, though there is a good deal of variation in this respect. General shape similar, but interorbital region markedly different, for while in *macropus* the edges are developed laterally, overhanging the orbit, and evenly divergent backwards, in *sherrini* they are parallel as far back as the commencement of the cerebral cavity, where they diverge a little and then run backwards across the parietals at a less distance apart than in *macropus*. The edges themselves are smoothly rounded anteriorly, sharp posteriorly, and with an even concavity between them.

Other characters about as in *macropus*, though the teeth average slightly smaller.

Dimensions of the type:—

Head and body 286 mm.; tail 344; hind foot 56; ear 31.

Skull: condylo-incisive length 64; zygomatic breadth 33·7; nasals 23; frontal, breadth at middle of orbital (not orbito-zygomatic) fossa 10·5, breadth immediately behind rudimentary postorbital projections 10; greatest breadth between ridges on parietals 16·6; palatilar length 33·5; palatine foramina 8·4; upper molar series (worn) 11·2.

Hab. as above.

Type. Adult female. B.M. no. 22.12.18.9. Original number 41. Collected 5th May, 1922.

The parallel-sided shape of the interorbital region of the skull will readily distinguish this species from *U. macropus*, in which the supraorbital edges diverge widely behind, and so alter the whole appearance of the skull.

I have much pleasure in naming this fine rat in honour of Mr. T. V. Sherrin, in recognition of the enthusiasm and skill he has shown in making the collection now described, and also in remembrance of many years' able service as taxidermist in the Museum.

U. sherrini is in all probability the species called *U. macropus* in Collett's paper, and recorded from Herbert Vale. The skull in that case was somewhat larger, 69 mm. in length.

4. *Melomys cervinipes*, Gould.

♂. 38, 46, 47, 50, 51, 52, 87; ♀. 40, 44, 45, 49, 60, 66, 80; ♂ in spirit. Dinner Creek, Ravenshoe. 2900'.

This rather variable animal has a considerable range, extending southwards to the Clarence and Richmond Rivers, New South Wales. The types were from Stradbroke Island. There seems to be no tangible difference between the North Queensland and New South Wales examples.

5. *Rattus rattus*, subsp.

♀. 101. Dinner Creek, Ravenshoe. 2900'.

Presumably represents the form described as *Epimys chionogaster* by Lönnberg, who himself thought it to be a geographical variation of *rattus*.

6. *Rattus assimilis coracijs*, subsp. n.

♂. 39, 42, 56, 58, 72, 79, 81, 86, 91, 95, 112, 124;
♀. 43, 48, 57, 61, 62, 71, 85, 92, 94, 102, 111, 113; 2 ♂, 2 ♀ in spirit. Dinner Creek, Ravenshoe. 2900'.

Essentially like *R. assimilis* of New South Wales, but the brown ticking of the back is finer, though the colour is quite the same; and in the skull the palatal foramina hardly reach the level of the first lamina of m^1 , and the bullæ are decidedly smaller.

Fur long and soft, the hairs of the back about 19 mm. in length, with the fine longer piles about 25–26 mm. Under surface dull slaty-greyish washed with whitish; about half the specimens with variable patches of pure white on the chest and belly.

Dimensions of the type:—

Head and body 175 mm.; tail 168; hind foot 36; ear 22.

Skull: greatest length 42; condylo-incisive length 40.4; zygomatic breadth 19.8; interorbital breadth 5.6; breadth between parietal ridges 14.7; palatal foramina 8.6; antero-posterior length of bullæ 6.2; upper molar series (worn) 6.4.

Hab. as above.

Type. Old female. B.M. no. 22. 12. 18. 28. Original number 43. Collected 5th May, 1922.

Chiefly distinguishable from true *assimilis* by the smaller size of the bullæ.

7. *Perameles nasuta pallescens*, subsp. n.

♂. 168, 171. Vine Creek, Ravenshoe. 3000'.

♀. 121 (young). Dinner Creek. 2900'.

A paler northern form of *P. nasuta*.

Essential characters, both external and cranial, apparently as in typical *nasuta*, though the bullæ may be a little smaller. Colour, however, decidedly lighter, a light drab with a slight

pinkish suffusion, nearly matching Ridgway's "écru-drab"; sides still paler, "light écru-drab," and belly more broadly white than in *nasuta*.

Dimensions of the type :—

Head and body 375 mm.; tail 165; hind foot 77; ear 42.

Skull: greatest length 90; condylo-basal length 84; zygomatic breadth 32.5; gnathion to orbit 53.5; palatal length 53; diameter of bullæ parallel with meatal opening 6; combined length of *ms.*¹⁻³ 12.

Hab. as above.

Type. Adult male. B.M. no. 22. 12. 18. 40. Original number 168. Collected 14th June, 1922.

This bandicoot may be readily distinguished from its representative in New South Wales by its beautiful écru-drab colour, much paler than is found in the more southerly form.

8. *Phascogale godmani*, sp. n.

♂. 93, 108, 110, 114, 117, 126, 144; ♀. 109, 118; ♂ in spirit. Dinner Creek, Ravenshoe. 2900'.

A large dark species of the *Ph. flavipes* group.

Essential characters as in *flavipes*, with similar proportions of head and body to tail, short-haired untufted tail, medium-sized claws, and all the main cranial and dental characteristics.

But the size is conspicuously greater, the new species considerably exceeding any other Australian member of this group. Fur close and thick, hairs of back about 8 mm. in length. Colour above dull greyish ("hair-brown") anteriorly, turning posteriorly into dull coppery or cinnamon-brown on the rump and base of tail. Under surface washed with cinnamon or drabby, the hairs broadly slaty for the greater part of their length. Muzzle and sides of face, especially the region between eye and ear, tending to be cinnamon or coppery, an inconspicuous median dark line on the top of the nose. Hands and feet pale brown above; fore claws of full average length, but not specially elongated as in *swainsoni* and *minima*. Hairs of scrotum dull cinnamon. Tail shorter than head and body, short-haired throughout, the fine hairs of the extreme tip above slightly longer; brown above, scarcely lighter below.

Skull about as in *flavipes*, but much larger and with a longer narrower muzzle. Nasals rather more expanded behind than in true *flavipes*, less than in subsp. *adusta*. Supraorbital edges not quite so sharply square. Palatal

foramina and vacuities about as in that species. Bullæ of average size. Proportions of teeth as in *flavipes*.

Dimensions of the type :—

Head and body 143 mm.; tail 122; hind foot 23; ear 19.

Skull: condylo-basal length 35; basal length 32·8; zygomatic breadth 18·6; nasals, length 13, median breadth 2·5, posterior breadth 5; intertemporal breadth 8; mastoid breadth 14·7; anterior palatal foramina 3·4; bulla, measured parallel with the meatal opening, 3·4; front of canine to back of last molar 13·3; combined length of *ms.*¹⁻³ 6·8.

Hab. as above.

Type. Adult male. B.M. no. 22.12.18.46. Original number 126. Collected 26th May, 1922.

This fine species, the largest member of the group which used to be known as "*Antechinus*" is readily distinguished by its size, grey or coppery colour, and long slender muzzle.

I have named the species, the first-fruits of the Exploration Trust, in honour and affectionate remembrance of the late Mr. F. DuCane Godman, Trustee and life-long benefactor of our National Museum, in whose memory the Godman Collecting Fund has been founded by his widow for the continued benefit of the Museum.

It is remarkable how like in colour and general appearance this species is to the local race of *Ph. flavipes*, which occurs together with it and which I have now to describe.

9. *Phascogale flavipes adusta*, subsp. n.

♂. 96, 100, 127, 149; ♀. 59, 125, 131, 143; ♂ ♀ in spirit. Dinner Creek, Ravenshoe. 2900'.

"Caught in dense scrub."

On laying out all the available specimens referable to the (formerly) common *Phascogale flavipes*, I find that there appear to be five recognizable races of it. These are the light-bellied *Ph. f. leucogastra* of Western Australia, a strongly red-bellied race in S. Australia (*rufogastra*), the true *flavipes* of New South Wales and Victoria, a reddish-brown form believed to inhabit the coastal districts of Northern New South Wales and S. Queensland (*unicolor*, Gould), and the present new subspecies from North Queensland. The last may be described as follows :—

Size about as in *flavipes*. Fur close and fine, hairs of back about 6 mm. in length. General colour above "olive-brown," slightly warmer posteriorly. Under surface washed with cinnamon. Head concolorous with fore-back, without rufous patches or median blackish line. Hands and feet

pale brown. Tail brown above, lighter below, the hairs of the terminal half slightly lengthened, so as to form an inconspicuous blackish pencil, longer below than above.

Skull similar to that of *unicolor* in size, the flattened forehead, and sharp supraorbital edges, but the nasals are more broadened posteriorly and the bullæ are rather smaller.

Dimensions of the type:—

Head and body 107 mm.; tail 94; hind foot 21; ear 18.

Skull: condylo-basal length 28.5; basal length 26.3; zygomatic breadth 16.3; nasals, length 9.7, median breadth 2.8, posterior breadth 4.9; intertemporal breadth 6.7; mastoid breadth 12.2; anterior palatine foramina 2.6; bulla, parallel with the meatal opening 2.9; front of canine to back of m^4 11; combined length of ms^{1-3} 5.5.

Hab. as above.

Type. Adult male. B.M. no. 22. 12. 18. 54. Original number 149. Collected 1st June, 1922.

A very distinct subspecies, distinguished by the nearly uniform brown colour, the wide expansion of the nasals posteriorly, and the small bullæ. On these characters it might, indeed, be considered a separate species, were it not that *Ph. f. unicolor*, as represented by the two co-types, believed to be from the coastal region of Northern New South Wales, and two specimens from Ebor are more or less intermediate between the extremes.

10. *Ornithorhynchus anatinus phoxinus*, subsp. n.

♂. 184. Dinner Creek, Ravenshoe. 2900'.

On examining all the available skulls of *Ornithorhynchus* with exact localities, it is interesting to find that there is so strong a differentiation in size as to render a distinction into three subspecies to be advisable. Unfortunately, the great majority of the specimens in the local and University Museums of this country have been merely recorded as from "Australia," while even in the National Museum the localized examples are sadly few in number.

However, allowing for the marked difference in the sizes of the sexes, it would appear that the form inhabiting the coastal area from north of Sydney, southwards through Victoria into Tasmania, is of medium size, while that to the west of the dividing range, on the upper waters of the Darling and Murray Rivers, is decidedly larger, while the present animal, from the north of Queensland, is again much smaller.

The three forms would thus be as follows:—

Ornithorhynchus anatinus phoxinus.

Size least of the genus; an adult male skull 86 mm. in condylo-basal length, with a least muzzle breadth in front of the anteorbital foramina of 17 mm. Length of muzzle from opening of anteorbital canal 38; breadth across tip of muzzle 28; interorbital breadth 12.5; posterior breadth 39; upper cornule, length (exclusive of the antero-internal projection) 11.5, breadth 8.

External characters apparently as usual in *anatinus*. Measurements: head and body 310 mm.; tail 98; hind foot 47.

Range. As yet only known from the present locality.

Type. Adult male. B.M. no. 22. 12. 18. 60. Original number 184. Collected 20th June, 1922.

Being a fully adult male, with closed sutures, the single specimen gives quite a satisfactory idea of the size of this small northern race.

It may be noted that the fossil S. Queensland species described by de Vis* was also decidedly smaller than the animal now living there.

Ornithorhynchus anatinus anatinus, Shaw.

Size medium; adult male skulls about 95–98 mm. in condylo-basal breadth, the least length of muzzle about 18–20 mm. Female skull about 85 mm. An adult male from Shoalhaven River, Southern New South Wales, gives the following measures:—length 98 mm.; least muzzle breadth 20; length of muzzle from anteorbital foramina 43; breadth across tip of muzzle 32; interorbital breadth 13.8; posterior breadth 42.5. Upper cornule (without projections) 13.3 × 8.7.

Range. Coastal area of New South Wales and Victoria east of the dividing range; and Tasmania.

All the technical names hitherto given in the genus would seem to be assignable to *anatinus*. Like *anatinus* itself, *paradoxus*, *rufus*, and *fuscus* are all defined on animals from the coast-region of New South Wales, *levis* has absolutely no locality, *brevirostris*† was based on a young animal from "Swan River," where no member of the genus occurs, and *crispus* refers to one from Tasmania. This last name would be available if the Tasmanian Platypus, which is perhaps slightly smaller than the continental one, with a less expanded beak, were to be thought distinguishable.

* P. Roy. Soc. Queensland, ii. p. 35 (1886).

† All young *Ornithorhynchii* have the short and comparatively broad beak supposed to be characteristic of *brevirostris*.

Ornithorhynchus anatinus triton, subsp. n.

Decidedly larger than *O. a. anatinus*. Skull in males upwards of 105 mm. in condylo-basal length with a narrowest rostral breadth of 22–23 mm. The type measures—length 108 mm.; least breadth of muzzle 22·5; length of muzzle 45·5; breadth across tip of muzzle 34·5; inter-orbital breadth 14; posterior breadth 53. Upper cornules (exclusive of projections) 17·5 × 12. A still larger skull is 114 mm. in length.

Range. West of the great dividing range, in the drainage-area of the Darling and Murray Rivers. In S. Queensland also it ranges eastwards nearly or quite to the coast. Type from the Victorian side of the Murray River, opposite Deniliquin, S.W. New South Wales. Other specimens in the Museum from Namoi River, N.S.W. (*Gould*), Darling Downs (*Mrs. T. B. Frost*), and Gin-Gin, near Bundaberg, Queensland (*W. Allen*).

Type. Adult male. B.M. no. 84.5.15.1. Collected and presented by Mr. J. Thies, of Deniliquin, N.S.W.

In connection with this large island race it is of much interest to note that, just a century ago, Desmarest * stated that "Les Anglais qui ont passé les montagnes bleues qui entourent le duché de Cumberland, ont rencontré en abondance des ornithorhynques plus grands que celui que nous venons de décrire, et peut-être d'espèce différente, dans la rivière de Campbell et dans celle de Macquarie." These rivers are tributaries of the Upper Darling.

XV.—*On Lepidoptera from New Guinea, Kei, Tenimber, the Philippines, and Australia.* By G. HULSTAERT, M.S.C. (Heverlee, Louvain).

IN this paper I propose to describe some new forms of Indo-Australian Lepidoptera. Most of them come from Dutch New Guinea, Kei, and Tenimber, but there are also a few from Mindanao and Australia. Besides, I am mentioning a few species already known and described previously, but the capture of which might be of interest to lepidopterological students.

* Mamm. ii. p. 380 (1822).

As will appear from the following pages, all the new forms received from New Guinea have been captured in the neighbourhood of Merauke*, on the southern coast of the Dutch part of the island.

In studying the localities in which a certain species has been found in New Guinea one finds invariably (with only very rare exceptions) the same localities mentioned: starting from Yule Island and the mainland of South-eastern Papua, passing through the northern part of the island, the Arfak Mountains, and the Western Peninsula, to the Snow Mountains. The great tract of land between the Papuan Gulf and the Snow Mountains thus appears almost unexplored in regard to Lepidoptera; therein Merauke is situated, separated from both by some of the largest rivers of the island—the Fly River, the Digul, etc. Hence we cannot be surprised if we find new local races there, and certainly we may expect still more.

All the specimens quoted are in the collection of our house at Heverlee, except where the contrary is expressly mentioned.

Papilionidæ.

Papilio riedeli, Kirsch, Proc. Zool. Soc. Lond. 1885, p. 275.

1 ♂, Oliliet (Jamdena), Tenimber (*Rev. Fr. J. Klerks, M.S.C.*).

Papilio fuscus beccarii, Oberth. Et. Ent. iv. p. 46.

† 1 ♀, Okaba (Dutch New Guinea), 1913 (*Rev. Fr. P. Ver-
tenten, M.S.C.*).

Papilio ambrax ambrax, Boisd. Voy. Astrol. Ent. p. 40.
no. 5.

1 ♂ forma *ambrax*, Boisd., Merauke, 1911 (*Rev. J. Viegen, M.S.C.*).

1 ♂ forma *ambracia*, Wall., Okaba, 1913 (*Rev. Fr. P. Ver-
tenten*).

1 ♀ forma *ambrax*, Boisd., Okaba, 1913 (*Rev. Fr. P. Ver-
tenten*).

* Merauke is ± 70 kilom. distant from the Papuan frontier; Okaba lies ± 75 kilom. west of Merauke.

Papilio ægeus ormenus, Guér. Voy. Coq. t. xiv. fig. 3.

1 ♂ forma *ormenus*, 1 ♀ forma *leporina*, Jord., 1 ♀ forma *amanga*, Boisd., Okaba, 1914 (*Rev. Fr. P. Vertenten*).

Papilio pericles, Wall., Trans. Linn. Soc. Lond. xxv. p. 45.

1 ♂, Oliliet, Tenimber, 1913 (*Rev. Fr. J. Klerks*).

Pieridæ.

Delias argenthona, F., ♀ forma *balli*, nov.

Differs from forma *seminigra*, Fruhst., by the base of both wings being closely irrorated with black scales and in the absence on hind wing of discocellular and submarginal yellow markings, in their place the red patches of underside being transparent.

One specimen.

Named after the lepidopterologist of the Royal Museum of Natural History at Brussels, Mr. Francis J. Ball, who has rendered me great services in my studies.

Appias ada virginea, subsp. n.

♂. Differs from *A. a. thasia*, Fruhst., in the external border on fore wing being more slightly dentate on veins, on hind wing broader, more regularly rounded proximally, hardly dentate.

Underside.—Black border broad, distant from cell $\frac{1}{2}$ mm. only; basal part yellow, orange near border.

1 ♂, Okaba, 1912 (*Rev. Fr. P. Vertenten*).

Terias apatosa, sp. n. (Text-fig. 1.)

♂. A mass of scales (androconia) under base of cell on underside of fore wing, another mass on upper side of hind wing under vein 8.

Above.—Fore wing pale yellow; base irrorated with black scales; a minute brown dot or stripe at upper angle of cell. Costal border as in *T. libythea*, F., ♀, at apex extending to point of separation of veins 7-8, then becoming narrower till vein 4, slightly dentate; under 4 almost parallel to termen, dentate, deeply excavated at tornus. Hind wing: border slightly dentate, scarcely 1 mm. broad on vein 6, then narrowing, disappearing on 3.

Below.—Both wings with only a small stripe on discocellulars, without any other marking (at least in the two males examined).

Genitalia (text-fig. 1).—Although I was not able to examine them perfectly, nevertheless it may be of interest to

Fig. 1.

Genitalia of *Terias apatosa*, sp. n., ♂.

communicate what I have found. Compared with *T. l. libythea*, the claspers are shorter, the hook at their extremity is longer, more curved, and more acute. I did not see a tooth distally from harpes, nor just after uncus. Penis as in *libythea*.

Expanse.—One ♂ 33 mm., another only 24 mm., both captured at Oliliet (Jamdena), Tenimber, 1917 (*Rev. D. van Roessel, M.S.C.*).

The latter specimen, although smaller, agrees fully with the other, only its colours being paler. I suppose it to be the form of the dry season (however, no date was indicated).

Danaidæ.

Danaida juvena kollerii, subsp. n.

Fore wing.—Stripe in cell quite developed in both sexes, separated from apical spot. Markings green, larger than in *turneri*, Butl., *georgina*, *metaxa*, *eugenia*, Fruhst.; those at each side of vein 1 separated completely or coalescent on outer half; postcellular and subapical spots rounder.

Hind wing.—Black stripe in cell rudimentary, especially in ♀; circumcellular markings well developed, submarginal spots completely present, admarginal distinct in the single ♀, reduced in one ♂, absent in the other ♂.

2 ♂♂, Merauke, 1910 (*Rev. J. Viegen*), Okaba, 1911 (*Rev. Fr. P. Vertenten*); 1 ♀, Okaba, 1911 (*Rev. Fr. P. Vertenten*).

This race differs from *D. i. turneri* in green cell-stripe of fore wing being completely developed in ♀, and in black one of hind wing being rudimentary in both sexes; from *eugenia* and *metaxa* in cell-stripe of fore wing being separated from apical marking, from the former also by feeble cell-stripe of hind wing; from *georgina* by rudimentary presence of this stripe in the larger markings of fore wing.

Named after Mr. A. Koller, Conservator of the Entomological Section at the Brussels Museum, as a mark of gratitude for his services.

Euplœa alecto rothschildiana, subsp. n.

♂. *Above*.—Dark black, white markings completely absent. Hind wing somewhat less darker; sexual patch brownish, not extending into cell nor reaching vein 7. Distal margin paler, anal area broadly coffee-brown.

Below.—Less dark than above. Fore wing lighter distally, still more so between veins 1 and 2. Discal spots absent. Hind wing: outer margin and anal area yellowish; four violet spots between veins 3 to 7 and one in cell. At base three white spots.

1 ♂, Merauke, 1911 (*Rev. Fr. P. Vertenten*).

As a mark of gratitude towards Lord Walter Rothschild, who was so generous as to send me his important and beautiful publication on the Lepidoptera collected by the B.O.U. and Wollaston Expeditions in the Snow Mountains, I avail myself of this opportunity to name this race after him.

Euplœa batesi, Feld. Reis. Nov. ii., Lep. p. 331.

1 ♂, 1 ♀, Okaba, 1911.

Related to *pubilia* and *mimica*, Fruhst.

Euplœa confusa, Butl. Proc. Zool. Soc. Lond. 1866, p. 283.

1 ♂, Okaba, 1911 (*Rev. Fr. P. Vertenten*).

Allied to *iapudia* and *catana*, Fruhst.

Euplœa guerini violetta, Butl. Ann. & Mag. Nat. Hist. (4) xviii. p. 242.

1 ♂, 1 ♀, Okaba, 1911 (*Rev. Fr. P. Vertenten*).

Euploa pumila jamesi, Butl. Proc. Zool. Soc. Lond. 1876, p. 766.

1 ♂, 1 ♀, Okaba, 1910, 1911 (*Rev. J. Viegen*).

Satyridæ.

Elymnias agondas, Boisd. Voy. Astr., Lép. p. 138, t. iii. fig. 5.

Rev. Fr. P. Vertenten has sent three ♂♂ captured at Okaba and Merauke, 1913. They resemble very much the form described by Mr. Fruhstorfer as *melagondas*. One specimen has no subapical lighter band on fore wings; in the two others it is present, but much reduced, one of them having the wings scarcely crenulate at the outer margins; the ocelli of hind wings are situated on an orange background also above, and the fore wing presents a blue ocellus (without circles) on vein 2 beneath near the outer margin.

Amathusiidæ.

Tenaris catops vaneeckeï, subsp. n.

♂. Near *T. c. colarima*, v. E.

Above.—Fore wing: white costal streak distinct till beyond middle of margin. Border greyish brown, in cell as broad as in *T. c. catops*, Westw., behind cell passing on vein 6, between which and vein 7 it leaves a white space, irrorated with brownish grey at extremities; at apex more or less paler, between 7 and 6 at margin only with some squamæ, disappearing completely behind 6. Vein 5 almost entirely, 4 partially, 3 at base, and median vein \pm irrorated with greyish brown. Hind wing: almost as in *T. c. mylæcha*, Westw. Yellow at base well marked, distal border almost disappearing, very narrow, dispense, only 1–2 mm. broad between veins 7–4. Ocelli of underside visible.

Below.—Border almost as above, veins not irrorated with brown; base of cell except on limits without irroration. Hind wing: costal border extending to 8, in basal half to subcostal; terminal border as above, somewhat broader between 6–4. Base a little yellow. Ocelli well marked, outer circle narrow, diffusely limited.

2 ♂♂, Merauke, 1911 (*Rev. J. Viegen*).

Named after Mr. R. van Eecke, Conservator of the Museum at Leiden, who rendered me great services in my studies.

Tenaris rothschildi maneta, subsp. n.

♂. Near *T. r. merana*, Fruhst.

Above.—Fore wing resembles much *T. r. rothschildi*, Sm., forma *pelagia*, Fruhst. White costal streak not very distinct. Costal border greyish, scarcely broader at apex, disappearing about vein 6. Inner border brownish grey, extending to vein 3 or somewhat above, filling cell almost entirely. Termen between both borders completely white; fringe grey when seen with the lens. Hind wing white, border greyish brown, very diffuse proximally, covering apical ocellus, then narrowing, disappearing almost completely at posterior ocellus, only touching it distally. Anal angle with very fine border, or broader but more slightly irrorated. Anal margin with broader border. Submedian hairs long, white or very feebly yellow. Ocelli below visible, black centre of anal one present above.

Below.—Fore wing as above, but colour darker grey. Hind wing: border not extending over vein 7, passing into black circle of ocellus; behind it narrower than in *T. r. merana*, disappearing about vein 3. Anal ocellus surrounded by white background. A grey spot opposite sexual marking. Below base of cell a little yellow. Ocelli equally large, in two specimens as small as in *T. r. rothschildi*, in another as in *T. r. ansuna*, Fruhst.; yellow circle rather pale, black one of posterior ocelli narrow.

3 ♂♂ (one of them in coll. Fr. van de Velde, Louvain); Merauke, 1911 (*Rev. J. Viegen*).

Nymphalidæ.

Cethosia lamarcki elateia, Fruhst., Seitz, Grossschm. Erde, ix. p. 502.

Rev. Fr. J. Klerks, M.S.C., has sent from Tenimber 3 ♂♂ captured at Oliliet (Jamdena), 1911, one having the inter-nerval striæ quite developed, another showing only spurs of them between veins 7-5; the third is no longer in our collection.

Mynes geoffroyi, Guér. Voy. Coq. t. xvi.

1 ♀ (Okaba, 1911), allied to *M. g. geoffroyi*, Guér., and *M. g. sestia*, Fruhst., but differing from both. As there is but a single ♀, I do not venture to separate it from them.

Hypolimnas alimena eremita, Butl. Ent. Month. Mag. xx.
p. 56.

2 ♀ ♀, Merauke (Rev. J. Viegen), one of them in coll. Fr.
v. de Velde, Louvain.

Hypolimnas misippus, Linn. Mus. Ludov. Ulr. p. 264.

1 ♂, Krawain (Jamdena), Tenimber, 1917 (R. D. van
Roessel); 2 ♀ ♀ (one of them in coll. Fathers Jesuits, Lou-
vain), Oliliet, Tenimber, 29. ii. 1912 (Rev. Fr. J. Klerks).

Prothoë australis, Guér. Voy. Coq. t. xiv. bis, fig. 14.

1 ♀, Merauke, 1909 (Rev. J. Viegen), resembling *P. a.*
mafaldu, forma *adua*, Frulst., but fore wing has, besides post-
cellular spot, a row of three spots between veins 4-7, and
spot above vein 2 is absent.

Lycænidæ.

Liphyra brassolis robusta, Feld. Reise Nov. Lep. ii. p. 219.
no. 237, t. xxvii. figs. 10, 11.

1 ♂, 1 ♀, Okaba, 1913 (Rev. Fr. P. Vertenten).

Amatidæ.

Amata micantala, sp. n.

Near *A. arfakensis*, Rothsch.

♂. Head (except a black line between antennæ), patagia,
metathorax, three spots on each side of thorax beneath, a spot
on underside of fore tibiæ yellow. Antennæ feebly serrate,
black. Thorax coloured like wings. Abdominal segments
yellow, anal one completely, two preceding beneath, greyish
black. Anal tufts yellow. Rings between segments coloured
like wings. Feet black, with bluish, violet, and purplish
scales. Wings black, suffused with bluish. Fore wing with
six hyaline spots: a square one below base of cell, a long one
under vein 2, a triangular one at end of cell, oval ones above
veins 3, 4, 6. Hind wing: one small hyaline spot above
vein 2.

♀. Differs from ♂ in dark abdominal rings, thorax and
wings being suffused with green. Only one abdominal seg-
ment yellow above and black below. Spots on fore wing

rounder; hind wing with a hyaline spot also below base of cell.

Expanse.—♂ 32 mm., ♀ 36 mm.

1 ♂ ♀ captured in copulation, Okaba, January 1913 (*Rev. Fr. P. Vertenten, M.S.C.*).

Arctiidae.

STENOCTYTARA, gen. nov. (*Lithosiinarum*). (Text-fig. 2.)

♂. Proboscis present; palpi slight, porrect, reaching frons. Antennæ slender, feebly serrate, with two rows of bristles and fasciculated cilia. General aspect and shape of fore wing as in *Eugoa*, Wkr. Cell very narrow, ending in one single acute angle, broadest at origin of vein 2—*i. e.*, before middle; 3 at $\frac{2}{3}$, 4 in the middle between 3 and 5; 5 and stalk of 6, 7, 8, 9 from angle, 10 before it, 11 from cell at the same distance as 4, anastomosing with 12. Hind wing: cell regular, 2 at $\frac{2}{3}$, 3 before angle, 4 from it, 5 above it, 6 and 7 stalked, 8 from beyond middle of cell.

Considering the unusual formation of the cell in fore wing, one would expect to find the cause of it in the presence of some sexual marking—however, I was unable to find anything in that line.

Genotype, *St. vittata*, sp. n.

Fig. 2



Fore wing of *Stenocyttara vittata*, gen. et sp. n., ♂.

Stenocyttara vittata, sp. n.

♂. White; underside of antennæ and their last $\frac{2}{3}$, distal abdominal segments greyish brown. A spot on vertex, one on each half of patagia, on prothorax, and on tegulæ light brown.

Fore wing white, with light brown markings—viz., two basal spots at costa, one under base of cell; a median band

split below cell into two narrow lines, which become broader below vein 2; a spot at end of cell; a postcellular band of distally coalescent spots, of which the one between veins 2-3 is twice as long (considered longitudinally) as the others; four submarginal markings, subparallel to postcellular band. Fringe light brown.

Hind wing white, above one apical light brown spot, below two such spots.

Expanse.—22 mm.

1 ♂, Bacuag (prov. Surigao, E. Mindanao), Philippines, 1. xi. 1909 (*Rev. A. van Odijk, M.S.C.*).

Chionæma fulvia laudans, subsp. n.

♀. Differs from *C. f. fulvia*, Linn., in black border of both wings being broader, on fore wing as broad as in *f. fulvia* ♂, on hind wing still broader than in the latter, especially at apex and anal angle, where it is produced basally.

1 ♀, Langgoer, Little Kei, 1909.

PARAMSACTA, gen. nov. (Text-fig. 3.)

Near *Amsacta* (Arctiinæ).

♂. Antennæ short, serrate. Palpi slender, short, obliquely bent down. Proboscis very minute. Hind tibiæ with one pair of spurs. Thorax clothed with hair; abdomen only with scales. Shape of wings like *Amsacta lineola*, F.

Fig. 3.



Head of *Paramsacta pura*, gen. et sp. n.

Venation.—Fore wing: areola absent; vein 2 from cell almost at $\frac{3}{4}$, 4 from angle, 3 and 5 very close to it, equally distant; 6 from upper angle or a little beneath it, or stalked; 7, 8, 9, 10 stalked. Hind wing: 2 from cell at $\frac{2}{3}$, 3 and 4 from angle, 5 just above it, 6 and 7 stalked, 8 from middle of cell.

Genotype, *P. pura*, sp. n.

Paramsacta pura, sp. n.

♂. Palpi red, upper side and third joint completely black.

Face white; frons and vertex red. Antennæ internally black, externally white. Patagia, tegulæ, thorax, base of abdomen, and underside of whole body white. Fore side of anterior coxæ (except a black spot) and femora, upper side of mid-femora red; fore side of anterior and median tibiæ, a spot at extremity of hind tibiæ, and partially tarsi brownish black; rest of feet white. Abdomen above (except anal segment) red, with a row of black markings dorsally and at sides. Wings brilliant white, costa of anterior pair crimson.

Expanse.—33–38 mm.

2 ♂♂, Okaba, 1913 (*Rev. Fr. P. Vertenten, M.S.C.*).

Argina cribraria, Cl. Icon. Ins. ii. t. liv.

Rev. Fr. P. Vertenten sent four specimens of this species, all of them being ♀♀, captured at Okaba, 1913. Two are typical; one has the spots of the first, second, and more or less the third band coalescent on veins and folds of right fore wing. The fourth has the black spots much reduced, especially on fore wing; two basal spots small, first transverse line developed, second indicated only by the costal spot, postdiscal line much reduced, spots almost completely disappearing.

I propose to name this aberration aberr. *detersa*, nov.

Nyctemera inconstans, Butl. Proc. Zool. Soc. Lond. 1880, p. 672.

1 ♀, Surigao (Mindanao), 26. vi. 1910 (*Rev. A. v. Odiyk*).

Agaristidæ.

Argyrolepidia goldiei similis, subsp. n.

Allied to *A. g. figurata*, Jord.

♂. Palpi black, second joint yellow at base, with some white scales at apex. Anterior femora with yellow hairs. Intermedian and posterior feet naked. Patagia without white spot, only with bluish-white margin. Tegulæ with white spot. Abdominal segments black, albo-marginate.

Fore wing with blue basal and postdiscal spots, white cell-spot, transverse white band, broadest between veins 3–4. *Hind wing*: white patch with a blue shine, not reaching inner margin, incised on vein 2, but only beneath cut into two. Base below metallic blue.

Expanse.—43 mm.

1 ♂, Merauke, 1912 (*Rev. J. Viegen*).

Noctuidæ.

Euxoa vertenteni, sp. n.

♂. Antennæ bipectinate to $\frac{2}{3}$, outer row with teeth more than half shorter than those of inner row.

Fore wing resembles very much *E. poliotis*, Hmps. Basal and submedian line distinct, distally dentate, the latter almost disappearing below submedian fold. Costa between the two lines dark. Median third not darker than rest of wing. Claviform very indistinct; orbicular round, white, with darker ring and centre; reniform black, with white and darker rings, the space between it and costa black. Postmedian line not very distinct, with a darker shade basally and more or less distinct stripes on veins 2-5 externally. Antemarginal line almost obsolete, with a not very distinct shade proximally; a row of black submarginal points between veins. At costa black spots on origin of bands. Fringe uniformly brownish grey.

Hind wing brilliant white, veins and termen slightly greyish. Fringe white.

Expanse.—32-36 mm.

♂♂, Okaba, 1913 (*Rev. Fr. P. Vertenten, M.S.C.*).

Sideridis diatrecta, Butl., aberr. *albata*, nov.

♂. Fore wing whitish ochreous instead of ochreous brown. Hind wing lighter on veins and at termen.

1 ♂, Douglas Park, N.S.W., Australia, 1919 (*Rev. G. Cody, M.S.C.*).

Sideridis leucosta, Low., ab. *vinosa*, nov.

♂. Fore wing without dark irroration, white dot at lower end of cell, and transverse rows of points distinct; rest of wing uniform.

1 ♂, Okaba, 1913 (*Rev. Fr. P. Vertenten*).

Calogramma festiva, Don. Epit. Ins. New Holl. 1805.

1 ♀, Okaba, 1913 (*Rev. Fr. P. Vertenten*).

Acontia transversa, Guen. Noct. ii. p. 211, pl. x. fig. 5.

1 ♂, Langgoer, Kei, 14. v. 1909; 1 ♂, Oliliet, Tenimber, 1917.

Trigonodes hyppasia, Cr. Pap. Exot. iii. pl. ccl. E.

5 ♂♂, Bacuag, 3. x. 1909 and 15. viii. 1909 (*Rev. A. v. Odijk*).

Lymantriidæ.

Dasychira grata, sp. n.

♂. General shape and aspect resembling *D. alboschistacea*, Rothsch., and *albiplaga*, Swinh.; costa more arched towards apex. Anterior and intermedian feet brown, with darker spots. Palpi, head, and thorax grey. Antennæ wood-brown, scape a little lighter.

Fore wing greyish brown; basal third yellowish grey; an almost straight brown basal line; at $\frac{1}{3}$ of wing a feebly crenulate brown line, limited basally by a reddish-brown colour. On submedian fold, before subbasal line, a distinct dark brown lunule, opened basally. Costal half of median third schistaceous, discocellulars and a patch between veins 4-6 yellowish grey; lower half grey, veins schistaceous, distally limited by a yellowish-grey patch. Postmedial line dark brown, very distinct, originating at costa in a white patch, oblique till vein 6, sharply dentate distally on this vein and on vein 4, then almost obsolescent, turning basally and limiting yellow patch below vein 3, thus almost disappearing on this vein. Apical part white till vein 6; behind postmedian line a brown patch at costa above 7, and three between 6-3; a grey spot at tornus, not very distinct. Rest of external third schistaceous (except at termen); a row of subterminal dark brown spots, becoming larger and larger to vein 2.

Hind wing buff-grey, almost white at base, darker at termen.

Underside of both wings without black lines or points on discocellulars.

Expanse.—35 mm.

1 ♂, Philippines, Mindanao (prov. Surigao).

Leucoma submarginata, forma *keiana*, nov.

♂. White; head (except a white spot on each side), palpi (except base beneath) brown. Antennæ yellowish white, scape pure white. Feet with black spots, and yellow claw-joints of tarsi.

Fore wing completely and *hind wing* on anal part bright silvery. Costa of fore wing on fore side, and distally also above, narrowly ochreous. Fringes brownish grey.

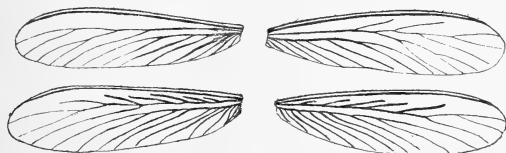
Expanse.—33-35 mm.

2 ♂♂, Sathëen, Klein Kei, 18. ii. 1921 (*Rev. P. van der Raad*, M.S.C.).

XVI.—Two new Termites from Uganda. By CLAUDE FULLER, Assist. Chief of Division of Entomology, Union of South Africa.

Cubitermes ugandensis, sp. n.

Winged Imago. Above brown, below yellow-brown, pleural sclerites and coxæ pale brown, pleural sutures dark brown. Legs and antennæ quite pallid. Wings hyaline, brownish; R. dark brown; C. paler than R. and becoming pallid toward wing-tip. Head uniformly dark brown with a pale fontanelle-spot and without distinct antennal spots; clypeus castaneous. Pronotum a tone paler than head, without markings. Mesonotum and metanotum paler than pronotum, especially the sides, which are yellowish; mesonotum with a small pale median spot on hind margin. Abdominal tergites uniformly coloured, the caudal series somewhat paler. Abdominal sternites darker laterally, genital plate of female with a pale anterior median field, which is bordered at the sides and behind by pale brown.



Wings of *Cubitermes ugandensis*.

Head glabrous, frons with a median depression, vertex flattened around a decided median ridge at fontanelle, this ridge may or may not be impressed along its length with an elongate depression; clypeus without a median groove; antennæ 16-jointed, joint iii. minute, iv. much smaller than v., v. and vi. subequal and smaller than vii. Pronotum glabrous, subsemicircular, depressed behind, without median groove, hind margin somewhat wide and shallowly incurvate; meso- and metanotum with weakly curved sides, hind margins notched, points short and angular. Wings about four times as long as wide; venation of hind wing very characteristic, as *M.* exhibits a series (5 to 6) of regularly spaced, strong, oblique offsets that extend towards R.; the first offset 1.5 to 3 mm. from line of fracture; in the forewing these offsets are either quite missing or, if present, fewer, longer, and further apart; when missing, the venation-scheme agrees with that described for *C. fungifaber*, Sjöst.

Measurements: Males not plainly smaller than females. Body, with head bent, 7 to 7.5 mm., with wings about 15.5; fore wings, without stumps, 13.5 by 3.5 to 3.7 mm.

Soldier. Large; head one-third longer than wide, elongate rectangular, sides almost parallel, tapering to mandibles, very faintly and slightly constricted near hind margin, dorsal profile incurvate behind frontal crest; labrum yellow, with pale base and tips, relatively short and deeply forked, tips acuminate, diverging slightly, sides weakly undulate; antennæ 15-jointed, joint iii. shorter than iv., and iv. shorter than v.; mandibles robust, as long as head is wide, reddish at base, the rest dense black. Pronotum with a short and wide prozona, which is indented in the middle; the cephalic edge is either straight with curved sides or faintly crenate.

Measurements: Head height, 1.9 to 2 mm.; width, 2.3 to 2.4 mm.; length, 3.3 to 3.5 mm.

UGANDA: Nkulukuku, 1921 (*H. L. Duke*): 37 imagos, 11 soldiers, many workers.

Types, British Museum; paratypes, Division of Entomology, Pretoria.

This species belongs to the *fungifaber* group.

Termes (Odontotermes) kibarensis, sp. n.

Soldier. Head reddish yellow, with small but distinct black eye-spots; body creamy yellow. Head flatly lenticular; from above elongate-oval, narrowing plainly to cephalic margin; frontal area shallowly and broadly depressed in clypeal region, behind this slightly raised, with characteristic but faint sculpturing comprising a Y-shaped median carina, the arms of the Y directed forward and usually embracing a shallow round pit; here are several short fine grooves radiating forwards on each side of the carina; antennæ 17-jointed, joints iii. and v. short and narrow, v. somewhat longer than iii., iv. about as large as vi. Mandibles black with reddish bases, short and robust, about half the head length; step-like tooth of left with ledge at right angles to margin of apical, tooth of right with ledge sloping away from margin of apical.

Measurements: Head with mandibles, 4.2 to 4.4 mm.; without, 2.9 to 3.1 mm.; head width, 2.4 to 2.45 mm.; mandibles, 1.4 to 1.5 mm.

UGANDA: Kibara, 1921 (*H. L. Duke*): 30 soldiers.

Types, British Museum; paratypes, Division of Entomology, Pretoria.

These soldiers belong to the *monodon-badius* series and appear to stand near the minor soldier of *fidens*, Sjöst.

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[NINTH SERIES.]

No. 62. FEBRUARY 1923.

XVII.—*New or little-known Tipulidæ (Diptera).*—XIV. *Australasian Species.* By CHARLES P. ALEXANDER, Ph.D., F.E.S., Amherst, Massachusetts, U.S.A.

THE crane-flies described in the present instalment are all from New Zealand, and were collected by Messrs. Campbell, Gourlay, Harris, Howes, Lindsay, Tapley, and Watt, to whom my sincere thanks are extended for the privilege of studying their extensive collections of Tipulidæ. The types are preserved in the writer's collection.

Dicranomyia mæsta, sp. n.

General coloration dark brown; wings relatively narrow, brown, the stigma darker brown; conspicuous pale areas before and beyond the stigma; male hypopygium with a group of about ten spines on the mid-apical line of the tergite.

Male.—Length about 6.5 mm.; wing 8.7 mm.

Rostrum and palpi dark brown. Antennæ dark brown throughout; flagellar segments oval. Head greyish brown.

Pronotum, mesonotal præscutum, and scutal lobes uniformly dark brown, only the humeral region of the præscutum a very little paler; median area of scutum and the scutellum pale brown; postnotum dark brown. Pleura dark brown, with a sparse, appressed, microscopic pubescence.

Halteres rather elongate, dark brown, the extreme base of the stem yellow. Legs with the coxæ yellowish, the lateral faces slightly infuscated; trochanters obscure yellow; remainder of the legs black. Wings relatively narrow, brown, the stigma still darker brown, oval; conspicuous pale areas before and beyond the stigma; veins dark brown. Venation: *Sc* short, *Sc*₁ ending just beyond the origin of *Rs*, *Sc*₂ a corresponding distance before this origin; basal deflection of *Cu*₁ before the fork of *M*.

Abdomen dark brown. Male hypopygium with the pleurites grooved along the mesal face; ventral pleural appendage relatively small and slender, with a conspicuous lobule on the mesal face before mid-length, the apex and this lobule terminating in powerful spinous setæ; dorsal pleural appendage a powerful, almost straight, chitinized rod, only the apex gently curved. Gonapophyses with the mesal apical angles produced into a slender blackened lobe, the lateral margin of which is microscopically denticulate or crenulate. A close group of about ten powerful spines on the mid-caudal line of the tergite.

Hab. New Zealand (North Island).

Holotype, ♂, Ohakune, altitude 2060 feet, February 8, 1922 (*T. R. Harris*).

Dicranomyia torrens, sp. n.

Male.—Length 7·5–7·8 mm.; wing 10·8–11 mm.

Female.—Length 7 mm.; wing 10 mm.

Generally similar to *D. fasciata*, Hutton, differing as follows:—

Halteres unusually long and slender, the stem pale except at the distal end. Legs with the apices of the femora distinctly pale. Wings with the stigma larger; dark colour in the anal cells occupying all of the cells; spot at origin of *Rs* not attaining vein *M*. Venation: a supernumerary cross-vein in cell *Sc*₁, the tip of *R*₁ being atrophied immediately beyond *r*. Male hypopygium with the mesal face of each pleurite produced caudad and mesad into a long conspicuous lobe. Ventral pleural appendage broad at base, narrowed apically; dorsal pleural appendage gently curved to the acute apex, not strongly bent near mid-length as in *fasciata*. Gonapophyses pale, the mesal apical angle produced caudad into a long slender lobe. Face of penis-guard with two convergent rows of powerful bristles at base. Ovipositor with the valves dark reddish horn-colour, the acute tips of the tergal valves slightly curved.

Hab. New Zealand (North Island).

Holotype, ♂, Ohakune, altitude 2060 feet, November 18, 1921 (*T. R. Harris*).

Allotopotype, ♀.

Paratopotypes; 30 ♂ ♀; 1 additional ♂, November 20, 1921.

“Hanging around a water fall.”

Dicranomyia heteracantha, sp. n.

Male.—Length about 4.3 mm.; wing 4.5 mm.

Related to *D. seducta*, Alexander, differing as follows:—

Size smaller. Mesonotal præscutum brownish yellow, with a broad, median, dark brown stripe, the lateral margins of the sclerite being broadly pale (in *seducta* the disk is largely covered by the three confluent stripes); scutal lobes slightly darkened; remainder of the mesonotum obscure yellow. Pleura pale brownish yellow. Wings with the stigma very pale brown, subcircular in outline. Venation with *Rs* more arcuated; cell 1st *M*₂ broader. Male hypopygium with the spines on the rostrum heteromorphous as in *seducta*. The more distal spine arises from a very elongate base, this base much longer than the rostrum beyond it and nearly as long as the proximal spine itself; the distal spine is about one-half longer than its base and very slender.

Hab. New Zealand (North Island).

Holotype, ♂, Ohakune, altitude 2060 feet, January 28, 1922 (*T. R. Harris*).

Molophilus howesi, sp. n.

General coloration brown, the postnotum and pleura dark brown; antennæ moderately elongate; halteres yellow; wings with a strong brown suffusion; anal veins convergent; male hypopygium with the pleural appendages terminal in position.

Male.—Length about 3.8 mm.; wing 4.4 mm.

Rostrum and palpi dark brown. Antennæ black, the second segment light yellowish brown; antennal flagellum, if bent backward, extending about to the halteres, dark brownish black. Head dark brown.

Pronotum dark brownish black. Mesonotum uniformly brown, the præscutum a little brighter than the scutal lobes, the humeral region and lateral margins obscure yellow; scutellum and postnotum dark brown. Pleura dark brown. Halteres yellow. Legs with the coxæ and trochanters

obscure yellow, contrasting with the dark pleura; remainder of the legs broken. Wings with a dark brown tinge, the base and costal region a little brighter; veins darker brown, with conspicuous macrotrichia. Venation: basal deflection of Cu_1 about one-third longer than the deflection of M_3 ; anal veins convergent.

Abdomen dark brown. Male hypopygium with the appendages terminal in position as in *M. terminans* and allies; a deep slit on mesal face of each pleurite to receive the appendages; lateral pleural appendage strongly curved near two-thirds the length, the apex acute, the angle of curvature filled with a pale membrane; mesal appendage about equal in length but not so stout, slender on basal third, the remainder a little dilated, the surface with tiny appressed denticles.

Hab. New Zealand (North Island).

Holotype, ♂, Wainuiomata, near Wellington, February 3, 1922 (*Geo. Howes*).

Paratype, ♀, Taumarunui, October 1, 1922 (*T. R. Harris*).

This species is named in honour of the collector, Mr. W. George Howes, to whom I am very greatly indebted for invaluable material.

Molophilus irregularis, sp. n.

General coloration shiny orange-yellow; wings with a strong yellow tinge; male hypopygium with the basal pleural appendage profoundly bifid, the lateral arm a strongly curved spine.

Male.—Length about 3.8 mm.; wing 4.7 mm.

Rostrum obscure yellow; palpi brown. Antennæ of moderate length; scapal segments obscure yellow, the flagellum pale brown. Head yellow.

Mesonotum shiny orange-yellow, unmarked. Pleura yellowish testaceous. Halteres yellow. Legs with the coxæ and trochanters yellow; remainder of the legs broken. Wings with a strong yellowish tinge, more intense at the base, in the costal region, and along vein Cu ; veins yellow, with brown macrotrichia. Venation: R_{4+5} and deflection of R_5 subequal; vein 2nd A elongate, sinuous.

Abdomen reddish yellow. Male hypopygium very different in structure from any similar species. Apex of each pleurite produced caudad into a cylindrical lobe, the apex terminating in a small chitinized spine, the surface covered with microscopic black hooks which group to form two distinct crests, along the lateral and dorsal margin of

each lobe. Pleural appendages two, the more distal a complex arm shaped somewhat as in *M. quadrifidus*, the dilated head with dense areas of erect spinulæ; basal appendage profoundly bifid, forking immediately beyond the base; lateral arm a chitinized spine that is broad-based, soon narrowed into a strongly curved, acicular point directed caudad and finally mesad; mesal arm a powerful spear-like arm or blade, dilated just before the apex, which ends in an acute straight point.

Hab. New Zealand (North Island).

Holotype, ♂, Mt. Ruapehu, altitude 4500 feet, February 27, 1922 (*T. R. Harris*).

Molophilus tanypus coloratus, subsp. n.

Female.—Length 5 mm.; wing 6 mm.

Differs from typical *M. tanypus*, Alexander, as follows:—

Size larger. Mesonotum darker. A dark brown pleural stripe extending across the mesepisternum and mesepimeron beneath the wing-root. Femora yellowish brown, the tips conspicuously dark brown; incisures between the femora and tibiæ not conspicuously pale. Wings whitish subhyaline, extensively clouded with brown, the coloration being on the membrane itself; the chief brown areas are at the base of *Rs*, including cells *C* and *Sc*; at the stigma, continued along the cord; all veins beyond the cord, with the exception of M_{1+2} , with conspicuous brown seams near their distal ends; conspicuous seams along the basal deflection of Cu_1 and M_3 , along Cu_2 , and near the base and tip of vein *2nd A*, the base, centre, and apex of cell *2nd A* being pale. A series of brown dashes on the lateral margins of the abdominal tergites.

Hab. New Zealand (North Island).

Holotype, ♀, Ohakune, altitude 2060 feet, July 1921 (*T. R. Harris*). The type is preserved in alcohol.

Rhabdomastix (Sacandaga) trichiata, sp. n.

Female.—Length about 5·8 mm.; wing 7·2 mm.

Generally similar to *R. neozelandia*, Alexander, differing as follows:—

Mesonotum shiny dark brown, with a thin yellowish-brown pollinosity, so that the surface appears subshiny, without stripes. Pleura less heavily pruinose. Femoral bases only narrowly pale. Wings distinctly tinged with brown, the stigma distinct; brown suffusions along the cord and vein *Cu*; other longitudinal veins less distinctly seamed

with brown. Venation: *Sc* long, ending about opposite two-thirds the length of *Rs*, *Sc*₂ atrophied; tip of *R*₂ about its own length from the tip of *R*₁; *m* and the outer deflection of *M*₃ subequal. Macrotrichiæ of wing-veins unusually heavy, occupying the entire length of veins *R*₂₊₃ and *R*₃, *R*₂₊₃ having about ten setæ; three setigerous punctures on the distal fifth of the sector. Abdomen uniformly dark brown, the valves of the ovipositor dark.

Hab. New Zealand (North Island).

Holotype, ♀, Ohakune, altitude 2060 feet, February 8, 1922 (*T. R. Harris*).

Rhabdomastix (Sacandaga) callosa, sp. n.

Male.—Wing 4.5 mm.

Generally similar to *R. otagana*, Alexander, differing as follows:—

Size larger. Head grey. Mesonotal præscutum and scutal lobes greyish yellow, with four indistinct brown stripes; on the mesal cephalic portion of each scutal lobe an oval shiny area bearing two long setæ. Pleura with more extensive dark areas on the mesepisternum and sides of the sternum. Wings with *R*₃ much shorter, cells *R*₂ and *R*₃ being nearly equal along the costal margin (in *otagana*, cell *R*₂ is one-half longer than *R*₃). Macrotrichiæ on the veins more numerous, there being about ten on *R*₃, extending almost to the fork of *R*₂₊₃; on the medial veins, the macrotrichiæ extend farther basad than in *otagana*; *Cu*₂ with about three macrotrichiæ, none on the distal third of the vein. Abdomen broken.

Hab. New Zealand (South Island).

Holotype, ♂, Otago (*Geo. Howes*).

Orolimnophila connexa, sp. n.

Female.—Length 8.5 mm.; wing 9.5 mm.

Related to *O. eluta*, Edwards, from which it differs as follows:—

Coloration of the thoracic præscutum reddish brown, the pleura and postnotum dark brown. Wings more greyish, with clearly-defined brown veins. Venation: *R*₂ fused distally for a short distance with *R*₁; *m* from one-half to two-thirds the outer deflection of *M*₃. Macrotrichiæ on *M* and *Sc* very sparse and scattered, practically confined to the region distad of the origin of *Rs*; *R*₂ more transverse in position and with but one or two macrotrichiæ. Abdomen

dark brown. Ovipositor with the valves, especially the tergal valves, shorter and stouter.

Hab. New Zealand (North Island).

Holotype, ♂ alcoholic, Ohakune, altitude 2060 feet, July 1921 (*T. R. Harris*).

Orolimnophila eluta flavida, subsp. n.

Female.—Length 9 mm. ; wing 9.3 mm.

Similar to *O. eluta*, Edwards, from which it differs as follows :—

Head ochreous, darker medially. Wings with a clear light yellow tinge, the veins slightly darker yellow. Venation: Sc_2 farther removed from the tip of Sc_1 ; R_s arcuated at origin; R_2 oblique, close to, but separate from, R_1 at the margin; cell 1st M_2 very small, almost square, tending to be open by the atrophy of the outer deflection of M_3 ; basal deflection of Cu_1 longer. Conspicuous macrotrichia on Sc almost to the base; R_2 with a single macrotrichia, situated on the basal half. Abdominal tergites colorous with the ochreous thorax, the sternites a very little darker. Ovipositor with the tergal valves long and slender.

Hab. New Zealand (South Island).

Holotype, ♀, Mt. Grey, Canterbury, altitude 1200–1500 feet, November 27, 1921 (*J. W. Campbell and Stuart Lindsay*).

Limnophila subtruncata, sp. n.

Male.—Length about 5 mm. ; wing 6.3 mm.

Female.—Length about 7 mm. ; wing 8.3 mm.

Generally similar to *L. truncata*, Alexander, differing as follows :—

Size smaller. Wings with the brown pattern a little less extensive. Venation: R_s angulate at origin; r less than its own length from the tip of R_1 ; basal deflection of Cu_1 about two-thirds its length beyond the fork of M . Male hypopygium with the pleurites simple, the mesal apical angle not produced as in *truncata*; outer pleural appendage blackened, the apex very obtusely rounded to subtruncate; inner pleural appendage with the base enlarged, the more slender apex weakly sigmoid in shape. Gonapophyses appearing as two slender fleshy lobes that lie parallel, one on either side of the comparatively small penis-guard, their surface setiferous.

Hab. New Zealand (North Island).

Holotype, ♂, Ohakune, altitude 2060 feet, January 18, 1922 (*T. R. Harris*).

Allotype, ♀, Ruapehu, between Ohakune and Camp, February 26, 1922 (*T. R. Harris*).

Limnophila otagensis, sp. n.

Allied to *L. cinereipleura*; wing of male over 6 mm.; mesonotum and pleura brown; basal deflection of Cu_1 beyond the fork of *M*.

Male.—Length 5 mm.; wing 6.2 mm.

Most closely related to the smaller *L. cinereipleura*, Alex.

Rostrum and palpi dark brown. Antennæ brownish black, short, with conspicuous verticils. Head greyish brown, clearer grey on the anterior part of the vertex. Mesonotum brown with a sparse brownish-yellow pollen, the præscutum with indistinct darker stripes. Pleura brownish testaceous, with no distinct tinge of grey, but with a slight indication of a darker longitudinal stripe. Halteres yellow. Legs with the coxæ and trochanters brownish yellow; remainder of the legs brown, the terminal tarsal segments black. Wings similar in colour to those of *L. cinereipleura*; cell M_1 larger; basal deflection of Cu_1 beyond the fork of *M* a distance approximately equal to one-third its length. Male hypopygium with the outer pleural appendage only a little longer than the inner appendage, unarmed. Gonapophyses appearing as very strongly curved horns, as in this group of species; penis-guard with the shoulders rounded.

Hab. New Zealand (South Island).

Holotype, ♂, Queenstown, Otago, December 26, 1921 (*G. Howes*).

Paratopotype, 1 ♂, with the type; 1 ♂, January 4, 1922.

Limnophila angusta, sp. n.

Male.—Length about 4 mm.; wing 4.8 mm.

Related to *L. cinereipleura*, Alexander, and *L. deviata*, Alexander, differing as follows:—

Wings very narrow, pale brownish yellow, the stigma almost lacking. Venation: *r* faint, on R_2 about its own length beyond the fork of R_{2+3} , and consequently far removed from the tip of R_1 ; R_2 beyond *r* straight, R_3 diverging from it, so cell R_2 at the wing-margin is much wider than cell 2nd R_1 ; cell M_1 small; all the cells of the wing are conspicuously narrowed, due to the shape of the

wing. Male hypopygium with the outer pleural appendage simple and acutely pointed at apex.

The body of the type is injured, so the coloration cannot be described with accuracy.

Hab. New Zealand (South Island).

Holotype, ♂, Purau, Banks Peninsula, February 19, 1922 (J. W. Campbell).

Limnophila (Metalimnophila) producta banksiana, subsp. n.

Male.—Length about 5 mm.; wing 5.5 mm.

Related to typical *producta*, Alex., differing chiefly in slight differences in the venation and structure of the hypopygium.

Wings with a faint brown cloud at *r-m*. Venation: *r* very faint; *Sc*₂ at tip of *Sc*₁ and only about one-half longer than it; cell 1st *M*₂ relatively small with the basal deflection of *Cu*₁ just beyond mid-length. Male hypopygium with the apical angles of the pleurites produced caudad and mesad into long slender arms as in *producta*; outer pleural appendage with a small circular apical notch, the lateral arm thus formed narrow and subacute at apex; inner pleural appendage with the pale apex long and slender, bent mesad at a right angle to the remainder of the appendage.

Hab. New Zealand (South Island).

Holotype, ♂, Mount Fitzgerald, Banks Peninsula, altitude 1500 feet, January 24, 1922 (E. S. Gourlay).

Macromastix flavidipennis, sp. n.

General coloration yellow, the præscutum with three pale brown stripes; vertical tubercle fulvous; wings tinged with yellow, the cells beyond the cord faintly infuscated; abdominal tergites dark brown, the bases obscure orange laterally.

Female.—Length about 11 mm.; wing 18.3 mm.

Frontal prolongation of the head elongate, brown; nasus lacking; palpi brown. Antennæ short, the scape pale testaceous yellow; flagellum brown. Head brown with a capillary dark brown line, the orbits broadly yellowish, deepening into fulvous on the low vertical tubercle.

Pronotum pale brownish yellow. Mesonotal præscutum yellow with three conspicuous but pale brown stripes, the median stripe split anteriorly by a capillary dark brown vitta; a narrow U-shaped dark mark on the cephalic margin of the præscutum; scutal lobes concolorous with the præscutal stripes, the median area paler; median lobe of

scutellum obscure yellow; postnotum darker brown, paler caudally and laterally. Pleura testaceous yellow, clearer yellow posteriorly. Halteres pale brownish yellow, the knobs darker. Legs with the coxæ concolorous with the pleura; trochanters testaceous, tinged with green; remainder of the legs dark brown, the femoral bases pale. Wings with a strong yellowish and brownish tinge, the stigma oval, dark brown; cell *Sc* dark brown, the base and narrow apex yellowish; the wing-base and cells *C*, *R*, *M*, 1st *R*₁ and *R*₂ are tinged with yellow; cells *R*₅, outer end of *R*₃, 1st *M*₂, *M*₁, 2nd *M*₂, *M*₃, and *Cu*₁ are slightly more infuscated; cells *Cu* and the anal cells greyish yellow to subhyaline; very small obliterative areas before and beyond the stigma and in the base of cell 1st *M*₂; veins brown, more yellowish at the wing-base. Venation: cell 2nd *R*₁ short and broad; petiole of cell *M*₁ about two-thirds *m*; *m-cu* distinct; cell 2nd *A* broad.

Abdomen dark brown, the sides of the basal tergite yellow; remaining tergites dark brown, the basal lateral angles broadly obscure orange; sternites yellowish.

Hab. New Zealand (North Island).

Holotype, ♀, Ohakune, altitude 2060 feet, January 28, 1922 (*T. R. Harris*).

Macromastix albiplagia, sp. n.

General coloration pale brownish testaceous; antennæ of ♂ moderately elongate; mesonotal præscutum with four brown stripes, the intermediate pair more or less confluent; wings greyish, the costal region brown; cells *R* and *M* brown, variegated with white blotches; a very conspicuous white area before the cord.

Male.—Length 10–11 mm.; wing 12–13·5 mm.

Female.—Length 10–12 mm.; wing 13–16·5 mm.

Frontal prolongation of the head pale brown, more yellowish basally; nasus elongate, simple; palpi dark brown. Antennæ of male moderately elongate, if bent backward extending nearly to the base of the abdomen; scape and basal two or three segments of flagellum obscure yellow, the remainder passing into brown. Head ochreous to pale brown, paler on the orbits.

Mesonotal præscutum buff or greyish buff with four dark brown stripes, the intermediate pair rather narrowly separated or confluent posteriorly; scutal lobes dark; remainder of mesonotum pale brownish testaceous, the sides of the

median sclerite of the postnotum darker; thoracic setæ comparatively short. Pleura pale testaceous, the mesoepisternum sometimes indistinctly variegated with brown. Halteres pale, the knobs infuscated except at the extreme tips. Legs with the coxæ and trochanters brownish yellow; femora pale brown, the tips narrowly but conspicuously blackened; tibiæ pale brown, the tips narrowly dark brown; metatarsi pale brown, the tips and remainder of the tarsi black. Wings strongly tinged with grey; cells *C* and *Sc* bright brown; cell 1st *C* pale; the wing-base and cells *R* and *M* infuscated; a brown cloud on the distal side of *r-m*; stigma still darker brown; anal cells subhyaline, especially on the basal third; a conspicuous white blotch near the middle of cell *M*, extending slightly into cell *R*; a second very conspicuous white blotch before the stigma, occupying cell 1st *R*₁, the outer ends of *R* and *M*, and the bases of cells 1st *M*₂ and *M*₃, narrowly interrupted along *R*_s; a small obliterative area beyond the stigma; veins dark brown. Venation: distal section of vein *R*₂ in alignment with the basal section, short; cell 2nd *R*₁ with parallel sides.

Abdomen with the basal tergite and broad lateral margins of the second segment obscure yellow; medial line and caudal margin of second tergite black; remaining tergites brown, the terminal segments darker; basal sternites yellow, the terminal segments darker. In the female the basal tergites in cases show indications of median and sublateral brown stripes. Pleural appendages of male hypopygium trispinous.

Hab. New Zealand (North Island).

Holotype, ♂, Ohakune, altitude 2060 feet, January 18, 1922 (*T. R. Harris*).

Allotopotype, ♀, February 9, 1922.

Paratopotypes, 40 ♂ ♀, January 18–February 14, 1922.

Macromastix albiplagia obliterata, subsp. n.

Male.—Length 9–10 mm.; wing 12–13 mm.

Female.—Length 12–13 mm.; wing 14–16 mm.

Generally similar to typical *albiplagia*, differing as follows:—

Antennal flagellum entirely brownish black. A linear dark brown mark on vertex. Präscutal stripes sometimes subobsolete, pale reddish brown, in other cases the lateral stripes darker than the median stripe. Wings with cells *R* and *M* not conspicuously darkened basally and not

variegated with white; bases of anal cells not pale; obliterative areas before the stigma and cord, and beyond the stigma, very small, almost obliterated.

Hab. New Zealand (North Island).

Holotype, ♂, Ohakune, altitude 2060 feet, February 16, 1922 (*T. R. Harris*).

Allotopotype, ♀.

Paratopotypes, 40 ♂ ♀, February 9-16, 1922.

The general appearance of this fly is very different from that of typical *albiplagia*, but the structure of the antenna and hypopygium is so similar that it seems best to consider the present fly as a subspecies.

Macromastix ohakunensis, sp. n.

General coloration grey, the præscutum with four black stripes; antennæ short, the scape yellow, the flagellum black; wings petiolate, tinged with brown; cell *Sc* and the stigma darker brown; cell *2nd A* narrow; abdominal tergites dark brown, segments 1 to 5 obscure yellow sublaterally.

Female.—Length 7.2 mm.; wing 10 mm.

Frontal prolongation of the head elongate, obscure yellow, the ventral surface more infuscated; palpi dark brown; nasus elongate. Antennæ short; scape light yellow, flagellum black. Head greyish brown, the orbits broadly ochreous.

Mesonotal præscutum grey with four black stripes, the intermediate pair narrowly separated; scutum brownish testaceous, each lobe with two black areas, the more caudal the larger; scutellum with the median lobe obscure brownish yellow, the lateral areas blackened; postnotum brownish testaceous, the caudal margin with two large circular black spots. Thoracic setæ not conspicuous. Pleura light grey, the dorso-pleural membrane more yellowish. Halteres dark brown, the base of the stem yellow. Legs with the coxæ pruinose, especially the mid-coxæ; trochanters obscure yellow; femora and tibiæ obscure yellow, the tips narrowly dark brown; tarsi elongate, darkened apically. Wings petiolate, tinged with brown, the stigma and cell *Sc* dark brown, cell *C* a little paler; stigma completely filling cells *Sc*₁ and *2nd R*₁; veins dark brown. Venation: basal section of *R*₂ short, in alignment with the distal section; *r* provided with abundant macrotrichæ; cell *Cu*₁ deep; petiole of cell *M*₁ about two and a half times *m*; cell *2nd A* very narrow.

Abdominal tergites dark brown; segments 1 to 5 broadly

obscure yellow sublaterally, the extreme lateral margins of the segments ochreous; sternites obscure yellow, the caudal margin of the segments narrowly infuscated; subterminal segments and ovipositor dark brown.

Hab. New Zealand (North Island).

Holotype, ♀, Ohakune, altitude 2060 feet, December 25, 1921 (*T. R. Harris*).

Macromastix minutissima, sp. n.

Size very small (wing under 8 mm.); general coloration light grey; antennæ short in both sexes.

Male.—Length 5.8–7.3 mm.; wing 7.2–7.4 mm.

Female.—Length 6.2 mm.; wing 7.5 mm.

Frontal prolongation of the head ochreous; nasus very short, the apex obtuse. Antennæ short in both sexes; scape obscure yellow, sparsely pruinose; flagellum dark brown; flagellar segments short. Head obscure grey, clearer on the orbits and genæ.

Mesonotal præscutum light grey, with four dark grey stripes; scutal lobes dark; remainder of the mesonotum very light grey; thoracic setæ relatively short, pale. Pleura pale, mesepisternum and sternum grey, separated by a narrow, pale, longitudinal stripe; posterior pleurites almost whitish; pleurites covered with a microscopic, appressed, woolly pubescence. Halteres obscure yellow, the base of the knobs infuscated. Legs with the coxæ whitish yellow; trochanters obscure yellow; remainder of the legs brown, the femora and tibiæ broadly paler basally; legs relatively short and stout. Wings subhyaline; stigma pale; veins brown; all veins caudad of the radial field very delicate. Venation: *Rs* a little shorter than R_{2+3} ; cell 1st M_2 strongly narrowed distally; petiole of cell M_1 about 2.5 times m ; basal deflection of Cu_1 beyond the fork of M , the distance about equal to or less than $r-m$; cell 2nd A narrow.

Abdominal tergites grey, the lateral margins broadly ochreous; sternites grey, the lateral and caudal margins ochreous; in the female the abdomen is more uniformly ochreous. Hypopygium ochreous, of very simple structure, the ninth tergite unarmed.

Hab. New Zealand (South Island).

Holotype, ♂, Mt. Ida, Otago, altitude 4000 feet, February 20, 1921 (*Geo. Howes*).

Allotopotype, ♀, with the type.

Paratopotypes, 3 ♂♂, with the type; 1 ♂ at 4500 feet; 1 ♂ at 5000 feet, February 19, 1922.

This is the smallest species of *Macromastix* yet discovered.

Macromastix tapleyi, sp. n.

Size small; antennæ short in both sexes; mesonotal præscutum brownish yellow with three plumbeous-brown stripes; thoracic setæ microscopic; wings fully developed in both sexes, faintly infuscated; cell *2nd A* narrow; abdomen pale brown.

Male.—Length 7·8·5 mm.; wing 9–10 mm.

Female.—Length 8·5 mm.; wing 9–10·2 mm.

Frontal prolongation of the head yellow, darker laterally; labellæ green; palpi dark brown; nasus conspicuous, entire. Antennæ short; scape yellow; flagellum black, the basal segment brown; basal flagellar segment pyriform; segments beyond the second flagellar elongate-cylindrical. Head pale brown, yellowish pollinose.

Pronotum greenish ochreous. Mesonotal præscutum brownish ochreous with three plumbeous to dark brown stripes that are rather ill-defined; lateral margins of the sclerites greenish; interspaces more or less infuscated; scutal lobes plumbeous brown; scutellum light green or ochreous; postnotum brownish green or ochreous, darker posteriorly. Mesonotum with microscopic black setæ on the interspaces. Pleura buffy with tints of green. Halteres pale, the knobs greenish brown. Legs with the coxæ and trochanters concolorous with the pleura; remainder of the legs brown, the tips of the tibiæ narrowly darkened, the long slender tarsi brownish black. Wings fully developed in both sexes, with a faint brown tinge; cell *Sc* a little darker; stigma oval, pale brown; veins dark brown. Venation: petiole of cell *M*₁ a little longer than *m*; *m-cu* present; cell *2nd A* narrow, in the female a little more widened distally.

Abdomen pale brown with greenish tints, especially basally; in some specimens the caudal margins of the tergites are narrowly darker brown. Male hypopygium light green; ninth tergite with a V-shaped notch, the surface densely set with microscopic black pegs. Ovipositor with the tergites having a V-shaped median apical notch; apical angles of each half of sternum produced into a slender curved spine.

Hab. New Zealand (South Island).

Holotype, ♂, Governor's Bay, Canterbury, altitude 80 feet, February 24, 1922 (*J. F. Tapley*).

Allotopotype, ♀.

Paratopotypes, 28 ♂ ♀, January 24–March 1, 1922 (*J. F. Tapley*); *paratypes*, 1 ♀, Lyttelton, February 2, 1922

(*J. W. Campbell*) ; Mt. Ida, Otago, February 20, 1922, 6 ♂♂ at 4000 feet ; 8 ♂♀ at 4500 feet ; 2 ♂♂ at 5000 feet (*Geo. Howes*).

The green tints above described presumably fade into ochreous in old specimens. The species is named in honour of the collector of the type-specimen, Mr. J. F. Tapley.

Macromastix campbelli, sp. n.

General coloration light green, the præscutum with three orange-fulvous stripes ; wings faintly infuscated ; thoracic setæ microscopic ; ovipositor with the tergal valves separated by a profound notch.

Female.—Length about 9·2 mm. ; wing 11·7 mm.

Frontal prolongation of the head yellow, darker laterally ; palpi brown basally, passing into black. Antennæ short, the scape greenish yellow, the first flagellar segment brown, the remainder of the organ black. Head pale brown, whitened on the anterior part of the vertex ; no apparent vertical tubercle.

Pronotum light green. Mesonotal præscutum light green with three orange-fulvous stripes ; scutum green, each lobe with a conspicuous orange-fulvous area ; remainder of mesonotum light green. Thoracic setæ sparse and microscopic. Pleura greenish, testaceous. Halteres brown. Legs with the coxæ and trochanters pale, tinged with green ; femora pale brown ; tibiæ brown, the tips narrowly darkened ; tarsi dark brown. Wings with a faint brown tinge ; cell *Sc* and the stigma darker brown ; veins dark brown. Venation : as in *M. tapleyi*.

Abdomen pale brown, the segments more or less tinged with green, especially the basal tergites ; terminal segments darkened. Ovipositor very different in structure from that of *M. tapleyi*, the valves of the tergite separate, the incision between the valves so deep that it extends beneath the caudal margin of the eighth tergite ; sternites not produced into chitinized spines.

Hab. New Zealand (South Island).

Holotype, ♀, Purau, Banks Peninsula, February 19, 1922 (*J. W. Campbell*).

This interesting species is named in honour of the collector, my friend Dr. J. W. Campbell. *Macromastix campbelli* and *M. tapleyi* are closely allied, in spite of the different structure of the ovipositor. The green tints, especially conspicuous in *campbelli*, may fade in old specimens, but the colours seem to be as permanent as in species of the *viridis* group.

Macromastix ferruginosa ruapehuensis, subsp. n.

Typical material of this fly was sent to Mr. Edwards for comparison with his types of *ferruginosa*. He reports that "The *Macromastix* is probably a subspecies of my *ferruginosa*, differing in the brighter yellow head, the rather lighter colour of the thorax, rendering the pale patch on the pleuræ rather less conspicuous, the larger pale markings on the abdomen, the clearer wing-membrane, and the shorter stem to cell M_1 ; perhaps also the legs are shorter." The above diagnosis covers the chief points in which this fly differs from *ferruginosa*, Edwards. I am very greatly indebted to Mr. Edwards for making this and other comparisons of material.

Hab. New Zealand (North Island).

Holotype, ♂, Mt. Ruapehu, altitude 4000–5000 feet, January 1921 (*M. N. Watt*).

Paratopotypes, 20 ♂♂.

XVIII.—*A Filariid from the African Elephant.*

By H. A. BAYLIS, M.A., D.Sc.

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ONE of the collections of nematodes and other parasites recently forwarded to the British Museum (Natural History) by Mr. A. Loveridge included some material collected by Mr. C. B. Goss from two elephants shot in the Lindi district of Tanganyika Territory. One batch of this material contained, besides several other species, three female specimens of a *Filaria* (sens. lat.), and as no adult *Filaria** has yet been recorded from either the African or the Indian elephant, it is thought desirable to give a brief account of this form. The absence of a male is regrettable, but the female has certain characters which will probably prove sufficient for identification should the worm be collected again. The position in the host is given on the collector's label as the "stomach." It may probably be assumed, however, that the Filariids came from the peritoneum or peritoneal cavity, in the neighbourhood of the stomach. The other species in the same batch were determined as *Grammocephalus clathratus*

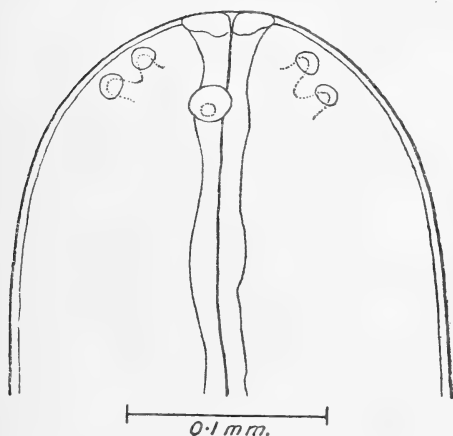
* With the exception of "*Filaria*" *smithii*, Cobbold, now referred to the genus *Parabronema*.

(Baird, 1868), *Quilonia apiensis* (Gedoelst, 1916), *Pteridopharynx africana*, Lane, 1921, and *Anira sameera*, Khalil, 1922. Of these the last two are recorded from the "stomach," while *Q. apiensis* occurs normally in the intestine and *Grammocephalus* in the bile-ducts.

Filaria gossi, sp. n.

The lengths of the three female specimens are about 115, 120, and 136 mm. respectively, and the greatest thickness about 0.9 mm. The worms taper much more markedly at the posterior than at the anterior end. They have much the general appearance of a *Setaria*, but are without peristomial armature. Both anterior and posterior extremities are bluntly rounded. The head (fig. 1) bears, apparently, ten

Fig 1.



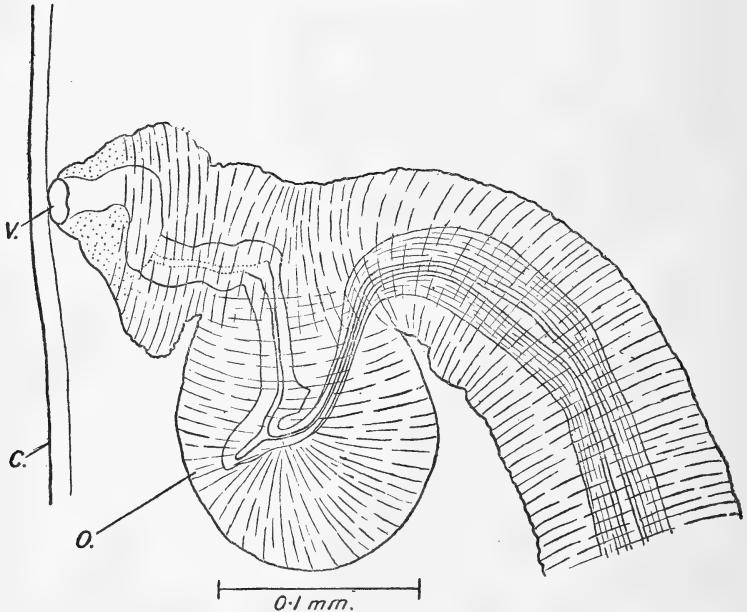
Filaria gossi. The head; lateral view.

papillæ. The two largest of these are lateral, while the remaining eight are arranged in submedian pairs. Each of these pairs of papillæ arises by the bifurcation of a common pulp. The two button-like terminations lie one behind the other. The transverse cuticular striation is excessively fine, and only visible under a high magnification. The length of the tail is about 0.23 mm., and the posterior end is curled ventrally. The mouth is minute and without lips. The oesophagus is very slender and measures 1.55-1.75 mm. in

length. It has very little muscular structure, and is not distinctly divided into two portions. Its anterior region, as far back as the nerve-ring, which is situated at 0.25 mm. from the extremity of the head, is rather more slender than the rest, and has apparently structureless walls. The lumen is very narrow. The intestine is also slender.

The vulva is situated on a slight prominence at 3.24–4.05 mm. from the anterior end. The vagina, the terminal portion of which runs posteriorly from the vulva, is long and

Fig. 2.



Filaria gossi. Terminal portion of vagina; nearly lateral view.

C., cuticle of body; O., muscular pouch or "ovejector"; V., vulva.

muscular, and is disposed in two longitudinally-arranged loops before giving rise to the two parallel uterine branches, which run posteriorly. There is a remarkable muscular pouch or "ovejector" (fig. 2, O.) near the vulva, the lumen of the vagina, which has at this point a thick cuticular lining, passing into it with a V-shaped bend. This arrangement is almost exactly the same as that of *Habronema microstoma*, and resembles to a lesser extent that of *Parabronema*. The

tubular portion of the vagina has two coats of muscles, the inner longitudinal and the outer circular. The coils of the ovaries are confined to the posterior region of the body. The greater part of the uterine branches is filled with immense numbers of embryos, which measure about 0.275 mm. in length, have blunt squarish heads, and tapering, slightly hooked tails, and are apparently without a sheath.

A microfilaria has been recorded by Evans and Rennie from the blood of the Indian elephant, and it may be that it is the embryo of a form closely related to that here described from the African elephant. In view of the known relationships between other parasites of the two elephants, however, it is unlikely to be the same species.

It has been mentioned above that *Amira sameera*, Khalil, occurred in the same collection as the *Filaria*. This form has hitherto been known only from a single male in the British Museum, from an elephant from the Addo Bush, Cape Province. The present material consists of three females, in rather poor condition, which, from their general characters, appear probably to belong to the same species.

XIX.—*An Ascarid from the Sperm-whale.*

By H. A. BAYLIS, M.A., D.Sc.

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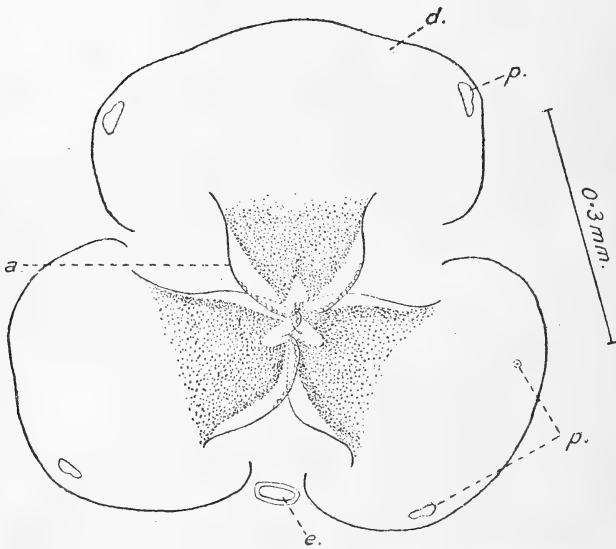
THE British Museum (Natural History) recently received, through the kindness of Mr. E. B. Binnie, Stipendiary Magistrate, South Georgia, several specimens of an *Ascarid* from the stomach of a sperm-whale (*Physeter catodon*). The worms prove to belong to the genus *Anisakis*, Dujardin, 1845, and represent a species hitherto undescribed.

Anisakis physeteris, sp. n.

This is a fairly large, stout form. The males measure 70–90 mm. in length and about 3 mm. in thickness; the females 80–112 mm. and 4–4.5 mm. respectively. The cuticle has extremely fine transverse striations, the interval between them being only about 2 μ . The regular, broad cuticular bands, with prominent posterior edges, characteristic of some species of this genus, are here absent, but there are, in addition to the fine striations, some irregular transverse wrinkles. The lips are relatively small, and the neck,

in most specimens, widens suddenly behind their bases. The narrow anterior lobes of the lips (fig. 1, *a.*) are sharply notched on their inner surfaces, that of the dorsal lip being thus divided into two equal portions. The notch of each ventro-lateral lip, however, divides the lobe asymmetrically, the portion ventral to the notch being larger than the latero-dorsal portion. The anterior lobe of each lip carries a denticerous ridge with very coarse, rather irregular teeth. The basal portion of each lip bears two papillæ. Those of the dorsal lip are lozenge-shaped, double papillæ, while each

Fig. 1.



Anisakis physeteris, female. The lips, viewed *en face*.

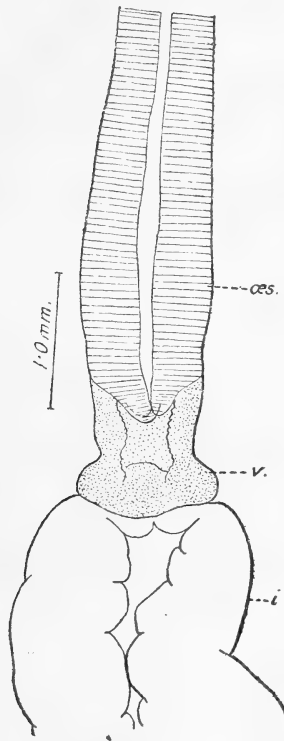
a., anterior lobe, and *d.*, basal portion, of dorsal lip; *e.*, excretory pore; *p.*, *p.*, papillæ.

ventro-lateral lip has one papilla of this type towards its ventral side and one very minute, simple papilla situated more laterally and further forward. There is a pair of cervical papillæ, situated at a distance of about 1 mm. from the anterior end.

The muscular portion of the œsophagus measures about 6 mm. in length in the male and 7 mm. in the female. It has a maximum thickness of a little over 1 mm. There is a very short ventriculus or glandular portion of the œsophagus

(fig. 2, *v.*), separated by valves from the muscular portion. It is without the sigmoid curve common in allied species, and is thickest near its posterior end. Here it measures up to 1.1 mm. in diameter, while the length of the organ is only 1 mm. The intestine is much wider at its commencement

Fig. 2.



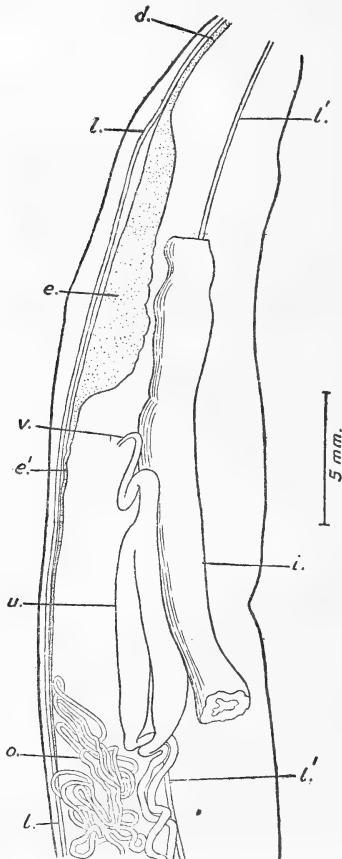
Anisakis physeteris, female. Posterior portion of oesophagus and anterior portion of intestine.

i., intestine; *oes.*, oesophagus; *v.*, ventriculus.

than the ventriculus. The excretory pore (fig. 1, *e.*) is situated, as usual in the genus, between the bases of the ventro-lateral lips. The excretory organ is of the type usual in this group of *Ascaridæ*. The terminal duct, which opens at the pore, widens out posteriorly into a flat gland (fig. 3, *e.*) which runs along the ventral side of the left lateral field.

The expanded portion of this gland, in a female 88 mm. long, measures about 11 mm. in length and 2 mm. in width

Fig. 3.



Anisakis physeteris. Portion of a dissection of a female specimen. A longitudinal incision has been made just dorsally to the left lateral field and the body-wall spread out.

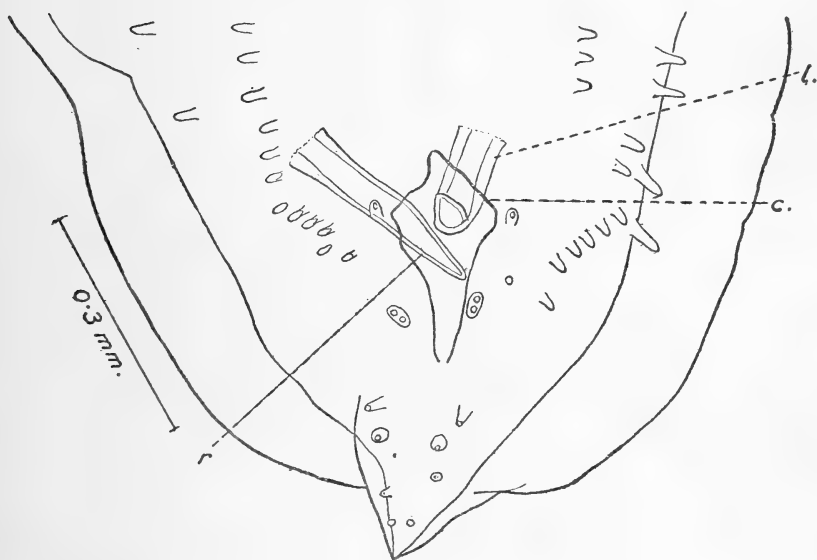
d., excretory duct; *e.*, excretory organ; *e'*, its narrow posterior portion; *i.*, portion of intestine (with both ends cut); *l.*, *l.*, left, and *l'*, *l'*, right lateral field; *o.*, coils of ovarian tubes; *u.*, uterus; *v.*, vagina.

at its widest (posterior) part. Posteriorly it diminishes to a very narrow strip (fig. 3, *e'*), and this can be traced back

to about the level of the posterior end of the uterine branches (see fig. 3). The length of the entire organ is rather more than one-third of the total length of the body.

The tail of the male measures about 0.45 mm. in length and tapers rapidly to a conical point. The cuticle near the caudal end is slightly expanded and dorso-ventrally flattened at the sides. The cloaca opens into a deep longitudinal depression in the cuticle (fig. 4, *c.*). The spicules are unequal in length, but both very short. The right spicule measures 0.35 mm. and is straight; the left measures 0.4 mm. and is

Fig. 4.



Anisakis physeteris. Caudal end of male; ventral view.
c., edge of cloacal depression; *l.*, left, and *r.*, right spicule.

slightly curved. The caudal papillæ (fig. 4) are irregularly arranged, and there is no clear distinction between the post-anal and preanal series. Near the extremity of the tail there are four pairs arranged in a fairly regular series. In front of these, and separated from the most anterior of them by a considerable space, there is a pair of double papillæ situated on the folds of cuticle forming the lateral walls of the cloacal depression. Anteriorly to these, at the level of the widest part of the cloacal depression, is a pair of simple papillæ.

Species.	Length (in mm.).	Thickness (in mm.).	Interval be- tween cuticular striations (in μ).	Length of oesophagus (in mm.).	Form and size (in mm.) of ventriculus.	Length of spicules (in mm.).	Position of vulva.	Diameter of eggs (in μ).
<i>dessantieri</i> , van Ben., 1870.	♂ 79 ♀ 70-100	♂ 2.2 ♀ 2.2-5	20-30	5-5.5	Sigmoid, longer than broad. 1.5 × 0.4	[L. ?] 2.7 [R. ?] 1.5	In anterior half of body, 25- 40 mm. from ant. end.	41-43
<i>simplex</i> (Rud., 1869). [see Du.]	♂ 37-130 ♀ 79-200	♂ 0.9-2.5 ♀ 2.2-2.75	23	.....	Thickest anteriorly.	1.68	Divides body in proportion of 3:4 (<i>v. Janslow</i>) or 36:72, (<i>Jügers- kiöld</i>), 70:150	52
<i>insignis</i> (Dies., 1851).	[♂ 50-90] [♀ 100-140]	[♂ ca. 1] [♀ ca. 1.6-2]	.....	.....	.....	.....	.....	.....
<i>typica</i> (Dies., 1860).	♂ 31-70 ♀ 37-90	♂ 1-1.5 ♀ 1.5-2	32	4	Usually sigmoid, longer than broad. 1.25 × 0.25	L. 3 R. 0.96	Near middle of body.	40-56
<i>kathenthalii</i> (Cobb, 1888).	♂ 70-90 ♀ 80-100	♂ 2-3 ♀ 2-5	30	5	Usually sigmoid, 2 2.5 long.	L. 2.3 R. 1.7	A little in front of middle.	.....
<i>physelaris</i> , sp. n.	♂ 70-90 ♀ 80-112	♂ 3 ♀ 4-4.5	2	6-7	Straight, broader than long. 1 × 1.1	L. 0.4 R. 0.35	Divides body in proportion of 2:7.	60

All these papillæ are subventral in position. A row of more laterally-placed papillæ begins on either side at about halfway between the two most anterior subventral papillæ. This row runs at first diagonally towards the sides of the body, and then is continued anteriorly as an extremely scattered pre-anal series, with a tendency to resolve itself into two rows. This series extends forward for a distance of some 5 mm. from the cloacal aperture.

The tail of the female measures about 0.7 mm. in length and is bluntly conical, with a small terminal button, sometimes sunk in a depression. The vulva is situated at about 19 mm. from the anterior end in a specimen 88 mm. long. It thus divides the body roughly in the proportion of 2:7. The vagina, together with the unpaired portion of the uterus (fig. 3, *v.*), forms a continuous tube increasing rapidly in diameter as it passes backwards. After forming two or three sinuous bends it gives origin, at a distance of about 5 mm. behind the vulva, to two stout uterine branches (fig. 3, *u.*), which are remarkably short (8 mm.). These diminish suddenly in width behind, and pass into the ovarian tubes, which pursue a tortuous course covering a further distance of about 13 mm., and then bend forward. They continue in a forward direction to a point slightly in front of the posterior end of the uterine branches, thence running posteriorly again, still with numerous loops disposed more or less transversely to the axis of the body, and terminating at about 20 mm. from the posterior end. The eggs are spherical, and have thick shells with a diameter of 0.06 mm. Their contents are unsegmented when ready for laying.

It may be useful to add a table (p. 216) comparing certain characters of this species with those of other members of the genus occurring in Cetacea.

The data used in this table have been taken mainly from Stiles and Hassall's valuable account of the *Ascaridæ* of marine mammals in 'Report of Fur-seal Investigations,' part iii. (Washington, 1899). The measurements of *A. insignis* have been calculated from those given by Diesing, which are in inches and lines. It will be noted that *A. phytoseteris* differs markedly from all the other species of which sufficient data are available, notably in the extreme shortness of the spicules, the form of the ventriculus, the size of the eggs, the stout build of the body and the fineness of the cuticular striations.

XX.—Notes on some Nematodes from East African Hosts.

By E. A. SPAUL, B.Sc., Birkbeck College, University of London.

THE following notes deal with part of a small collection of Nematodes from the alimentary canal of various reptiles, birds, and mammals in Tanganyika Territory, sent by Mr. A. Loveridge to the British Museum.

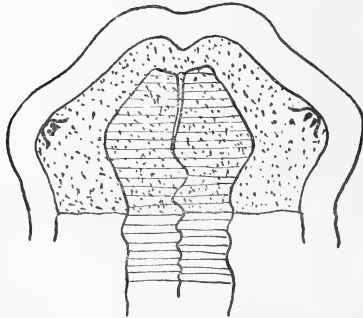
The material has been identified with previously described forms, except in one or two instances which are recorded here.

The work was carried out at the British Museum and at Birkbeck College, University of London, and my thanks are due to Dr. H. A. Baylis for help and for entrusting me with the material.

Strongyluris gigas, sp. n.

This remarkably large new species of *Strongyluris* from the lizard *Agama distanti*, Blgr., is described here in detail, and is apparently the largest member of the genus yet met with. Von Linstow (1897) and Gendre (1909) have described forms from *Agama* which bear strong resemblances

Fig. 1.



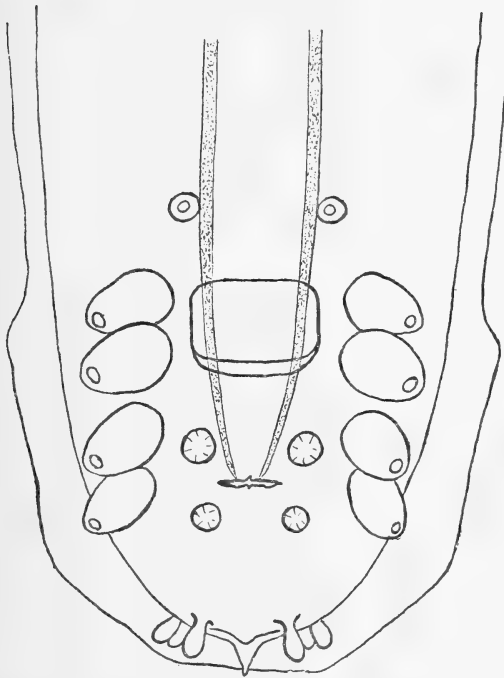
Dorsal lip showing papillæ.

to this one, but they are much smaller, and it was found on further detailed examination and comparison that other differences existed.

There are three lips, each bearing two papillæ and having flange-like marginal extensions of the cuticle (fig. 1). There

seems to be a marked tendency for the ventro-lateral lips to be slightly larger than the dorsal lip. The cuticle is finely striated. There is a pharynx, separated from the œsophagus by a constriction and a ventral kink in the lumen. The nerve-ring is situated at approximately the same distance behind the constriction as the latter is from the anterior end. At the posterior end the œsophagus enlarges into a bulb just

Fig. 2 A.

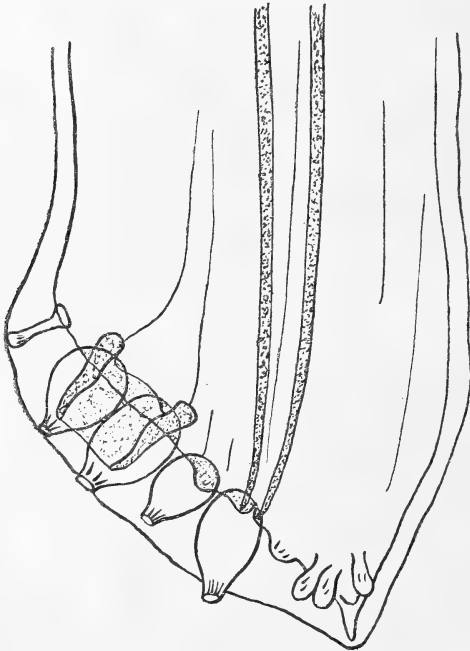


Ventral view of male tail, showing sucker, anus, and arrangement of papillæ.

behind the excretory pore. The lateral fields are very conspicuous, and consist, as usual, of a single row of large cells. The tail of the male is typical, with a preanal sucker having a chitinous ring, papillæ, and spicules of the usual type. There are six pairs of preanal and four pairs of postanal papillæ (figs. 2 A & 2 B). The most anterior pair is slender and stalked, not always well pronounced; the next is large,

conical, and flask-shaped, situated at the level of the anterior edge of the sucker; immediately behind is a similar though larger pair; the next pair varies in size between finger-like processes in the smaller and prominent flask-shaped masses similar to the preceding ones in the older and larger specimens. The same applies to the next pair, situated just behind these, but further from the middle line, and directed slightly outwards and posteriorly. The latter pair is level with the anus, which has a small pair of sessile papillæ in

Fig. 2B.

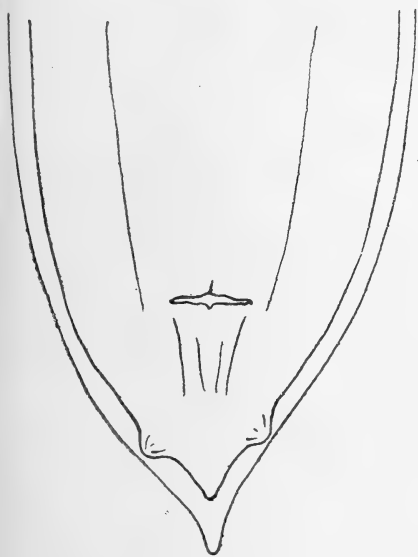


Side-view of male tail, showing relative sizes of papillæ.

front of it and a similar pair behind it. Posteriorly, on either side of the terminal spike, is a cluster of three papillæ which vary in shape, but they are usually small and finger-like, and are situated at different levels. At the base of the spike there is a small median ventral protuberance, similar, apparently, to the median papilla described by Gendre, but as it is difficult at times to locate and not constant in its occurrence it can hardly be described as a papilla. There is

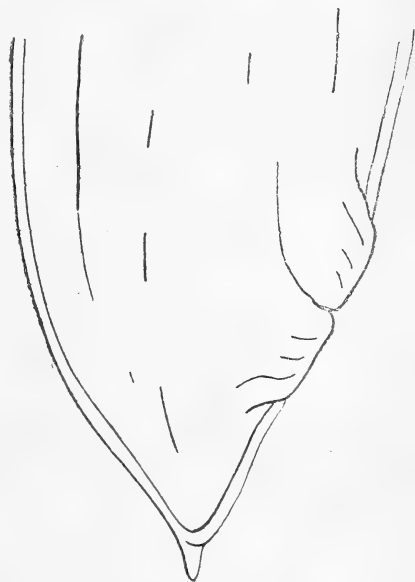
apparently no crown of papillæ behind the head. The female tail tapers regularly, the angle not being so acute as in *S. ornata* as described by v. Linstow, nor so obtuse as in the form described by Gendre. It has a papilla on either side close to the terminal spike (figs. 3 A & 3 B). As regards size, position of excretory pore, etc., the female is larger, but everything the sexes have in common exists in the same relative position and in the same proportion. The vulva opens in the posterior half of the body. The eggs are oval with smooth shells, but vary greatly in size.

Fig. 3 A.



Ventral view of female tail, showing anus and papillæ.

Fig. 3 B.



Side-view of female tail.

The measurements are tabulated on p. 222 with those of *S. ornata* as described by Gendre and by v. Linstow, and also with those of the genotype—*Strongyluris brevicaudata* (Müller) [all these forms occurring in species of *Agama*].

S. brevicaudata has three pairs of preanal papillæ and six pairs of postanal. The measurements of *S. gigas* are taken from a typical specimen, whilst the ratios are averages of all the specimens examined. Those of *S. ornata* are taken respectively from the descriptions of Gendre and v. Linstow,

	<i>Strongylaris gigas</i> .		<i>S. [Heterakis] ornata</i> (Gendre).		<i>S. [Heterakis] ornata</i> (v. Linstow).		<i>S. brevicaudata</i> (Müller).	
	♀.	♂.	♀.	♂.	♀.	♂.	♀.	♂.
Length	35	32	18-17	15-12	..	12	10.5	9.6
Breadth	1.5	1.2-1.5	.9-1	.76-.84	..	.83	.55	.45
Diam. of head end .....	.22	.17	..	..	..	..	.05	..
" " tail end .....	.5	.6	..	..	..	..	.28	..
Length of tail .....	.4 ($\frac{1}{90}$)	.25 ($\frac{1}{125}$)	($\frac{1}{61}$)-($\frac{1}{67}$)	($\frac{1}{90}$)-($\frac{1}{93}$)	($\frac{1}{60}$)	($\frac{1}{100}$)	.2 ($\frac{1}{50}$)	.1 ($\frac{1}{95}$)
" " pharynx .....	.4	.3	..	..	..	..	.29	.25
" " cesophagus	3.5	3	..	..	..	..	2	1.9
Ratio of length of cesophagus to total length	($\frac{1}{9}$)-($\frac{1}{10}$)	($\frac{1}{10}$)-($\frac{1}{12}$)	($\frac{1}{5}$)-($\frac{1}{5.3}$)	($\frac{1}{4.7}$)-($\frac{1}{5.6}$)	..	($\frac{1}{6}$)	($\frac{1}{5.25}$)	($\frac{1}{5.1}$)
Nerve-ring from anterior end ..	.65	.62	..	..	..	..	.45	.5
Excretory pore from anterior end ..	3	2.6	..	..	..	..	1.65	1.5
Length of cesophageal bulb .....	.44	.45	..	..	.44	..	.41	.34
Width .....	.25	.25	..	..	..	..	.24	.22
Spicules: width .....	..	.04	..	..	..	..	..	.02
" " length .....	..	1.1	..	1.5	..	..	..	1.3
Length of lips .....	.12	.12	..	..	..	..	..	..
Width .....	.06	.06	..	..	..	..	..	..
" " of cesophagus .....	.096	.085	..	..	..	..	..	..
Position of vulva—Ratio of distance from posterior end to total length .....	..	..	($\frac{10}{17}$)	..	($\frac{11}{20}$)	..	3.5 ($\frac{10}{30}$)	..
Distance of sucker from posterior end .....	..	.4	..	..	..	..	..	.185
Eggs: length	150 μ	..	76 μ	..	..	..	63 μ	..
width	90 μ	..	44 μ	..	..	..	48 μ	..

These measurements are all in mm., except where otherwise stated.

whilst those of *S. brevicaudata* are taken from specimens in the British Museum from a West African lizard.

The reasons for regarding *Strongyluris gigas* as a distinct species can be summed up as follows:—

- (1) The great length and thickness compared with the other species could hardly be due to variation.
- (2) The male of *S. ornata* as described by Linstow has one more pair of caudal papillæ, whilst the median "papilla" in *S. gigas* is not nearly so distinct as in Gendré's form, although in other respects the papillæ agree with his description.
- (3) The ratio of the lengths of the tail and œsophagus to the total length of the worm is much lower in the case of *S. gigas* than in the other forms, and such a difference could not be accounted for by variation.
- (4) The size of the eggs is much greater than in the other two species.
- (5) The female tail is distinct in shape from that of other species, being neither so acute as in the *S. ornata* of v. Linstow nor so obtuse as in the *S. ornata* of Gendré.

Physaloptera affinis (Gedöelst, 1916).

An examination of examples of this species from *Psammophis subteniatus* shows that the four branches of the uterus originate dichotomously, as described for *Physaloptera abbreviata* and *P. pallaryi* by Seurat (1917), and not simultaneously as in *P. varani*.

Leidy describes a species, *Physaloptera abjecta*, from *Psammophis flagelliformis*, a snake found in the United States and Mexico. This host is in reality a *Zamenis*, and the worm is probably distinct from *P. affinis*, which occurs in *Psammophis* in Africa.

Contracæcum microcephalum (Rud., 1809).

Specimens referred to this species were taken from *Ardea purpurea*, *Ardeola ralloides*, and *Scopus umbretta bannermanni*. The last-mentioned appears to be a new host.

Ascaris sp.

Some Ascarids, not referable to either of the genera *Belascaris* and *Toxascaris* were taken from *Genetta* (? *stuhlmanni*),

but owing to the absence of a male it is not considered advisable to base a description on this material.

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 SEURAT, L. G. 1917. "Physaloptères des Reptiles du Nord-africain." C. R. Soc. Biol., Paris, lxxx. pp. 43-52.

XXI.—*On a new Species of Armadillidium.* By HAROLD G. JACKSON, M.Sc., Birkbeck College, University of London.

THE species of *Armadillidium* described and figured below is founded on a large amount of material sent to me by Mr. Edward Speyer, M.A. He collected it in the cucumber-houses of the Experimental and Research Station, Cheshunt, Herts, and I have great pleasure in associating his name with it. I am also indebted to him for most of the figures illustrating this paper.

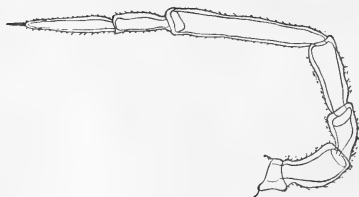
The holotype of the species is deposited in the British Museum, where the work for this note has been done, by the courtesy of Dr. W. T. Calman, F.R.S.

Armadillidium speyeri, sp. n.

Male specimen described.

Body oblong-oval, 11 mm. long by 5 mm. broad ;

Fig. 1.

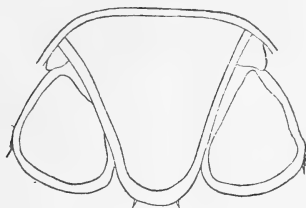


Armadillidium speyeri, antenna.

moderately convex above. Surface smooth with very minute granulations. Front of head slightly curved ; very

deeply notched in the mid-line; on each side of notch a shallow groove passes backwards and outwards over the forehead to join the hind border of the head just behind each eye. Lateral lobes small. Antennary tubercles (*Dollfus*) moderately large, their rims thicker on the inner than on the outer side. Epistomal shield turned upwards and greatly exceeding the forehead.

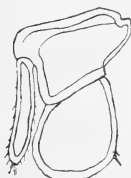
Fig. 2.



Armadillidium speyeri, telson and uropods, from above.

Posterior edge of first somite of *thorax* nearly straight in middle; its coxal plates drawn back sharply to form acute backwardly directed angles; junction of posterior edges of coxal plates with posterior edge of scutum sinuate and not marked by deep notch. Coxal plates of second, third, and fourth somites successively less drawn back, and with obtuse postero-lateral angles; postero-lateral angles of remainder subrectangular. *Abdomen* not abruptly contracted and

Fig. 3.



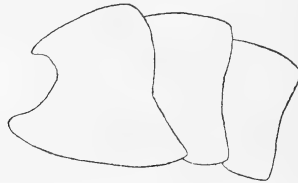
Armadillidium speyeri, left uropod, from below.

semicircular in outline. "Telson" about as broad at base as long; triangulate, sides very slightly concave, apex bluntly rounded. *Antenna* not more than one-third the whole body; distal joint of flagellum about half as long again as proximal; whole flagellum shorter than last peduncular joint. Exopodite of *uropod* subrectangular in shape, but longer than basal part; endopodite slender, styliiform, reaching back nearly as far as apex of "telson."

Mouth-parts as in *A. vulgare*. *Colour*: general surface varying from slate-blue to dark brown. A continuous narrow light band runs down the middle of every somite, but not on the head or "telson." The coxal plates are light with narrow, dark, posterior margin. Between coxal plates and median line the dark areas of each somite are broken up with light mottling.

Remarks.—This species is distinguished from *A. nasatum*, B. L. (with which it was formerly confused), by the following

Fig. 4.



Armadillidium speyeri, first three thoracic somites, from the side.

characters. The epistomal shield, although very prominent, is not so pronounced; the front of the head is much more deeply notched in the median line; the hind edge of the first thoracic somite is not deeply notched on each side of the posterior edge; the "telson" is not narrow and pointed, but widely rounded at the apex; the external plate of the uropod is rectangular and not spatulate, and the segments of the flagellum are markedly unequal. That it has been confused

Fig. 5.



Armadillidium nasatum, first three thoracic somites, from the side.

with *A. nasatum* in the past is shown by an examination of Budde-Lund's copious material in the British Museum, Natural History. A large collection from S.W. France, labelled *A. nasatum*, could easily be divided into two portions comprising the true *A. nasatum* and the present species. It is suggested that *A. speyeri* is a species of a warm climate that has been imported into England some time in the past, and has only found it possible to exist

in an artificially heated environment such as is provided by the cucumber-houses in which it was found.

Bionomics. Mr. Speyer has been good enough to send the following interesting note on the habits of this species :—

“The species here described is in the British Isles probably confined to glass-houses in which a high temperature is maintained. It is an active species, living on the surface of soil in the cucumber-houses, feeding by day as well as by night on various forms of fermenting cellulose and also on living plant-tissues. In winter it does not burrow in the soil to any great depth, but hides under clods of earth and in wall-crevices. Many thousands of specimens have been caught in pot-traps filled with straw in a single night. Outside glass-houses it has not been found, except under bricks and in warm places in the immediate vicinity of the houses; even the temperature of tomato-houses does not appear high enough to afford sufficient heat for its existence for any length of time. Mating occurs on hot mornings in May, and the young, to the number of fifty, escape from the brood-pouches in June.

“This is the most destructive of all wood-lice found in glass-houses, and, in addition to destroying tomato-seedlings in the propagating-house, does considerable damage by eating holes in the leaves of young cucumber-plants, and later gnawing the stem and surface-roots of full-grown plants. The species is gregarious, somewhat similar to *A. pictum*, Br., which is also common in cucumber-houses. Further details of the habits of *A. speyeri*, Jackson, will appear in the Annual Report of the Experimental and Research Station, Turner’s Hill, Cheshunt, Herts, for 1922.”

XXII.—On a new Genus and Species of Colubrine Snake
from S.E. Brazil. By JOAN B. PROCTER, F.Z.S.

THE interesting new snake described in the present paper came into the possession of the British Museum in a rather amusing way. A bottle of mixed specimens without data of any kind was brought to me for identification in the Easter holidays by a boy who is very keen on such things. The bottle, amongst other things, contained specimens of the S. American legless lizards *Amphisbæna darwini* and *Ophiodes striatus*; the two small snakes proved to be puzzling and

were therefore put on one side, and the boy, Master John Brandon-Jones, after whom I have named this new species, went away without leaving his address. By roundabout methods this was at last ascertained, and he has been able to furnish me with complete data as to the locality in which they were found by his great-uncle, Mr. Duckinford-Jones, who is a collector of Brazilian butterflies. He has also presented both specimens to the Museum.

The snakes belong to a new and very distinct genus of the subfamily Colubrinæ, for which I propose the name *Sordellina*, in honour of Prof. Sordelli of Milan, for whose beautiful work in the 'Iconographie Générale des Ophidiens' all workers at snakes will ever be grateful.

SORDELLINA, gen. nov.

Maxilla short, with nine teeth increasing in size posteriorly, followed after an interspace by two enlarged ones. Palatine and pterygoid with about eighteen teeth*. Mandibular teeth subequal, fourteen or more in number †.

Fig. 1.



Maxilla of *Sordellina brandon-jonesii*, gen. et sp. n.
× 2.

Head scarcely distinct from neck; nasal shield semi-divided; eye very small with vertically subelliptic pupil. Body cylindrical; scales smooth, without apical pits, in seventeen rows; tail short, tapering to a sharp point. Subcaudals in two rows. Anal divided. Hypapophyses absent in the posterior vertebræ.

Affinities. Allied to *Urotheca*, Bibr., from which it differs in the form of the tail, which is very long and thick throughout in *Urotheca* and short and tapering in *Sordellina*. The eye of the former is also larger, and has a round pupil. The dentition is similar. In the size of the eye and general form and scutellation of the body *Sordellina* resembles *Hydrops*, Wagl., to some extent.

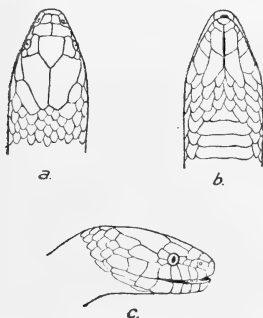
* Of which nine are fixed and functional and the alternating nine not fixed and not functional but accessory.

† Of which but seven or so are fixed and functional. Apart from these accessory teeth situated in the functional series, there is in each case the usual complete reserve series lying prone within the gum-flap on the inner side of the maxillary and mandibular sets and the outer side of the pterygoid and palatine.

Sordellina brandon-jonesii, sp. n.

Rostral about twice as broad as deep, scarcely visible from above; nostril in a semidivided nasal, the cleft running from the first labial to behind the nostril, making the posterior part of the shield look like an anterior loreal, unless examined with care; internasals triangular, shorter than the præfrontals, which are much broader than long; frontal slightly longer than broad, about twice the width of a supraocular, but longer than its distance from tip of snout, much shorter than the parietals, which are large; loreal small, as deep as or deeper than long; one præ- and two postoculars, the upper much the larger; temporals 1+2, the anterior about twice as long as deep, the upper posterior broken up on the right side of each specimen, and reaching beyond the parietals on the left;

Fig. 2.



a. Upper view of head; b. Lower view; c. Side view. Nat. size.

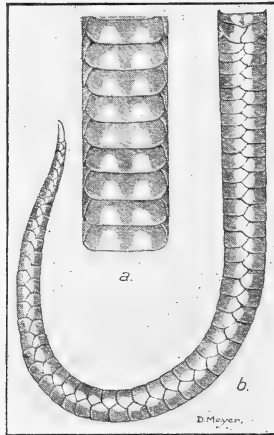
eight upper labials, 3rd, 4th, and 5th entering the eye, or seven, 3rd and 4th entering the eye (3rd and 4th fused in this case); four lower labials in contact with anterior chin-shields, which are about half as long as the posterior. Scales in seventeen rows throughout entire length of body; ventrals 150, 148; anal divided; subcaudals 43 (tip of tail damaged), 53, in two rows; tail ending in a conical sharply pointed scale. Length of tail about one-sixth total length. Total length of specimens 528 mm. and 314 mm.; tail 87 mm. (tip damaged) and 62 mm.

Coloration. Chocolate-brown above and beneath; shield and scale edges sometimes lighter; a cream-coloured narrow streak through upper labials, broadening into a blotch on each side of neck, and then continuing as a narrow broken

line a little distance down first or second row of scales. Chin variegated chocolate and cream-colour. Each ventral and pair of subcaudals with a pair of large cream-coloured spots, semicircular on the ventrals, pentagonal on the subcaudals, forming two straight longitudinal series.

Habitat. The campos near Castro, on the R. de Tibeira, Parana, S.E. Brazil, probably in moist places.

Fig. 3.



a. Ventral shields; b. Tail. Nat. size.

Food. The stomach of the larger specimen contained a rare Cœcilian, *Chthonerpeton indistinctum*, Reinh. & Lutk., hitherto only represented in the Museum's collection by two specimens from Porto Alegre and Camapuan River respectively. Unfortunately, the posterior half is partially destroyed by digestion, but the head, including the highly characteristic palate etc., is in quite good condition.

XXIII.—Notes sur les *Cercopides africains*.

Par Dr. V. LALLEMAND.

Locris marshalli, sp. n.

Thorax, tête, pronotum et écusson noir (quelquefois une petite tache rougeâtre près du bord postérieur du pronotum). Elytres rouge-brique, teintées légèrement de jaune dans les deux tiers antérieurs, noirâtres sur le tiers postérieur; au

contre de cette dernière partie existe une tache irrégulière jaune ; le bord antérieur de la partie noire est irrégulier et part à peu près du milieu du bord externe. L'abdomen et les pattes (sauf les organes génitaux, la moitié basale des cuisses, les épines et les tarsi, qui sont noirs) sont d'un jaune légèrement teinté de rouge.

Ocelles très proches l'un de l'autre, séparés par la carène mousse longitudinale. Pronotum ponctué finement dans sa moitié antérieure, plus fortement, en stries transversales, sur la moitié postérieure ; bords latéro-antérieurs légèrement relevés, et le long de chacun de ceux-ci court une dépression de forme de gouttière, la moitié antérieure est irrégulière et fossulée. Le bord antérieur du front vu de côté est d'abord droit, puis s'arrondit régulièrement. Les tarsi postérieurs ont une épine à l'extrémité du second tiers.

Var. *rubrocincta*, n.—Les 2/5 antérieurs du pronotum sont noirs et la partie postérieure est rouge-jaunâtre.

Var. *obscura*, n.—Les élytres sont brunes dans leur plus grande partie, tout en ayant la tache jaunâtre vers leur extrémité.

AFRIQUE ORIENTALE ANGLAISE : S.E. slopes of Mt. Kenya (6000 à 7000 pieds), 3-12. ii. 1911 (*S. A. Neave*).

Long. totale 10 mm. ; long. des élytres 7.5 mm. ; largeur de celles-ci 2.5 mm.

Type : collection du British Muséum et la mienne.

Je dédie cette espèce à Mr. G. A. K. Marshall, Directeur du bureau impérial d'entomologie à Londres, à qui je dois l'envoi de ces insectes.

Locris sylvatica, sp. n.

Le thorax, la tête (sauf le bord antérieur des lobes du vertex, qui est rouge), le pronotum (sauf les bords latéraux étroitement et le postérieur plus largement, qui sont rouges) et l'écusson sont noirs ; le tiers basal des élytres est rouge bordé postérieurement de noir, le restant est jaune traversé obliquement par une bande noire formée de tache se trouvant entre les nervures jaunes ; le bord postérieur des élytres est noir ; sur la partie rouge basale s'étend une ligne noire le long de la suture clavocoriale, de la base à la ligne noire transverse, celle-ci près du bord externe émet un petit prolongement antérieur ; l'abdomen est noir, les bords postérieurs de chaque segment finement et les bords latéraux plus largement sont rouges ; les cuisses, les tarsi et les épines sont noirs, les tarsi rouges ; toute la surface supérieure de l'insecte et le front sont recouverts d'une villosité jaune-blanchâtre assez dense.

Ocelles très rapprochés l'un de l'autre, séparés par une carène mousse longitudinale. Pronotum ponctué finement et peu densément dans sa moitié antérieure, plus fortement en stries transversales dans sa moitié postérieure; ses bords latéro-antérieurs sont légèrement relevés, et le long de chacun de ceux-ci court une dépression en forme de gouttière. Vu de côté le bord antérieur du front est régulièrement arrondi, ses carènes transversales sont très marquées. Les nervures médiane et cubitale sont réunies sur toute la partie rouge des élytres (tiers basal), puis s'écartent assez fortement. Les tibias postérieurs ont une épine à l'extrémité du second tiers.

Cette espèce est voisine de *hieroglyphica*, Leth., et de *hindei*, Dist.; la bordure rouge à la partie postérieure du pronotum et la bande noire bordant postérieurement le tiers antérieur rouge de l'élytre la fait reconnaître de suite.

NYASALAND; Mt. Mlanje, 12. iii. 1913 (*S. A. Neave*).

Longueur totale 12.5 mm.; longueur des élytres 6.5 mm.

Type: collection du British Muséum et la mienne.

Locris atra, sp. n.

Noir, le tiers apical des élytres est grenat très foncé; l'extrême base des élytres et le radius, sur le tiers basal, des taches arrondies de chaque côté sur le prothorax en arrière de l'œil, la base des hanches, les bords postérieur et latéraux des segments de l'abdomen sont rouge-grenat; les tibias postérieurs sont grenat foncé.

Les ocelles, jaunâtres, sont très gros et rapprochés l'un de l'autre, la distance qui les sépare des yeux est égale à au moins 3 fois leur écartement. Toute la surface supérieure, spécialement les élytres, est recouverte d'une villosité blanchâtre épaisse à telle point que vus sous certain angle les élytres acquièrent une teinte spéciale. Le front est lisse, brillant et proéminent, vu de côté le bord antérieur forme avec le postérieur un angle légèrement aigu, la carène longitudinale est très nette, les stries transversales sont à peine indiquées; la partie frontale du vertex est relativement assez grande et fait saillie entre les lobes du vertex. Le pronotum est assez allongé, sa longueur égale sa largeur entre les angles latéraux; sa surface est légèrement rugueuse, fortement pointillée en lignes transversales; il porte une carène peu nette. Sur les élytres, les nervures médiane et le cubitale sont réunies sur un trajet relativement court, à peine le cinquième de la longueur.

Cette espèce est voisine de *L. nigrorubra*; celle-ci s'en distingue facilement par le front un peu moins proéminent

arrondi vu de côté, par les ocelles plus petits et plus écartés, par le pronotum moins long et la couleur de l'écusson qui est rougeâtre.

SIERRA LEONE: Serakola, Yiraia, vi. 1912 (*Jas. J. Simpson*).

Long. totale 12 mm. ; long. des élytres 9 mm.

Type : collection du British Muséum et une à mienne.

Locris quadrinotata, sp. n.

Tout l'insecte est noir, sauf une tache à la base et à l'extrémité des hanches, l'extrémité de deux articles du rostre, le bord postérieur des segments abdominaux, qui sont rouge-carmin ; le mésothorax, la base de la tarrière et deux taches transversales sur chaque élytre sont jaune-rougeâtre ; la disposition de ces taches rappelle celle de *Callitettix versicolor*, F., une se trouve sur le clavus et l'autre sur le corium, cette dernière à la hauteur de la séparation du médian et du cubitus. Les ailes sont foncées ; le front, le pronotum et spécialement les élytres sont recouverts d'une villosité jaune d'or très dense.

Ocelles jaunâtres, assez gros ; leur écartement est moindre que la distance qui les sépare des yeux ; ils sont séparés par une carène longitudinale. La carène antérieure du front est nette, vu de côté le bord antérieur est arrondi et d'abord incliné en bas et en avant, puis devient perpendiculaire et forme un angle droit avec l'inférieur. Le pronotum est rugueux, pointillé fortement en stries transversales ; la carène médiane est peu marquée, elle n'est indiquée que dans la moitié antérieure.

Var. *obliterata*, n.—Les taches sont peu marquées, celle du corium est à peine indiquée.

SIERRA LEONE: Panguma, 30. vi. 1912 (*J. J. Simpson*).

Long. totale 12.5 mm. ; long. des élytres 10 mm.

Type : coll. British Muséum et la mienne.

Locris ibadana, sp. n.

Noir, sauf le bord antérieur de la partie supérieure de la tête, la carène médiane du front, une tache près de l'extrémité de l'écusson, sur les élytres, une tache allongée près de la base entre le radius et le bord externe et sur le tiers antérieur une série oblique de petites taches plus ou moins bien limitées, qui sont jaune-rougeâtre ; la moitié postérieure de l'élytre est noire avec des suffusions rougeâtres. Taches sur le mésothorax et bords postérieur et latéraux de chaque segment abdominal sur ses faces supérieure et inférieure

rouge-carmin; ailes enfumées surtout à l'extrémité, base rosée.

Front globuleux, arrondi, vu du côté à stries transversales fort marquées et à carène médiane très nette. Ocelles assez gros, leur écartement est moitié moindre que la distance qui les sépare des yeux. Pronotum relativement assez étroit, rugueux, ponctué en stries transversales, ayant une fine carène longitudinale; bord postérieur légèrement concave; surface de l'écusson creusé en fossette.

NIGÉRIE DU SUD: Ibadan, 22. x. 1913 (*Dr. W. A. Lamborn*).

Longueur totale 12 mm.; long. des élytres 9 mm.; largeur de celles-ci 3 mm.

Type: British Muséum.

Locris pulverosula, sp. n.

La partie inférieure de l'insecte est noire, teintée de rouge, la partie supérieure peut varier; ou bien entièrement rouge-carmin très légèrement brunâtre, ou bien la tête, le pronotum et les deux tiers antérieurs des élytres sont brun-rougeâtre, tandis que le tiers apical de celles-ci est rouge-carmin.

Tête globuleuse arrondie, à stries transversales très nettes; ocelles plus près l'un de l'autre que des yeux. Pronotum rugueux sur les 2/3 postérieurs, inégal dans le tiers antérieur où il est très finement ponctué; la carène médiane à peine indiquée à la partie antérieure n'est plus visible en arrière.

Les exemplaires foncés ressemblent plus ou moins comme coloration des élytres à *L. nigrorubra*, mais s'en différencient de suite par la taille, par les organes génitaux du mâle, dont les apophyses ont une petite protubérance au bord postérieur se dirigeant sur le côté, et par l'absence presque complète de la carène du pronotum. Voisin de *L. atra* pour la forme générale, mais s'en distingue par la coloration et surtout par les ocelles qui sont plus petits, de coloration différente et plus écartés.

FERNANDO-PO. NIGÉRIE: Onitsha, vii. 1910 (*J. A. de Gaye*); Abutshi; Old Calabar, Cross R.

Long. totale 11.5 mm.; long. des élytres 9 mm.

Type: collection du British Muséum et la mienne.

Lehina apicalis, Hagl.

Leterna? *apicalis*, Hagl. Öfv. K. Vet.-Ak. Förh. 1899, p. 51.

Lehina dilecta, Mel. Verh. zool.-bot. Ges. Wien, 1915, p. 7.

- Cricotopus basalis* (Staeger). I, B, S., G.
Orthocladius ? *conformis* (Holmgren). S.
 — ? *pleuralis*, Malloch. A.
Camptocladus incertus (Becher). S.
 — *lasiophthalmus*, Malloch. A.
Metriocnemus callosus (Becher). ? B.
Trichocera maculipennis, Mg. E., I, G., A.
 — *lutea*, Becher. B.

Most of the species in this list are known to occur elsewhere, and these are marked as follows:—E., Europe; A., North America; G., Greenland; I., Iceland; B., Bear Island; S., Spitsbergen. The two *Orthocladus* in this list may be male and female of the same species, and the two *Camptocladus* are doubtfully distinct.

Mr. Bristowe writes:—"By the time we left Jan Mayen—the beginning of September—summer was drawing to a close. Judging by the advanced stages of several Nematoceran larvæ found just before our departure, besides pupæ, it seems probable that they pass the winter in the pupal stage, though it is also likely that they can do so in the larval stage. Mr. Porsild, who is stationed at Disco, tells me he has artificially frozen Lepidopteron larvæ and pupæ until they have become as brittle as twigs. Yet on being thawed the great majority have recovered.

"There are no biting forms of Nematocera on Jan Mayen—at least, we did not notice any biters."

1. *Sciara tridentata*, Rübs.

Several specimens, including both sexes, were collected by Mr. Bristowe. An easily recognized species, on account of the well-marked hypopygial characters and the short stout antennæ.

2. *Sciara bicolor*, Mg.

Recorded by Becher; not examined by me.

3. *Sciara globiceps*, Becher.

The original series under this name comprised one male and four females. The male should be taken as the type. It shows the following characters:— R_1 a little shorter than R and ending well before the level of mf ; halteres and palpi both pale (possibly faded); no macrotrichia on M and Cu ; antennal segments about twice as long as broad; clasper a little over twice as long as broad, with a single rather

long apical spine, directed inwards; there is apparently no group of fine bristles at the base of the hypopygium beneath. Three of the females agree in most respects with the male, but R_1 is practically as long as R and reaches almost to the level of mf ; in the fourth R_1 is much shorter, and this specimen probably represents a distinct species. Some females, probably of this species, were obtained by Mr. Bristowe.

4. *Evechia frigida* (Holmgren) (*Parevechia concolor*, Becher).

Numerous specimens of this species were collected by Mr. Bristowe, both sexes being represented. The colour of the coxæ varies; most specimens have them dark, whereas Becher says "gelb," but the specimens agree structurally with the description, and there is no doubt about the identification. The species is apparently identical with the North-American *E. costa*, Johansen. There is no reason whatever for maintaining the genus *Parevechia*.

"Common on the mossy patches." (*Bristowe*.)

5. *Scatopse pulicaria*, Lw.

Recorded by Becher; not found by Mr. Bristowe nor examined by me.

6. *Diamesa ? aberrata*, Lundbeck.

One damaged male of a *Diamesa* was present among Becher's material, though not described by him; one newly-hatched female and one pupa evidently of the same species were collected by Mr. Bristowe, the former in a mossy marsh, the latter in a little pool at the base of the Säule Rock. These specimens show all the characters mentioned by Lundbeck in his description of *D. aberrata*, and it will probably be safe to assume they are that species. The species apparently belongs to Kieffer's genus *Syndiamesa*, the eyes being quite bare and the fourth tarsal segment almost cylindrical, only slightly emarginate at the tip, and not much shorter than the fifth. In the male the last antennal segment is more than twice as long as the remaining flagellar segments together; the hypopygium is almost as figured by Malloch for *D. waltli*, the spine of the anal segment being very short, but the clasper is of rather a different shape, being straight and rather narrow, blunt-ended. In the female the scutellum and legs are pale yellowish probably owing to immaturity. The pupa is

extremely similar to those described by Potthast and Thiene-
mann, but differs in regard to the bristles on the lateral
abdominal flanges. These are dark in colour, less than half
as long as the segments, and almost equidistant.

7. *Metriocnemus callosus* (Becher).

Becher's types comprised 2 ♂, 2 ♀ (not 1 ♂, 3 ♀, as he
stated). All the specimens are apparently newly emerged,
besides having faded in alcohol; hence Becher's description
is valueless as regards coloration. The true mature colour is
shown by some specimens collected by Mr. Bristowe; in
these the body, antennæ, and legs are uniformly dull black,
also the halteres of the male, the female halteres being
yellowish. In both sexes (not only in the female, as indicated
by Becher) the wings are distinctly milky white. A careful
examination of all the specimens shows that there are a few
hairs present at the extreme tip of the wing, about 10-15
in the male and 20-30 in the female. On this account, and
also because of the conspicuously hairy legs, the species
seems better placed in *Metriocnemus* than in *Orthocladus*.
The male antennæ are missing in Becher's specimens, but in
Bristowe's the last segment is a little more than twice as
long as the rest of the flagellum. According to the descrip-
tion, Kieffer's *Dactylocladius subpilosus* from Bear Island
and *Metriocnemus similis* from Novaia Zemlya must be
extremely similar to *M. callosus*, and may possibly prove
identical.

8. *Orthocladus? conformis* (Holmgren).

A single male was collected by Mr. Bristowe which may
provisionally be regarded as a variety of *O. conformis*. In
regard to the structure of its antennæ, hypopygium, claws,
and empodium, it agrees rather closely with the specimen
recently mentioned by me from Bear Island, but the halteres
are yellow instead of black.

9. *Orthocladus* sp.

Two ♀, near or identical with *Dactylocladius pleuralis*,
Mall., described from North America, and perhaps also
identical with a common European species for which some
earlier name no doubt exists. This may possibly be the
female of *O. conformis*, mentioned above, but, in addition to
the striking difference in the colour of the thorax (all black
in *O. conformis*, yellow with three well-separated brown

mesonotal stripes in *O. pleuralis*), the empodia of these females seem rather longer.

10. *Cricotopus basalis* (Staeg.).

A series was collected by Mr. Bristowe, including several of both sexes. This forms an interesting extension of the known range of this widely-spread circumpolar species.

"Plentiful round the North Lagoon (a deep freshwater lagoon)." (*Bristowe.*)

11. *Camptocladius incertus* (Becher).

The seven females of this species in Becher's collection are all more or less damaged and very much faded through long immersion in alcohol, but are still recognizable. They appear to be identical with Kieffer's *Trichocladius* (*Phæno-cladius*) *curvinervis*. Becher's figure of the wing hardly suggests a *Camptocladius*, but it is inaccurate, the bend in *Cu*₂ being really quite pronounced in all the specimens. The halteres are yellowish, as described by Kieffer; in recording the species recently from Spitsbergen, I omitted to notice that the halteres in those specimens were dark, though, since they agreed in other respects, the identification may be correct. *Camptocladius incertus*, Lundström, recently described from Arctic Siberia, is possibly the same species.

12. *Camptocladius* ? *lasiophthalmus*, Mall.

Several specimens (including both sexes) collected by Mr. Bristowe resemble *C. incertus* in most respects, and are, perhaps, referable to that species, but the fork of *Cu* is shorter, its base being quite twice the length of the cross-vein distant from the base of the cross-vein. These specimens agree in all respects with Malloch's description of *C. lasiophthalmus*, and differ chiefly from the common European *C. aterrimus*, Mg., in having paler halteres. The males agree with *C. nudipennis*, Goet., as regards antennæ and hypopygium, but have the eyes distinctly though very shortly pubescent.

"*Camptocladius lasiophthalmus* was very common on flowers, especially the dandelion, *Taraxacum officinalis* (Web), and *Saxifraga cæspitosa* (L.) up to 2000 ft. The latter seemed to be very sticky inside, and dead specimens were frequent, having apparently been caught by the gummy nature of the flower. Whether the Saxifrage benefited in any way by their dead bodies, I do not know. Two

ichneumons—*Stenomacrus intermedius*, Hlgr., and *S. cubiceps*, Thor. (according to Mr. Morley probably parasitic on the Mycetophilidæ)—were also very numerous in these two flowers. Eighteen of the latter species were shaken from two heads of one dandelion-plant. Any cross-pollination which takes place on Jan. Mayen must be chiefly due to *C. lasiophthalmus* and the two ichneumons." (*Bristowe.*)

13. *Trichocera maculipennis*, Mg.

Recorded by Becher, not found by Mr. Bristowe.

14. *Trichocera lutea*, Becher.

Several females were obtained by Mr. Bristowe. They are dark in colour and do not show the yellow ground-colour described by Becher, whose specimens were doubtless either immature or discoloured by alcohol. The species is of interest on account of a peculiarity of venation, *r-m* being placed slightly *before* the fork of *Rs*.

"Found round a little pool at the base of the Säule rock. One had got drowned, and, though in the middle of the pool, was being scavenged by *Bdella littoralis*, Linn., a red mite very common on the island." (*Bristowe.*)

XXV.—*The Animal Ecology of King's College Chapel, Cambridge.—A Preliminary Note.* By A. D. HOBSON, B.A., Christ's College, and L. H. MATTHEWS, B.A., King's College*.

THIS paper is a consideration of the relationships of the animals living in the situation in question. The object is not primarily entomological, although many of the animals are insects.

The place under consideration is peculiar, and must first be described. The chapel has a double roof, the inner being the stone vaulting, while the outer is composed of wooden beams supporting the lead outer roof. There is a space between the two roofs extending over the whole of the chapel, and varying from 7 feet to 10 feet in height. This space, which is about 80 feet above the ground, communicates with the exterior by a window at each end. A gallery runs

* From the Zoological Laboratory, Cambridge.

along either side at a slightly lower level, and has windows on the outside and openings leading to the inter-roof space on the inside.

In addition to the animals inhabiting this space, the fauna of one of the four spiral staircases which communicate with it has been included. This staircase is disused, and is therefore similar biologically to the inter-roof space, as the pigeons, which form the central group of the fauna, are numerous there.

The whole floor of this space and the staircase are covered more or less with a *débris* derived from the pigeons, which nest and roost everywhere. This *débris* consists of droppings, together with derelict food, nesting materials, feathers, and remains of dead pigeons, forming a rich feeding-ground for a varied fauna.

Conditions at first sight appear unfavourable to life, owing to the extreme dryness of the food and to the darkness. On the other hand, so far as it has been possible to ascertain, the range of temperature is less than that outside.

An examination of the list given below shows that the majority of the animals found are dependent, directly or indirectly, upon the pigeons for food. It is found that the various members of the fauna fall into two main groups, as follows:—

I. *Independent Species.*

These merely use the chapel as a place of shelter, and obtain their food elsewhere:

e. g., pigeons, bats, and hibernating insects.

II. *Dependent Species.*

These fall into the following subgroups:—

A. *Parasites of Independent Species:*

e. g., ticks, fleas, bird-lice.

B. *Indirect Dependents.*

(a) Those feeding on the pigeon-refuse described above.

This group includes most of the fauna:

e. g., mites, *Lepisma*, larvæ of Coleoptera, Diptera, Lepidoptera, and Siphonaptera.

(b) Those preying on members of group (a) above:

e. g., spiders, Rhynchota, Chernetidea, and some mites.

It will be noted that some forms fall into more than one group at different stages in their life-history. Such an animal is the pigeon-flea, of which the larva feeds on refuse in the nests, whilst the adult is a parasite.

The following list includes all the members of this association which have so far been obtained. It is by no means complete, owing to the difficulty of collecting material because of the minute size of many of the animals. Indeed, additional species are continually turning up.

MAMMALIA.

Barbastella barbastellus, Gm. Barbastelle Bat.

The only mammal hitherto found. A single specimen was obtained from a crevice in the rafters on October 7th, 1922. This, incidentally, is the second recorded occurrence of this bat in Cambridgeshire.

AVES.

Columba livia. Pigeon.

Ecologically this is the most important animal, most of the fauna forming a "pigeon association" around it.

MOLLUSCA.

Helix arbustorum, L.

A single living example and one empty shell were taken in a dark part of the roof-space in August. This is the most anomalous member of the fauna, it being difficult to find any explanation for its presence owing to lack of suitable food.

ARACHNIDA.

ARANEINA.

Spiders are numerous in all parts, but, so far, have not been identified. There is reason to believe that they feed, in part at least, on the inhabitants of the pigeon refuse.

CHERNETIDEA.

Chernes sp.

One specimen only was found in rubbish. It is predaceous on refuse-feeders.

ACARINA.

Tyroglyphidæ.

Glycyphagus sp.

A species belonging to this genus is exceedingly abundant in the nests, and also, to a lesser extent, in the general refuse. These feed on particles of organic débris.

Aleurobius farinæ, De Geer.

Occurs in the same situation, and is similar in habits and food to *Glycyphagus*.

Liponyssus sp.

Found in moderate numbers amongst refuse. This is a predaceous species, feeding on the smaller refuse-feeders.

Dermanyssus spp.

Two species were found parasitic on pigeons, and were most abundant during the summer.

Several specimens of an undetermined Gamasid mite were taken on the barbastelle bat, chiefly on the head. These are blood-sucking parasites.

Argasidæ.

Argas reflexus, Fischer. Pigeon Tick.

Several specimens were found hiding in crevices of the masonry, in every case close to a pigeon's nest. It is a blood-sucking parasite of the pigeon. This is the second recorded locality in Great Britain, the species hitherto having been found only in Canterbury Cathedral. (See 'Nature,' vol. cx. p. 313.)

INSECTA.

LEPIDOPTERA.

Vanessa io. Peacock Butterfly.

Vanessa urticae. Small Tortoiseshell Butterfly.

Hibernating specimens of both species not uncommon.

Tineidæ.

Larvæ of one or more species commonly found feeding in the refuse.

COLEOPTERA.

Staphylinidæ.

Small beetles of this family are not uncommon in the refuse, but have not yet been worked out. Specimens of *Oxytelus sculpturatus* and *O. complanatus*, collected in the chapel by H. Jenkinson, M.A., are among the University collections.

Dermestidæ.

Dermestes lardarius.

Common in both adult and larval stages during the summer, feeding on refuse and dead pigeons.

Cryptophagidæ.

Cryptophagus badius.

Both larvæ and adults very common in pigeon-refuse.

Ptinidæ.

Ptinus fur.

Both larvæ and adults very common in the refuse or on dead pigeons.

Tenebrionidæ.

Tenebrio molitor, L.

Larvæ and adults common in refuse. The larvæ are usually found feeding in very dry masses of pigeon-droppings mixed with vegetable matter round the nests.

DIPTERA.

Fannia sp. Latrine Fly.

Larvæ not generally common, but when found occur in large numbers. Apparently usually occurs in accumulations of wet droppings, and by a process of external digestion prevents the mass from drying up. The only refuse-feeding animal found which does not feed exclusively on dry material.

Calliphora erythrocephala. Blue-bottle.

Very common, the larvæ feeding upon dead pigeons.

SIPHONAPTERA.

Ceratophyllus columbæ. Pigeon Flea.

This species is very common in larval and adult stages in the nests during the summer; not so numerous in winter. The larvæ, as pointed out above, fall into the category of refuse-feeders, whilst the adults are blood-sucking parasites.

Ischnopsyllus hexactenus.

Three specimens were found on the barbastelle bat. This species is characteristically a parasite of the long-eared bat (*Plecotus auritus*).

MALLOPHAGA.

Esthiopterum columbæ.

Occurs abundantly on the pigeons.

Psocidæ.

One immature specimen only of an unidentified species found amongst refuse, on which it probably feeds.

RHYNCHOTA.

Anthocoris sp.

Not common. This bug is predaceous, and probably feeds, in part at least, on larvæ of *Tenebrio molitor*.

APTERYGOTA.

Lepisma saccharina.

Not uncommon amongst the refuse, on which it feeds.

As is evident from the above observations, the fauna under consideration is of a considerable complexity, and further work will probably show that it is even more complex. The existence of various species which prey upon the refuse-feeders indicates that this association has been well established for a long time.

In conclusion, we would wish to express our gratitude to Mr. F. Balfour-Browne for his continued help and kind encouragement, and also to Mr. C. Warburton, Dr. Hugh Scott, and Mr. M. G. L. Perkins for help in identification of species.

XXVI.—*On some Queensland Phalangeridæ.*
By OLDFIELD THOMAS.

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THE Queensland representatives of the Koala and the large black Flying-Phalanger have long been known to me as not quite the same as their New South Wales allies, but it is only recently that material justifying detailed examination has been received by the British Museum. Thanks to the Godman Exploration Fund examples of both have now arrived, and the points of difference may be noted.

Commencing with the Koala, the Queensland form may be described as

Phascolarctos cinereus adustus, subsp. n.

Smaller than New South Wales and Victoria *cinereus*, the skull shorter in each sex. Fur shorter, hairs on withers about 16 mm. in length. General colour above of anterior back more or less strongly suffused with dull rufous or tawny, true *cinereus* being greyish or greyish brown on the back, without, or with but little, tawny suffusion. Ears far less thickly hairy, the inner surface almost naked. Under surface lighter, the prominent groin-patches rather browner and less rufous.

Dimensions of the type:—

Head and body 600 mm.; hind foot 97; ear 78.

Skull: condylo-basal length 138; zygomatic breadth 80; combined length of upper molars 30. A female skull has the molar series 28 mm. in length.

Hab. Queensland, extending as far north as Inkerman, in S. lat. 19° 30'. Type from O Bil Bil, near Mundubbera, 460'.

Type. Adult male. B.M. no. 22. 12. 29. 27. Original number 36. Collected 5th February, 1922, by T. V. Sherrin. Presented by the Godman Exploration Fund.

This animal is more suffused with rufous than the greyish one of New South Wales and Victoria, and is also somewhat smaller, the difference being particularly noticeable in the females.

THE TAGUAN FLYING-PHALANGERS.

Some years ago the British Museum received from the neighbourhood of Bundaberg, South Queensland, a small

series of the Taguan Flying-Phalanger—*Petauroides volans*. The specimens appeared to be greyer than the ordinary form, but for the moment they were put aside till further material should arrive.

Now from the same region Mr. Sherrin, the Godman collector, has sent some further examples of the animal, and, after a careful comparison with the more southern material available, I consider the Queensland form should be distinguished subspecifically.

Petauroides volans incanus, subsp. n.

Size as in true *volans*, both animals being somewhat variable in the dimensions of the skull. General colour of the back dark cinereous grey, apparently "deep mouse-grey" of Ridgway, the hairs blackish grey for the greater part of their length, their ends with a whitish subterminal band, the extreme tips black. Laterally the light bands increase in breadth and dominance, so that towards and on the edges of the parachute the colour is whitish, with a slight drabby tone. Under surface practically all white. Top of head grey like back, but the ears, as also the hands, feet, and greater part of tail, deep black, as in *volans*. Base of tail commonly whitish or white.

In true *volans* the body-area is black, slightly lightening laterally on the parachute, but with few or no light rings to the hairs, the general effect being very much darker than in *incanus*.

Skull as in *volans*.

Dimensions of the type:—

Head and body 390 mm.; tail 490; hind foot 52; ear 55.

Skull: condylo-basal length 60; zygomatic breadth 40·5; combined length of ms^{1-3} 11·5.

Hab. South-eastern Queensland. Type from Eidsvold, near Mundubbera, 450'; other specimens from Gin-Gin, W. of Bundaberg (coll. W. Allen).

Type. Adult male. B.M. no. 22.12.29.19. Original number 27. Collected 21st January, 1922, by T. V. Sherrin. Presented by the Godman Exploration Fund. Eighteen specimens examined.

All the older names in the literature refer to the blackish animal of Port Jackson and other parts of New South Wales and Victoria, an animal whose first introduction to zoology by Governor Phillip was under the name of the "Black Flying-Opossum."

As usual, there is a great prevalence of white-headed and white-tailed individuals in the present series, about one-third of the specimens being so affected.

Collett's subspecies *P. volans minor*, of which the type-locality may be taken as Herbert Vale, North Queensland, is of about the same colour as *incanus*, but is materially smaller.

Among the specimens assigned by Collett* to this animal, however, are two from Coomooboolaroo and Calliungal respectively, both in the Rockhampton region, which are larger than *minor*, while still decidedly smaller than *incanus*. These appear to me to represent a Middle Queensland subspecies, which may be called

Petauroides volans armillatus, subsp. n.

Size, as gauged by skull, distinctly larger than in *minor*, though falling much short of that in *volans* and *incanus*.

General colour of upper surface as in *minor*, but, as in *incanus*, the backs of the ears, the forearms, and the lower legs are black, almost as black as the hands, while in true *minor*, as shown by Mr. Sherrin's series, these are merely brown, little darker than the dorsal colour, and distinctly lighter than the black hands. Tail, in the single specimen, grey at base, like the back, not whitish as in *minor*, while the terminal part is less markedly black—but the caudal colour is rather variable throughout the genus.

Skull like that of *minor*, but larger. In the type the nasals are continued further back in the middle line than usual, but there is variation in *minor* in this respect.

Dimensions of the type :—

Head and body (on skin, apparently stretched) 370 mm. ; tail 460 ; hind foot 48 ; ear 36.

Skull: greatest length 56 ; condylo-basal length 54 ; zygomatic breadth 36.5 ; nasals 16.6 × 9 ; intertemporal breadth 6.6 ; ms^{1-3} 10.5.

Hab. Rockhampton region of southern Middle Queensland. Type from Coomooboolaroo, 80 miles S.W. of Rockhampton. Another specimen of what is evidently the same form recorded by Collett from Calliungal, 80 miles W. of Rockhampton.

Type. Adult male. B.M. no. 87. 5. 12. 2. Collected Jan. 1884 by Dr. Carl Lumholtz, and received in exchange from the Christiania Museum.

"Dr. Ramsay's *P. cinereus*," incidentally mentioned by Ogilby † as probably the same as *minor*, seems never to have been described.

* Zool. Jahrb. ii. p. 926 (1887).

† Cat. Austr. Mamm. p. 32 (1892).

Parallel with the modification in the *Petauroides*, I find that the large *Petaurus*—*P. australis*—of southern Queensland is lighter than the New South Wales one, and may be described as

Petaurus australis reginæ, subsp. n.

Lighter throughout than true *P. australis* of New South Wales, the general tone more olivaceous grey, the dark line on the back less strongly marked and only commencing on the withers, the rump not so blackish, the black on the top of the parachute less extended towards the back, the inner and posterior side of the hind limbs not so completely and wholly black, the proximal part of the thick tufts that lead down to the heels more or less whitish. Tail lighter-coloured, only about 3 inches of the end black all round, the underside of the rest buffy whitish. Belly buffy, not so deep as it usually is in *australis*. Skull as in *australis*.

Dimensions of the type (measured in the flesh):—

Head and body 360 mm.; tail 450; hind foot 47; ear 45.

Skull: greatest length 55.5.

Hab. South-east Queensland. Type from Gin-Gin, 28 miles inland of Bundaberg.

Type. Adult female. B.M. no. 14. 1. 23. 7. Original number 8. Collected 16th June, 1913, by Mr. W. Allen.

A NEW *PSEUDOCHIRUS* FROM N. QUEENSLAND.

Pseudochirus laniginosus incanens, subsp. n.

General characters of New South Wales *laniginosus*, but the dorsal colour clear ashy grey. Under surface white. Ears with prominent whitish patches behind and around their bases. Forearms and hind legs drabby or pale rufous; hands a little darker; feet paler than legs, drabby whitish. Tail with the proximal three-fifths darkening to black, the terminal two-fifths white.

Skull about as in *laniginosus*.

Dimensions of the type (measured in flesh):—

Head and body 300 mm.; tail 340; hind foot 45; ear 39.

Skull: greatest length 56; zygomatic breadth 34.5; nasals 20×9.8 ; ms^{1-3} 11.5.

Hab. Ravenshoe, N. Queensland. Type from Vine Creek, 3000'.

Type. Young adult female. B.M. no. 22. 12. 18. 86.

Original number 180. Collected 18th June, 1922, by T. V. Sherrin. Presented by the Godman Exploration Fund.

Readily distinguishable from all the hitherto known forms of the "*peregrinus*" group by its clear ashy-grey colour.

The complete disagreement of this North-Queensland specimen with Pennant's description of the Endeavour-River animal obtained by Banks, on which the name *peregrinus* is founded, shows that the latter name should not be used for any member of the group typified by the common ring-tailed opossum of New South Wales, and I therefore use Gould's name *laniginosus* for the latter. To what species *peregrinus* really applies is not yet clear, but it was probably what we know as *P. herbertensis*, Collett, of which I believe *P. h. colletti*, Waite, to be the young.

THE ROCK *PSEUDOCHIRUS* OF THE NORTHERN TERRITORY.

Dr. Matschie* has divided the Ring-tailed Phalangers into three subgenera—*Pseudochirus*, *Pseudochirops*, and *Pseudochirulus*,—of which *Ps. peregrinus*, *albertisi*, and *canescens* are respectively typical.

He has included in the second the North Australian *Ps. dahl*i, but this animal appears to me to be so different from any of the others as also to need a special subgenus for its reception. Its rock- instead of tree-haunting habits, its peculiar short tail, and, in the skull, its excessively inflated mastoids—which rise on each side higher than the occipital crest,—and the extreme imperfection of the palate, whose vacuities extend from the level of the back of *m*¹ to the palation, being only bounded behind by a narrow bar, are all characters which indicate its super-specific separation from the other members of the genus. I would therefore propose to make for it a special subgenus, which might be called *Petropsedes*.

XXVII.—On some small Mammals, chiefly Bats, from the East Indian Archipelago. By OLDFIELD THOMAS.

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By the kindness of Dr. de Beaufort, of the Amsterdam Museum, I have been privileged to work out the large series of small mammals, in spirit, from the East Indian Archipelago there preserved, and to describe such new forms as occur among them.

* SB. Ges. Nat. Fr. 1915, p. 83.

Of these, the most interesting are a new fruit-bat from Sumatra allied to *Chironax* and *Balionycteris*, but representing a new genus, and a beautiful parti-coloured *Myotis* allied to *M. weberi* and *bartelsi*, but larger, and showing at its maximum the striking red and black "dead-leaf" coloration that occurs in certain bats, of which the present is the largest.

ÆTHALODES, gen. nov. (Pteropodidæ).

Allied to *Chironax* and *Balionycteris*.

Muzzle broad; lips splayed out. No tail; interfemoral and calcar much reduced; hind limbs furry to base of claws. Wings to between the bases of the first and second toes.

Skull without postorbital foramina; premaxillæ in simple contact anteriorly.

Incisors $\frac{2}{1}$, the inner upper pair both slenderer and shorter than the outer, in marked contrast to the condition in the allied genera. Cheek-teeth $\frac{4}{5}$; p^1 very small; p^3 with strongly developed antero-external basal cusp. Lower grinding-teeth (p_3-m_1) broad, almost square, their shape recalling that in *Dyacopterus*.

Genotype, *Æ. alecto*, sp. n.

This new genus is one of a little group of Cynopterine genera to which *Chironax*, *Balionycteris*, and others belong, as described in Andersen's Catalogue, but it differs markedly in its combination of characters, though it would seem to be most nearly allied to the other small forms *Chironax melanocephalus* and *Balionycteris maculata*.

The proportions of its incisors—the inner pair considerably shorter and more slender than the outer—are unique, while the presence of only one pair of lower incisors, the absence of a tail, and the reduction of the interfemoral are all characters by which it may be readily recognized.

It is, therefore, a striking and highly interesting addition to the known genera of fruit-bats.

Æthalodes alecto, sp. n.

Size small, *Chironax melanocephalus* alone of this group being less in size. Fur thick and woolly, closely covering both the proximal part of the forearms, the whole of the interfemoral membrane, and the hind limbs down to the claws. Colour throughout dark smoky blackish, the face quite black. Middle area of belly slightly lighter. Ears black, the edges slightly thickened and lighter coloured. Membranes black

throughout, except that there are a few inconspicuous lighter spots on the wings which may correspond to the well-marked spots of *Balionycteris*.

Dimensions of the type, measured on the spirit-specimen :—

Forearm 48 mm.

Head and body 67; ear 13; pollex (c. u.) 18; third finger, metacarpus 34, first phalanx 24, second phalanx 30·5; fifth finger, metacarpus 30·5, first phalanx 14·5, second phalanx 16·5; lower leg and hind foot (c. u.) 28.

Hab. (of type). Indrapura Peak, Sumatra. Alt. 7300'.

Type. Adult female. B.M. no. 23. 1. 2. 1. Current number 93. Collected in 1921 by Messrs. Pratt. Brought home to the Amsterdam Museum by Dr. L. J. Toxopeus.

A very interesting fruit-bat, adding one to a small group of strongly marked forms, mostly inhabitants of mountainous regions.

It is of interest to record that there is also in the collection an example from Pulo Nias of *Chironax melanocephalus*, Temm., which had not been rediscovered since its first description in 1825, and of which, therefore, Dr. Andersen only had for examination the original and somewhat time-worn specimens in the Leyden Museum. It may be noted that the palate-ridges, as Dr. Andersen expected, prove to be very like those of *Cynopterus*, of similar number and shape, except that the posterior ridges are more strongly bent backwards at the sides. The wings are inserted at the base of the first toe, not between the first and second, as in *Ethalodes*.

Myotis hermani, sp. n.

A beautiful black and red bat allied to "*Chrysopteron*" *bartelsi* and *weberi*, Jentink, but larger than either.

Coloration essentially as figured in the excellent plate of *weberi*, the tone of the reddish parts of the membranes very much as figured, near "orange-cinnamon," rather than the "orange" mentioned by the describer. Dark parts blacker than in the figure. Edges of ears black to about the same extent as in *weberi*, therefore less than in *bartelsi*. Hind legs reddish only to the ankles, the feet being black.

Skull with a proportionally small brain-case and long heavy muzzle. The specimen is old, and has a well-marked sagittal crest. Teeth as in such species of the genus as have the second small premolar reduced, this tooth being minute and quite internal above, and minute and half internal below. Large premolar scarcely longer than m_1 above, and not so

long as m_1 below, proportions very different from those stated to occur in the allied species.

Dimensions of the type (measured on the spirit-specimen):—

Forearm 61 mm.

Head and body 68; tail 59; ear 21; tragus on inner edge 9; third finger, metacarpus 54, first phalanx 24·5; lower leg and hind foot (c. u.) 42·5.

Skull: greatest length 21; basi-sinual length 16·3; zygomatic breadth 14; palato-sinual length 10; front of canine to back of m^3 9.

Hab. Sabang, N.W. of Sumatra.

Type. Adult female in alcohol. B.M. no. 23. 1. 2. 13. Current number 91. Collected by Mr. G. Herman.

Of the three fine bats above mentioned, the first described—*weberi*—was placed by Jentink in *Kerivoula*; but later, when describing *bartelsi*, he founded a new genus—*Chrysopteron*—for the two, largely on the differences their teeth showed from those of *Kerivoula*. But I fail to see any reason for distinguishing them from *Myotis*, among which there are several other species with the dried-leaf coloration, while one of these—*M. rufopictus*—has the small premolar even more reduced, being absent altogether above in the type and only known specimen: and the premolar is equally reduced in *M. formosus* and *M. sicarius*, the latter a species without the dried-leaf coloration.

At Dr. de Beaufort's suggestion I have named this beautiful bat after its discoverer Mr. Herman, to whom the Amsterdam Museum owes many valuable accessions.

Among the latter there is also an example of a *Pipistrellus*, from Sabang, which I at first supposed to be new, owing to its possession of a peculiar sac-like gland on the upper side of the base of the tail. But further study, and the loan of specimens from the Doria Museum, Genoa, showed that this gland was characteristic of the male sex of *Pipistrellus macrotis*, as also of *P. imbricatus* of Java, *kitcheneri* of Borneo, and *lophurus* of the Malay Peninsula. The appreciable number of specimens of both *imbricatus* and *kitcheneri* in the Museum are almost all females, and the type of *P. curtatus*, Miller, said to be a synonym of *macrotis*, is also a female, so that it has only been on the arrival of Mr. Herman's male specimen of *macrotis* that I have been able to draw attention to this striking sexual characteristic.

P. lophurus was distinguished by its possession of a glandular tuft without any idea that the same structure occurred elsewhere.

Murina toxopei, sp. n.

Nearly allied to *M. florum*, Thos., with which it agrees in size and general colour, but the hind limbs, tail, and interfemoral membranes are as thickly haired as they are in *M. suilla*, not nearly naked as in *florum*. Under surface wholly greyish, without white on the throat, the ends of the hairs drabby whitish.

Skull and teeth practically as in *florum*, though the muzzle may be rather longer and the teeth a little heavier throughout. M^3 slightly thicker. Lower canine and premolars rather higher, the posterior premolar with an indistinct groove on its outer aspect, which may, however, be individual.

Dimensions of the type (measured on the spirit-specimen) :—

Forearm 35 mm.

Head and body 43; tail 34; ear 14; third finger, metacarpus 30.5, first phalanx 14.5; lower leg and hind foot (c. u.) 23.7.

Skull: greatest length 17; basi-sinual length 12; front of canine to back of m^3 5.6.

Hab. Buru. Type from En-Biloro.

Type. Adult female. B.M. no. 23. 1. 2. 27. Current number 110. Collected June 1921 by Dr. L. J. Toxopeus.

I have much pleasure in naming this little bat in honour of its discoverer, to whom the Amsterdam Museum owes the fine series of Buru Mammalia which I have been privileged to work out.

Murina canescens, sp. n.

Nearly allied to *M. suilla* and *balstoni*, agreeing with them in general essential characters and size, and equally smaller than *M. florum*; but colour nearly precisely as in the latter, the back similarly dull greyish, and the belly also greyish, with the chest dull whitish. In *balstoni* the whole of the under surface is white, in *suilla* the throat and chest are white, and in the latter the upper surface is more or less strongly rufous. Interfemoral and hind limbs thinly hairy.

Dimensions of the type (measured on the alcoholic specimen) :—

Forearm 29.5 mm.

Head and body 38; tail 30; ear 12; tragus on inner edge 5; lower leg and hind foot (c. u.) 19.3.

Skull: greatest length 14·2; basi-sinual length 10·2; breadth of brain-case 7·4; front of canine to back of m^1 4·8.

Hab. Nias Island, W. of Sumatra.

Type. Adult male. B.M. no. 23. 1. 2. 28. Current number 173. Collected by Mr. Kleiweg de Zwaan. Two specimens.

Tupaia glis phæniura, subsp. n.

General characters of Sumatran *T. g. ferruginea*, but the terminal half of the tail not greyish, as in *ferruginea*, nor abruptly creamy white, as in *demissa*, but gradually passing into orange-rufous, so far as the basal halves of the hairs are concerned. Ends of tail-hairs with a black subterminal ring and pale rufous tip. Underside of terminal part of tail clear bright orange-rufous, just edged with the darker tips of the hairs.

Body and limbs generally closely matching those of *T. g. demissa*, with the same darkening on the posterior back. Hairs of under surface grey-based, with buffy or ochraceous tips.

The type is young, its dimensions being:—

Head and body 134 mm.; tail 133; hind foot 40.

Skull: greatest length 42.

Hab. Deli, Sumatra.

Type. Immature female (skinned out of spirit). B.M. no. 23. 1. 2. 30. Current number 310. Collected by Dr. L. P. de Bussy. Two specimens examined.

In 1904 I described as *Tupaia ferruginea demissa* a tree-shrew from Lower Langkat, in the same part of Sumatra but at a lower level. That animal was characterized by the terminal part of the tail being abruptly contrasted creamy white, and its original collector obtained no less than forty-six specimens showing this peculiar coloration.

Dr. Lyon, in his 'Monograph of Tupaiidæ,' considered it a separate species on the ground that no intermediate specimens between it and *glis ferruginea* were known. Now, however, by its graduated rufous-ended tail, the present form may be considered as an intermediate between *demissa* and *ferruginea*, and I should therefore still retain the terminology I originally used for the creamy-tailed form.

In all probability this, and not *demissa*, was the Deli animal referred to by Jentink as *T. ferruginea chrysurus* in 1888.

XXVIII.—*A Note on Two Species of the Genus Murshidia (Nematode, Strongyloidea) parasitic in the Wart-Hog.* By R. DAUBNEY, M.Sc., M.R.C.V.S., Ministry of Agriculture and Fisheries.

THE material dealt with in this paper is the property of the British Museum (Natural History), South Kensington. I wish to express my thanks to Dr. H. A. Baylis for his generosity in placing this material at my disposal. The type-specimens of the new species are in the British Museum (Natural History).

Genus MURSHIDIA, Lane, 1914.

This genus, described by Lane (1914), differs from the genus *Cylicostomum* in characters of the head, the male bursa, the spicules, and the female tail. Lane's diagnosis has recently been reprinted in Khalil (1922, p. 220).

That both of the species discussed below should be assigned to this genus is indubitable, although hitherto its members have been described from elephants only. It is, however, always of peculiar interest to note the occurrence of members of a helminth genus, previously associated entirely with one host genus or group, in another host-group whose relationship to the first is not very obvious.

Murshidia pugnicaudata (Leiper, 1909).

Synonym. *Cylichnostomum pugnicaudatum*, Leiper, 1909.

This species has been collected recently on four occasions from the wart-hog (*Phacochærus æthiopicus*) in Zululand. On each occasion there was also present a closely allied species—*Murshidia hamata*,—which is described below. From the description of Leiper (1909, p. 23) there is reason to suppose that the material from which his species was originally described included also the second species. His figure of the œsophagus in particular would appear to apply more closely to *M. hamata* than to *M. pugnicaudata*. However, it is clearly indicated by his figure of the spicules which of the two species should be regarded as *M. pugnicaudata*.

Murshidia hamata, sp. n.

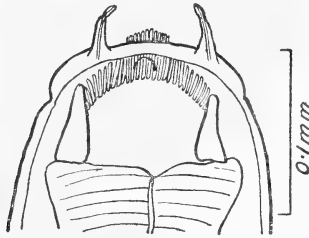
Host. Wart-hog (*Phacochærus æthiopicus*).

Locality. Zululand.

This is a fairly long robust form. The females measure

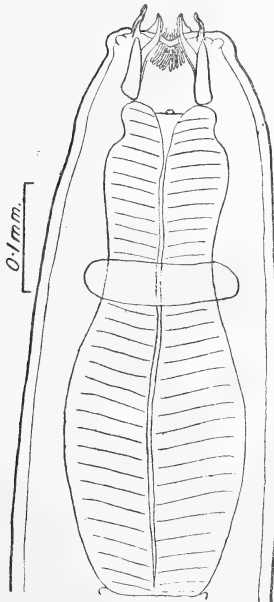
from 16·5 to 19 mm. in length and up to 0·79 mm. in thickness, the males from 13 to 14·5 mm. and up to 0·52 mm.

Fig. 1.



Murshidia hamata. Head, lateral view.

Fig. 2.



Murshidia hamata. Anterior end, dorsal view.

respectively. The female is tapered at both ends, the tip of the tail being drawn out to a fine point. The male is tapered

from just in front of the bursa forwards. The striæ of the cuticle are about 3μ apart.

The head, which measures about 0.12 mm. in dorso-ventral diameter, has well-developed, freely projecting, submedian papillæ, of which that part which is distal to the constriction is elongated rather than spherical. The lateral papillæ are small, fairly slender, and do not project through the mouth-collar. The mouth-collar is of medium height, with a rather depressed margin. It is elliptical in outline, and is notched laterally. The buccal capsule itself is ellipsoid, its longer axis directed dorso-ventrally. It is about 0.065 mm. deep. In the dorso-ventral position it appears about as broad as deep, while in the lateral position its width is much greater than its depth. In the latter position its walls in optical section appear roughly triangular, the base being considerably thickened. In the dorso-ventral position, however, this thickening towards the base is much less marked. The internal leaf-crown appears to be absent. The external leaf-crown consists of numerous (upwards of eighty) rather slender elements with rounded tips, which originate from the interior surface of the buccal capsule-wall along the curved line characteristic of the genus. From twenty-six to thirty-two of the elements protrude through the mouth-opening. These projecting leaves, which are mainly confined to the lateral walls, are arranged somewhat in the fashion of the feathers of a fan, the tallest elements being opposite the lateral papillæ; unevenness of length and of origin both assist in bringing about this arrangement. The dorsal gutter is represented by a blunt tubercle on the floor of the buccal capsule. The œsophageal funnel is poorly developed. The œsophagus measures from 0.54 to 0.56 mm. in length and up to 0.16 mm. in maximum thickness. It is bottle-shaped, having a well-defined waist at the point where it is encircled by the nerve-ring. There is a sharp constriction giving rise to a distinct shoulder just behind its anterior extremity. The nerve-ring is situated at about 0.16 mm. from its anterior end, whilst the excretory pore opens just behind its base.

Female.—The tail of the female is from 1 to 1.1 mm. in length and is sharply pointed. The vulva is situated at about 0.7 to 0.8 mm. in front of the anus, or from 1.7 to 1.9 mm. from the posterior extremity. The diameter of the worm increases suddenly immediately in front of the vulva. The vagina is curved spirally and appears to be muscular. The two branches of the uterus run directly forwards to within

about 1·8 mm. of the base of the œsophagus, where the ovarian tubes commence, running directly backwards to within about 5 mm. of the posterior extremity. Both uterine branches and ovarian tubes are arranged in numerous transverse loops partially encircling the gut. The eggs in the uterus are oval and measure $0\cdot072-80 \times 0\cdot036-0\cdot04$ mm. Their content is unsegmented.

Fig. 3.

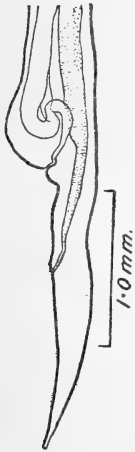


Fig. 4.

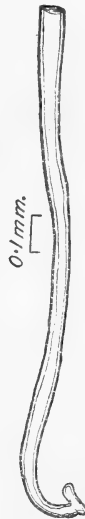


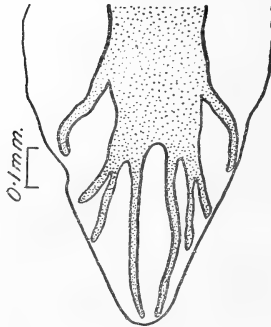
Fig. 3.—*Murshidia hamata*. Tail of female, lateral view.
 Fig. 4.—*Murshidia hamata*. Spicule of male.

Male.—The bursa of the male is completely closed, but possesses a long dorsal lobe. In addition to this and the lateral lobes there is a small accessory lobe on either side supported by the externo-dorsal ray.

The main trunk of the dorsal ray is exceedingly stout and rather short. The externo-dorsal rays are detached at a wide angle and recurve towards the dorsal side of the bursa. At about 0·2 mm. behind the point of origin of the externo-dorsal rays a pair of stout branches leaves the main trunk. Each of these, soon after leaving the main trunk, divides into two slender branches, of which the outer is distinctly the shorter. Just behind this point the main trunk divides into

two long slender branches which extend to the tip of the dorsal lobe. There are thus six rays in the dorsal lobe and a

Fig. 5.



Murshidia hamata. Dorsal and externo-dorsal rays of male.

ray (the externo-dorsal) in each of the small accessory lobes. The lateral and ventral rays appear to arise from a common trunk. Each of the former has a bulb-like swelling at its

Fig. 6.

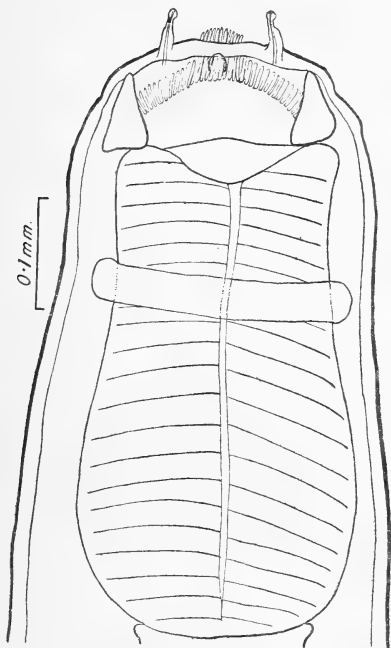


Murshidia hamata. Bursa of male, lateral view.

point of separation from the common trunk. The externo-lateral ray diverges noticeably from the other two and is

directed towards the ventral rays. The ventral rays are short, slender, and closely applied to each other. The spicules are rather stout and measure about 1.57 mm. in length. They curve distinctly in the dorsal direction near their posterior ends. Their extremities have each a large flattened hook, which faces ventrally and is somewhat like the sole of a child's sandal. A roughly conical accessory piece measuring 0.38 mm. to 0.4 mm. is present. The male

Fig. 7.



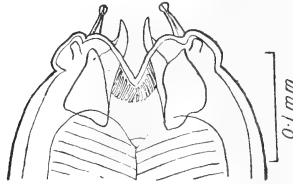
Murshidia pugnicaudata. Anterior and lateral view.

genital tube is much coiled and extends to within a short distance of the oesophagus.

Figures of *M. pugnicaudata* (Leiper) are appended, for purposes of comparison. The new species differs from *M. pugnicaudata* in the form of the mouth-capsule, of the oesophagus, of the vulva and vagina, and of the spicules of the male. Comparing the two, the buccal capsule of *M. hamata* is much narrower in proportion to its depth,

whilst in optical section its walls do not show such pronounced thickening towards the base. The terminations

Fig. 8.



Murshidia pugnicaudata. Head, dorsal view.

Fig. 10.

Fig. 9.



0.1 mm.



Fig. 9.—*Murshidia pugnicaudata.* Tail of female, lateral view. ■
 Fig. 10.—*Murshidia pugnicaudata.* Spicule of male.

of the submedian papillæ are also different in shape, being globular in *M. vugnicaudata* and elongated in *M. hamata*.

The figures will indicate the pronounced difference in the shape of the oesophagus. The anterior shoulder and the well-defined waist are conspicuous characters in *M. hamata*. Both lips of the vulva in *M. pugnicaudata* are somewhat prominent and the vagina is straight, while in the new species the anterior lip of the vulva is especially swollen and boss-like, and the vagina spirally curved.

Figures 4 and 10 will indicate clearly the differences between the spicules.

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XXIX.—Descriptions and Records of Bees.—XCVII.

By T. D. A. COCKERELL, University of Colorado.

Megachile fortis vestali, Cockerell.

Described from a male collected in Nebraska. Miss Grace Sandhouse has collected a female at Jumbo Reservoir, near Crook, Colorado, Aug. 13, 1921. It has exactly the appearance of the male, except for the sexual characters. The face is covered with bright reddish-fulvous hair, and the ventral scopa is entirely red. The posterior basitarsi are very broad. Among the known females, this is closely related to *M. emoryi*, Ckll., but is smaller, with redder hair. It seems possible that *M. emoryi* is the true female of *M. fortis*, Cresson, and that the present insect should stand as a distinct species, *M. vestali*.

Hoplitis graceæ, sp. n.

♀.—Length about 9 mm.

Black, rather narrow, with nearly parallel-sided abdomen; head and thorax shining, but closely punctured; mandibles broad, 3-dentate; clypeus with lower margin strongly but broadly emarginate; disc of clypeus convex, with no smooth

line or ridge; orbits slightly converging below; flagellum ferruginous beneath except basally and at extreme apex; tegulæ with a suffused red spot. Wings strongly clouded, reddish; first r. n. going beyond first intercubitus a distance much more than half length of latter. Tarsi with cream-coloured hair on inner side. Abdomen shining, the thin white hair-bands developed only at sides; ventral scopa pure white.

Sterling, Colorado, July 1, 1921 (*Grace Sandhouse*).

Compared with *H. sambuci*, Titus, it is less robust, with much narrower face, without the well-defined polished area on upper part of clypeus, and the antennæ and tegulæ are differently coloured. Compared with *H. mescalerium*, Ckll., it is smaller, with much less ample wings, the disc of mesothorax is more closely punctured, and the abdominal hair-bands are much less developed. *H. monardæ*, Ckll., is quite different; Crawford suggests that it should be transferred to *Andronicus*.

Miss Sandhouse investigated the mouth-parts of *H. graceæ*. The maxillary palpi are five-jointed, with the third joint longest, much longer than 4 + 5 (equal to 4 + 5 in *sambuci*), second much longer than fourth (2 and 4 subequal in *sambuci*); labial palpi with second joint longer than first; tongue about as long as labial palpi; blade of maxilla very long and slender, as in other species. *H. mescalerium* also differs in the palpi, having the maxillary palpi with the third joint equal to the second, but the fourth much shorter than second.

The bee has a general resemblance to *Andronicus cylindricus*, Cress., but that is larger, with 4-dentate mandibles and different venation.

Miss Sandhouse has also collected the following, new to Colorado: *Xenoglossa strenua*, Cress., Sterling, July 12, ♂ on nasturtium flowers; *Halictus occidentalis*, Cress., Crook, ♀, Aug. 24; *Perdita bigeloviae*, Ckll., Crook, males, Aug. 17-18, larger than usual (length about or nearly 6 mm.), and with less yellow on cheeks, but the latter character varies both in Colorado and New Mexico specimens.

Andrena murreensis, sp. n.

♀ (type).—Length 9-11 mm.

Black, with hind margins of first three abdominal segments (third rather obscurely) and base of second and third (or third not evidently) ferruginous; flagellum dull ferruginous beneath, except at base; tegulæ shining rufo-testaceous. Wings dusky hyaline, stigma dull ferruginous, nervures fuscous. Legs black; hair of head and thorax mainly

fulvous above and white below, but front and vertex with much black hair. Abdomen with rather narrow yellowish-white hair-bands on segments 2 to 4; apical fimbria very dark chocolate. Scopa of hind tibiæ shining pale reddish anteriorly, dark fuscous posteriorly; hair on inner side of basitarsi pale red; spurs light ferruginous. Malar space practically obsolete; process of labrum broad and truncate; clypeus shining, with strong punctures, an indistinct smooth line; facial foveæ very narrow, bounded on front by long tufts of black hair; mesothorax polished, with weak inconspicuous punctures; area of metathorax triangular, dull and granular, the margins shining; second s.m. broad, receiving first r. n. well beyond middle; b. n. falling just short of nervulus; stigma well developed. Abdomen thinly hairy, with weak piliferous punctures; second segment depressed about a third.

♂.—Length about 8 mm.

More slender; head large, without pale face-markings; clypeus prominent, with sparse punctures on disc; cheeks very broad, flattened, polished, sparsely punctured, not dentate; mandibles of moderate length; front with black hair; flagellum moderate, bright ferruginous beneath; legs black.

Murree Hills, Punjab, 7500 ft., May 1920, 5 ♀ (*Dutt*); Murree, 7500 ft., June 18, 2 ♀, 1 ♂ (*Dutt*). (*Fletcher*, 50, 51, 52, 53, 57, 156, 162, 165.)

In *Smiedeknecht's* table of European species, the female runs to *lombardica*, Schn., and the male near to *basalis*, Sichel, but these are not closely related. In my table of Oriental species in the British Museum, *A. murreensis* runs to *A. familiaris*, Smith, but is easily separated by the dark tibiæ and tarsi of the male. In my table made from the Rothney collection at Oxford, it runs to *A. morosa*, Cam., but is not the same. I noted of the Rothney collection type of *morosa*: larger than *A. rothneyi* or *maligna*; clypeus shining, with scattered rather weak punctures; mesothorax very feebly punctured; red on abdomen confined to apices of first two segments and bases of second and third; hair at end of abdomen reddish chocolate. Bingham gives the length as 12–13 mm. The British Museum also has a "type" of *morosa*, which lacks the red on abdomen and may be distinct. It runs in my table next to *levilabris*, and is separable thus (♀):—

Clypeus with a large median polished space, grooved down middle.....	<i>morosa</i> , Cam.
Clypeus closely punctured, without such a space	<i>levilabris</i> , Cam. (type).

The *morosa* is labelled Masuri.

The *A. mephistophelica*, Cam., type in the Rothney collection, has the abdomen without red; front and vertex covered with black hair; flagellum red beneath except basally; abdomen dull, with dullish white bands. This species is not in the British Museum. Bingham's description does not agree with the type.

Andrena rothneyi, Cameron.

I have this (♀) from Simla, September (*Nurse*). *A. simlaënsis*, Cam., also from Simla, August (*Nurse*), is in Col. Nurse's opinion almost certainly the male of *rothneyi*. In *rothneyi* the first two abdominal segments are red, and the mesothorax is dullish and closely minutely punctured; in *simlaënsis* the abdomen is entirely black, and the mesothorax is highly polished.

Andrena anonyma, Cameron.

I noted of the ♀ type in Rothney collection: flagellum obscurely reddish beneath; mesothorax dull, with hardly visible very weak punctures; scutellum shining; second s.m. broad; abdomen shining, with brilliant white bands. The male, not previously described, is also in the collection; it has a very broad head, with broad cheeks and long mandibles; scutellum shining as in ♀; second s.m. not unusually broad.

Andrena incanescens, sp. n.

♂.—Length about 9 mm.

Black, head and thorax with long dull white hair, faintly yellowish on thorax above, but with no black hair anywhere; head broad, facial quadrangle much broader than long; no light face-markings; process of labrum polished, broadly truncate; mandibles ordinary, with an inner tooth. Malar space linear, with a distinct tubercle at upper end; cheeks rounded, covered with long hair; clypeus ordinary, convex, shining, finely punctured, with no smooth line; flagellum stout, crenulated, very obscurely reddish beneath; third antennal joint a little shorter than 4+5; mesothorax dull, with very long hair; scutellum shining; area of metathorax hardly defined, rugose, the rugæ transverse, the metathorax covered with very long hair; tegulæ piceous. Wings reddish hyaline; stigma well developed, dark reddish; nervures fuscous, second s.m. receiving first r. n. a little before or at middle; b. n. falling just short of nervulus. Legs black,

with pale hair, bright ferruginous on inner side of tarsi ; spurs light ferruginous. Abdomen rather broad, convex, finely and distinctly punctured, the third segment more closely than the second ; surface thinly hairy, and segments 2 to 4 with thin but entire and rather broad white hair-bands, not conspicuous ; sixth segment with long dark hairs, indicating dark hair at apex in female.

Murree Hills, Punjab, 7500 ft., May 1920, 3 ♂ (*Dutt*). (*Fletcher*, 119, 132, 133.)

The sculpture of the metathorax recalls *A. morosa*, but the species is distinct from all described from India in the male sex, and I do not think it can be associated with any of the females. In the European table it runs near *A. simillima*, Smith, but the abdomen is much broader and duller, and there are many other differences. The abdominal bands are not dense and white at the sides as in *A. heteropoda*, Ckll. There is a very close superficial resemblance to *A. afzeliella*, Kirby (*ovatula*, Kirby).

Nomioides taprobanae (Cameron).

The type of *Ceratina taprobanae*, in the Rothney collection, is a *Nomioides*. It is very small ; clypeus yellow, with two black spots close together ; mesothorax dark green ; anterior and middle tibiae and tarsi wholly yellow. Ceylon.

SUDILA, Cameron.

This genus, based on three forms from Ceylon, could be regarded as a subgenus of *Halictus*, but may perhaps retain generic rank. I made the following notes from the types in the Rothney collection.

Sudila ceylonica, Cameron.

♀.—Clypeus produced, but malar space short ; venation ordinary, b. n. falling short of nervulus ; area of metathorax large, hardly defined, not plicate at all ; hind legs with short hair, but the femora with a good curled pollen-collecting scopa ; abdomen fusiform.

Sudila bidentata, Cameron.

♂.—Head very large, quadrate, with great flattened cheeks with a great dentiform angle below ; clypeus with two very large long parallel teeth, somewhat curved downward ; mandibles extremely long, crossing, strongly curved, red, with an inner tooth or angle ; anterior border of prothorax very strongly elevated, with red margin. The first

r. n. meets the second intercubitus ; in *ceylonica* it falls a little short of it. In both the third s.m. is short, not very much broader than second, and the outer nervures are quite distinct. Apparently *S. bidentata* is the male of *ceylonica*.

Sudila fuscipennis, Cameron.

♂.—Compared with *bidentata*, the head is much smaller, and the clypeal teeth are much shorter ; the mandibles are shorter and much darker ; the wings are dusky, quite reddish (not so in *bidentata*). The second s.m. is narrowed above, and receives first r. n. at extreme end. The abdomen is missing.

A slide mount of the mouth-parts of *S. ceylonica* shows six-jointed, slender maxillary palpi, the first joint short, the others subequal.

Augochlora floralia, Smith.

Type in Wilson Saunders collection at Oxford.

♀.—Length about 8 mm.

Very brilliant shining blue-green, but front dull and granular ; face very broad ; area of metathorax with feeble very oblique striæ ; hind spur pectinate ; abdominal segments not vibrissate.

Augochlora cytherea, Smith.

Type in Wilson Saunders collection.

♀.—Length about 10 mm.

Brilliant yellowish green ; mandibles broad, reddish in middle, with strong inner tooth ; area of metathorax lunate, with oblique striæ ; hind spur pectinate ; first recurrent nervure meets second intercubitus ; yellowish vibrissæ at sides of first two abdominal segments.

Augochlora vesta, Smith.

Described from the female. A male in the Wilson Saunders collection has expanse about 18 mm. Wings suffused with brown ; mesothorax densely and strongly punctured ; abdomen brilliant crimson, tending toward magenta, with orange vibrissæ ; punctures on first segment very strong.

Nomia opulenta, Smith.

Described from the male, collected on Morty I. In the Wilson Saunders collection I find also the female with label "M.," doubtless meaning Morty I. The male has on the

abdomen five yellow-green (Smith says blue-green) bands, slightly shot with red, the first being on first segment; postscutellum densely tomentose, unarmed; area of metathorax appearing as a narrow shining band, with a triangular dull apical part abruptly separated from it; second s.m. small, higher than long; hind femora not thickened, but tibiæ strongly curved. The female is evidently the same species; it has five abdominal bands, very strongly vermilion.

Nomia elegans, Smith.

Type in Wilson Saunders collection.

♀.—Abdomen with four yellow-green bands, first on first segment; punctures of mesothorax very fine and weak; anterior wings with apical dusky cloud; tegulæ pale fulvous; area of metathorax channelled, with cross-ridges; tibiæ and tarsi light ferruginous.

Schmiedeknechtia oraniensis, Friese.

I examined this in Mr. Morice's collection, and noted that it was very like the American genus *Neopasites*, Ashm., with the same hair-spots on abdomen. Head subglobose; second s.m. large and triangular; b. n. meeting nervulus. Ashmead says "labial palpi (?) 5-jointed," but it should be maxillary palpi. The genera are perhaps identical, but in *Neopasites* the mandibles are bidentate, whereas Friese describes *S. oraniensis* as having them simple.

XXX.—Notes on the Nomenclature of the Family Scolytidæ.
By Lt.-Col. WINN SAMPSON, F.E.S.

As regards the question whether this family should be called Ipidæ or Scolytidæ, it is unnecessary to give a detailed account of all that has been written on the subject, as it seems to have been entirely overlooked by Ganglbauer [Munich. Koleopt. Zeit. 1903, p. 311, footnote (sep.)] and others that Dr. A. F. Fourcroy, in 1785, published a small book in Paris entitled 'Entomologia Parisiensis,' the preface to which states that the trivial names therein were added by Geoffroy himself to rectify the omissions in his original work, and on page 139 of the first volume the specific name of "*niger*" is added to *Scolytus*.

It is evident, therefore, that the generic name *Eccoptyogaster*, Herbst, must give place to *Scolytus*, as having a seniority of eight years, and, although the *Ips* of De Geer was erected in

1775, there is no rule whereby the oldest generic name must necessarily be used for the family; so that the name *Ipidæ* can quite properly give place to the much more generally known one of *Scolytus*.

* In a recent publication (Entomologisch. Berichten, cxxvi. Deel vi., 1 Juli, 1922) Herr Oberförster Eggers states that he cannot agree with me that *Stephanoderes coffeæ*, Haged., is a synonym of *St. hampei*, Ferr., and in support of his opinion quotes an abstract from the original diagnosis of Ferrari (Die Forst- und Baumzuchtsschadlichen Borkenkäfer Wien, 1867, p. 12), and another from Eichhoff's description (Ratio, Descriptio, Emendatio eorum Tomicinorum, p. 153). Both authors state the elytral clothing to be "setæ," the original adding the qualifying word "crassis," whilst Eichhoff calls them "obtusiusculus tamen non clavatis." Ferrari further emphasizes the absence of "schuppenborsten" (when comparing his species with *Cryphalus ratzburgi*, Ferr.; Hagedorn stating the setæ of his species *St. coffeæ* to be "nicht keulenformigen," and later on differentiates his species from *St. hampei* as having, *inter alia*, elytral hairs that are even less scale-like.

In Eichhoff's key to the genus he separates *St. cassiæ* from *St. hampei* chiefly by the former having "setis subclavatis" and the latter "haud clavatis." A specimen of *St. hampei* in my possession from Chapuis's collection, and which he probably received from Eichhoff, shows the setæ to be very slightly broadened; but in a specimen lent me by Herr Eggers for examination, and which he tells me has been compared with a probably ("wahrscheinlich") typical example, I found the setæ to be widely broadened as in *St. cassiæ* and other species, and I wrote to Herr Eggers pointing out the discrepancies between our specimens and suggesting further investigation. At present I am of the same opinion as before, as from time to time a large number of specimens have reached me, and they are certainly similar to the description given by Ferrari and to my Chapuis specimen.

Xyleborus fornicatus, Eichh., and *X. fornicator*, Eggers.

In the many long series of *X. fornicatus* that have passed through my hands there have been differences of size and consequent variations in the length of the elytral curve from base to apex, but no specimens that could be said to have a flattened appearance; and in the description given by Eichhoff (who is generally most accurate and painstaking) he takes particular trouble to differentiate the species from *X. xanthopus* by, *inter alia*, the fact that in the latter species the curve is

not continuous ; I am unable, therefore, to accept *X. fornicator* as a good species.

The present opportunity may be taken of deprecating the multiplication by splitting up of species except on the most valid grounds. A description of a species is not a description of a specimen only, and the practice of taking small and insignificant differences in a series for the erecting of new species only retards, instead of advancing, our knowledge. In the Scolytidæ this custom has, perhaps, been carried furthest in the genera *Hypothenemus* and *Stephanoderes*, but in all the genera the diagnostic value of colour, number and size of prothoracic tubercles, and in some genera the number of funicular joints, as well as the partial or complete division of the eye etc., depend on the examination of the longest series obtainable ; and the giving of specific value to single and often immature specimens which do not exhibit some striking peculiarities, is equally to be deplored.

The foregoing remarks have no reference to those cases where the forest expert is able to prove dissimilarity in life-history etc., as in such cases apparently trivial differences may become of the first importance.

BIBLIOGRAPHICAL NOTICE.

Strasburger's Text-book of Botany, re-written by Dr. Hans Fitting, Dr. Ludwig Jost, Dr. Heinrich Schenck, and Dr. George Karsten.
Fifth English Edition, revised from the Fourteenth German Edition by W. H. LANG. Macmillan and Co: London, 1921.
31s. 6d.

SINCE the last English edition of this famous text-book Professor Strasburger has died. The original authors of the text-book, as it appeared in 1894, were Professor Strasburger, Professor Noll, Professor Schenck, and Schimper. The new English edition contains important new sections on Morphology, Physiology, and Spermatophyta, contributed by Fitting, Jost, and Karsten, respectively ; and these Professors, together with Professor Schenck, who contributes the chapters on Thallophyta, Bryophyta, and Pteridophyta, are responsible for this edition, which in the main follows the lines of the original text-book. The addition of the important new material by the authorities already mentioned makes the book of quite exceptional value as a text-book, and it will be a great advantage to students to have before them the brief account of recent literature and the exhaustive bibliography which is given by each of the four subeditors.

PROCEEDINGS OF LEARNED SOCIETIES.

GEOLOGICAL SOCIETY.

December 6th, 1922.—Prof. A. C. Seward, Sc.D., F.R.S., President, and afterwards Mr. R. D. Oldham, Vice-President, in the Chair.

The following communication was read:—

‘On a Collection of Fossil Plants from the Falkland Islands.’
By Albert Charles Seward, Sc.D., F.R.S., Pres.G.S., and John Walton, B.A.

The collection of fossil plants submitted to the Authors for examination was made by Dr. H. A. Baker at several localities in East and West Falkland, and in Speedwell and George Islands (south of East Falkland). It includes a few fragments of Lepidodendroid stems too imperfect for specific determination: an examination of the specimens and a comparison of some other plant-remains, previously described by Dr. T. G. Halle, with plants from other countries lead the Authors to suggest a Devonian age for the oldest plant-bearing beds.

Numerous examples of *Glossopteris* leaves were collected, especially in Lafonia, and these are referred to *Glossopteris indica* Schimper and *G. browniana* Brongniart, species which are not confined to one geological series in the Gondwana System. Many specimens of Equisetaceous stems were also obtained from the *Glossopteris* Beds: of these several are clearly identical with Falkland examples described by A. G. Nathorst and by T. G. Halle, while others are compared with an Upper Triassic or Rhætic species *Neocalamites carrerei* (Zeiller). The examination of some well-preserved wood from Choiseul Sound enables the Authors to amplify the account given by Halle, of wood which is closely allied to that discovered by Dr. Baker. A comparison of petrified wood, most of which has been assigned by various writers to the genus *Dadoxylon*, from different parts of Gondwanaland, points to the prevalence in the southern botanical province of trees differing in certain anatomical characters from contemporary plants in the northern province. The present Authors' conclusion is that the Permo-Carboniferous flora as a whole, so far as it is possible to base an opinion on the few species represented, agrees most nearly with the Damuda and Beaufort Series of India and South Africa respectively. The stems compared with *Neocalamites* favour a reference of the beds at Cygnet Harbour and Egg Harbour to a somewhat higher position; and, on the other hand, the leaves described as *Glossopteris indica* Schimper (cf. *G. decipiens* Feistmantel) from North Arm, although they represent a type which has a wide range both in space and in time, suggest a possible correlation with the Ecca Series of South Africa and the Talchir Series of India.

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[NINTH SERIES.]

No. 63. MARCH 1923.

XXXI.—*Coleoptera of the Second Mount Everest Expedition, 1922**.—Part I. Carabidæ. By H. E. ANDREWES, F.E.S.

ALL the Carabidæ were taken by Dr. T. G. Longstaff during the month of May in the neighbourhood of the Base Camp, Upper Rombuk, Tibet, at an altitude of 16,500 feet. The specimens secured belong to four well-known Palæarctic genera, and are represented by five species, all of which I believe to be new. There are good series of three of these, but of the other two there are in each case two examples only. The *Nebria* is a very aberrant form and, as will be seen, differs rather widely from any hitherto described species.

Nebria superna, sp. n.

Length 10·5–11·0 mm. ; width 3·8–4·2 mm.

Dark brown-red, ventral surface a little lighter, moderately shiny: joint 1 of antennæ (rest fuscous), apex of palpi, femora, and trochanters red. In one example there are two clearly separated red spots on the vertex, in the other the greater part of the head is red.

Head smooth, wide, and rather flat, a slight constriction behind eyes, middle of front uneven, the slight impressions

* For Coleoptera of the 1921 Expedition, see *Ann. & Mag. Nat. Hist.* (9) ix. pp. 558–562 (1922).

differing in the two specimens, clypeus slightly, labrum rather strongly emarginate, mandibles short, sharply contracted and hooked at extremity, longitudinally striate in the scrobe, eyes rather prominent, antennæ thick, barely reaching middle of elytra, joint 1 short and widely dilated, 2 very short, not more than a third of 1, 3 half as long again as 1, 4 a little shorter than the apical joints, 3 and 4 strongly compressed laterally quite close to base; the tooth of the mentum is short and wide, slightly and widely emarginate, with a seta at each side of base, another seta on each side of mentum near base, and yet another on each side of base of submentum not far from buccal fissure; joint 2 of labial palpi with only 2 setæ visible on inner margin. *Prothorax* moderately convex, barely wider than head and only slightly wider than long, extremities truncate, sides of base a little oblique quite close to angles, sides narrowly bordered in front, a little more widely behind, very gently rounded, a slight sinuation near front angles and a marked one rather before hind angles, which are approximately right and fairly sharp, projecting a little laterally, no marginal pores or setæ; median line moderately marked on disk only, both transverse impressions deep, the foveæ barely indicated, surface generally smooth, vaguely punctate along the transverse impressions. *Elytra* elongate-ovate, rather flat, not quite twice as wide as prothorax, and two-thirds as long again as wide, widest behind middle, shoulders nearly obsolete, but basal border forming with side border a slight obtuse humeral angle, sides bordered, faintly sinuate behind shoulder; finely punctate-striate, stria 1 fairly deep on disk, and quite clear to apex, the others progressively finer towards both sides and apex, where they become almost obsolete, scutellary striole short, intervals flat, though slightly convex on disk, no sign of a carina at apex, no setiferous pores, the punctures of the marginal series few, small, and far apart, surface smooth and slightly sericeous, microsculpture very clear, isodiametric. *Under-side* smooth, a few very vaguely indicated punctures at sides of venter near base, ventral segments with 2 (sometimes 3) setæ on each side of median line, apical segment with 1 only. Tarsal joints glabrous above, those of the pro- and mesotarsi almost moniliform, apex of metatarsal joints produced beneath.

The last-mentioned character would put the species into the subgenus *Nebriola*, but the other characters are widely different, and I am unable to make any comparison with another species, as I know of nothing at all similar. To my

eyes the new species is evidently a *Nebria*, and I do not therefore propose a new genus for it: in view of its unusual features, however, I think a new subgenus is called for, and I propose the name of *Psilonebria*, characterized by the unusual reduction of the setæ on the body (including 2 only on the inner margin of the second joint of the labial palpi), the strongly compressed joints 3-4 of the antennæ, the submoniliform tarsal joints, etc.

2 ex., ♀ ♀.

Bembidium (Plataphus) nivicola, sp. n.

Length 5.0 mm.; width 2.1 mm.

Black, shiny, with metallic reflections: upper surface of a deep, faintly bluish green, trochanters red.

Head convex, with moderately deep nearly parallel frontal furrows, diverging slightly behind and extending from the front supraorbital to the clypeal pore, eyes rather flat, antennæ elongate, nearly reaching middle of elytra; surface smooth and polished, a little uneven at sides, impunctate. *Prothorax* transverse, rather flat, but convex towards front angles, a little wider than head, base truncate, its sides very slightly oblique, the sides gently rounded and sinuate before base, hind angles sharply rectangular, carina short but distinct, at right angles to base; median line short but moderately deep, not reaching extremities, basal transverse depression shallow, foveæ wide but impressed at bottom; surface of disk smooth and polished, basal area strigose, the striæ transverse a little in front of base, longitudinal along margin. *Elytra* ovate, flat, depressed behind base, half as wide again as prothorax and as much longer than wide, contracted towards base and widest behind middle, shoulders very square, sides gently rounded, border reaching stria 5; striæ punctate, rather feebly impressed, 7 almost obsolete, 1 deep near apex, where it curves round to meet 2, apical stria long and deep, joining 7, scutellary striole short, intervals almost flat, 3 with the two pores on stria 3; surface smooth but shagreened and less shiny than that of head and prothorax. The microsculpture throughout approximately isodiametric (very much as in *B. laticolle*, Motsch.). Beneath the surface is smooth, the metasternum unbordered between the mesocoxæ, ventral surface glabrous.

Of same size as *B. virens*, Gyllh., but of a bluer green. Head with furrows diverging slightly behind; prothorax a little longer, sides distinctly sinuate before base, the angles consequently sharper, median line obsolete near base, carina slighter, foveæ less deep, base finely rugose; elytra

a little more narrowed towards base, with striæ—especially outer ones—less impressed and less conspicuously punctate, the pores on 3 smaller.

2 ex., ♂ ♂.

Amara (Leiomorpha) brucei, sp. n.

Length 6·0–7·0 mm. ; width 2·5–3·0 mm.

Piceous, upper surface with faint metallic lustre ; antennæ and palpi light testaceous, side-margins of prothorax, apical margin of elytra, and legs darker testaceous.

Head very convex, not contracted behind, clypeal suture fine, the frontal impressions slight and linear, eyes rather flat, antennæ with short joints, reaching little beyond base of prothorax, apical joint of palpi pointed and hollowed out beneath, surface smooth. *Prothorax* convex, a third as wide again as head, and a little more than a third as wide again as long, extremities truncate, sides of base bordered, sides evenly rounded, without sinuation, but more contracted in front than behind and widest before middle, angles not much rounded, the hind ones a little obtuse, the hind lateral pore within and not far removed from them ; median line short and fine, transverse impressions rather shallow, inner foveæ well marked, ending in front in an impressed line, outer ones very slight, a distinct raised area between them ; surface smooth, base finely and rather slightly punctate at sides, faintly strigose in middle. *Elytra* convex, oval, about a third as wide again as prothorax, and half as long again as wide, moderately contracted towards base, sides rounded, basal border slightly bisinuate, with a distinct angle at shoulder ; striæ rather fine and very finely crenulate, striae comparatively short, without pore at base, intervals nearly flat, surface smooth, shagreened. Beneath the surface is nearly smooth, vaguely punctate at sides, ventral surface minutely strigose, prosternal process bordered at apex, with two setæ, metepisterna barely longer than wide, ventral segments bisetose, apical segment with a pair of setæ on each side, rather close together in ♂, more distant in ♀, hind tibiæ not setose on inner margin.

Rather larger and more elongate than *A. alpicola*, Dej., the only other species of the group known to me, antennæ and legs lighter. Head with flatter eyes, the foveæ less marked ; sides of prothorax without sinuation, hind angles obtuse, base slightly punctate, the inner foveæ not so clearly marked, outer ones slight but present ; striæ of elytra a little less impressed, striae longer, intervals flatter, basal sulcus not so deep.

Many ex., ♂ ♀.

Amara (Leiomorpha) hypsela, sp. n.

Length 5·5–6·0 mm. ; width 2·4–2·6 mm.

Very much like the preceding species and similarly coloured, but a little smaller and differing in the following particulars. The frontal furrows, though slight, seem on average to be rather more marked, and the eyes are rather more prominent. The prothorax is wider, its sides slightly but distinctly sinuate before base, so that the angles are very nearly right ; the inner fovea hardly differs, but the outer one is obsolete, and the raised area is wanting, the punctures at sides of base a little coarser and more numerous. The elytra are rather more contracted towards base, the inner striæ deeper, with more obvious puncturation, the striole short and very inconspicuous. Beneath the border of the prosternal process is very slight, sometimes obsolete, the sides of the metasternum and its episterna more evidently punctate, the apical ventral segment ♂ with only one pore and seta.

Many ex., ♂ ♀.

Cymindis longstaffi, sp. n.

Length 7·0–8·5 mm. ; width 2·6–3·2 mm.

Piceous, shiny ; side-margins of prothorax, side and apical margins of elytra, legs, antennæ (darker towards apex), palpi, metasternum, and middle of ventral surface testaceous ; suture and frequently also base of elytra, sometimes head and prothorax brown.

Head rather wide, convex, frontal foveæ small but fairly deep, eyes moderately prominent, genæ very oblique, joint 3 of antennæ only sparsely pubescent, apical joint of palpi truncate, in the labials ♂ very slightly dilated ; surface, especially vertex, sparsely punctate, neck and clypeus smooth. *Prothorax* moderately convex, a little wider than head and half as wide again as long, sides rounded, margin reflexed, hind angles also reflexed, obtuse, but quite evident ; median line and transverse impressions all moderately marked, basal foveæ rounded, rather small but deep ; surface punctate but not closely, a little more so at sides and along base. *Elytra* moderately convex, oval, with a re-entrant angle at apex, the truncature hardly apparent, contracted towards base, where the border, which reaches the small scutellary striole, is strongly sinuate on each side, almost forming an angle at shoulder ; striæ rather fine and very finely punctate, 7 obsolete towards apex, intervals flat ; surface very shortly pubescent, moderately and not very closely punctate, the punctures of same size as on head and prothorax.

A little smaller than *C. mannerheimi*, Gebl., lighter in colour, especially legs and antennæ, surface more shiny. Head much more sparsely punctate, with more prominent eyes and deeper foveæ; prothorax more transverse, with wider marginal channel and more obtuse hind angles, surface less and not confluent punctate; elytra shorter and a little more convex, sides more rounded, basal border strongly sinuate on each side, apex hardly truncate, striæ much finer, 7 less evident near apex, surface more finely punctate, and with shorter pubescence.

24 ex., ♂ ♀.

XXXII.—*Coleoptera of the Second Mt. Everest Expedition, 1922.*—Part II. *Heteromera*. By K. G. BLAIR, B.Sc., F.E.S.

THE total number of Heteromera collected by the Expedition of 1922 amounts to 139 compared with 17 obtained last year, though the number of species is only 7 compared with 4 (or possibly 5) of last year; only one of these, *Mylabris przewalskyi*, was obtained in both years. The rest of the Heteromera all belong to the family Tenebrionidæ, and all the species are apparently undescribed, though belonging either to genera that are peculiar to the mountainous regions of Central Asia or to groups of species characteristic of this region in more widely Palæartic genera. They were all captured by Dr. T. G. Longstaff, the Medical Officer of the Expedition, the Tenebrionidæ all under stones, and, except the *Gnaptorina*, all in the vicinity of the Base Camp, Rongbuk, Thibet, at an elevation of 16,500 ft., *i. e.*, about 2000 ft. lower than last year's locality and about 2 miles further from Everest, but with an identical aspect. Probably the great difference in the material secured in the two years is due largely to this method of collecting, though the early date, 16th to 20th May, about two months earlier than last year, no doubt accounts for the comparative absence in 1922 of flower-frequenting species—indeed, Dr. Longstaff informs me that there were no flowers.

Fam. Tenebrionidæ.

1. *Ascelosodis everestinus*, sp. n.

Ovate, blackish piccous, antennæ, legs, and underside paler. Clypeal lobe of head very densely rugosely punctate, not very prominent or sharply separated from the lateral lobes; clypeal suture but faintly perceptible; vertex rather

sparsely but sharply punctate, the punctures becoming denser and obliquely elongate towards the sides. Antennæ short, not reaching to base of thorax, first three joints stout, the 3rd scarcely longer than the 2nd, 4th to 8th narrower, almost as wide as long, 9th to 11th wider, transverse. Thorax more than twice as wide as its median length, anterior margin broadly concave, posterior margin almost parallel with it, sides rounded, anterior angles obtuse, rounded at apex, posterior angles completely rounded; lateral borders narrow but distinct, anterior and posterior margins interrupted in the middle; disc evenly convex from side to side, rather sparsely asperately punctate in the middle, more densely so towards the sides; lateral margins with a sparse fringe of long hairs arising from beneath. Scutellum minute, frequently concealed by the base of the thorax. Elytra shortly ovate, shoulders rounded without a lateral carina, epipleura narrow, completely ventral; surface moderately shining, very finely and sparsely muricately punctate, not more densely so towards the sides, with fine irregularly branching lines all over; lateral margins, especially near the shoulders, flavo-ciliate.

Length 5-6 mm.

12 ex.

According to the key given by Bates (*Cist. Ent.* ii. p. 468) this species would run down to *A. haagi*, Bates, which is unknown to me, but from which it evidently differs in its smaller size and rounded shoulders to the elytra.

2. *Ascelosodis longstaffi*, sp. n.

Very closely resembles the preceding in size and form, but has rather shorter antennæ and the elytra rather strongly and densely though somewhat irregularly punctate, with the scutellar area very much more finely and evenly punctured than the central portion of the disc. The antennæ are similarly constructed to those of *A. everestinus*, but shorter, joints 4 to 8 being feebly transverse.

Length 5 mm.

6 ex.

From *A. serripes*, Redt., it differs in having the anterior lobe of the head very much less prominent, the antennæ shorter, the anterior angles of the thorax obtuse, rounded at the apex, and the posterior angles completely rounded; the puncturation is also finer and muricate in character.

These two species, and presumably *A. haagi*, Bates, differ from the normal form of the genus in the median lobe of the head being very much less prominent, giving it a superficial resemblance to the head of *Spyrathus*.

The British Museum possesses three further species, collected by the Thibet Expedition of 1904, that may be assigned to this genus, though two of them differ in the form of the prothorax, the sides of which are straight or feebly sinuate behind, so that the posterior angles are approximately rectangular. According to Reitter's 'Bestimmungs-Tabellen' (xlii. p. 87), this character would place them in *Gnathosia*, but this genus has, *inter alia*, the thorax more or less conical, widest at the base, the external apical angle of the anterior tibiæ not produced, etc. In other respects they agree with *Ascelosodis*, so that it appears unnecessary to erect a new genus for their reception.

The following key, alternative to that given by Bates, will supplement it by the inclusion of the new species * :—

- | | | |
|--|----|--------------------------|
| 1 (20). Sides of thorax rounded to base, posterior angles very obtuse or rounded | 2. | |
| 2 (15). Median lobe of head well-defined and prominent | 3. | |
| 3 (14). Base of thorax not markedly bisinuate | 4. | |
| 4 (9). Elytral shoulders rounded | 5. | |
| 5 (8). Thorax widest about the middle, lateral margins not reflexed | 6. | |
| 6 (7). Anterior and posterior margins of thorax finely bordered throughout; median lobe of head not sharply divided from lateral lobe; sides of thorax and elytra ciliate beneath | | <i>serripes</i> , Redt. |
| 7 (6). Anterior and posterior borders of thorax widely interrupted in the middle; median lobe of head divided from lateral lobes by short distinct sulci; sides of thorax and elytra not ciliate beneath | | <i>waltoni</i> , sp. n.† |

* *A. ovoideus*, Fairm., from Kashmir, unknown to me, is omitted; *A. inermis*, Fairm., belongs apparently to *Syachis*, Bates, and is possibly identical with *A. himalaicus*. *Orocina*, Reitt., with two species from Turkestan, both unknown to me, does not appear to differ from *Ascelosodis*, Bates; the latter genus was unknown to Reitter, and the labrum is not normally concealed as stated by him.

† *Ascelosodis waltoni*, sp. n.

Is very similar to *A. serripes*, Redt., but, in addition to the differences given above, the head is very finely and sparsely punctate, rather more strongly so towards the vertex, the punctures becoming strigose above the eye. From *A. intermedius*, Bates, which it resembles in the sides of the thorax and elytra being not ciliate beneath, it differs in size, in the sharply-separated median lobe of the head, in the shape of the thorax, etc.

Length $5\frac{1}{2}$ – $7\frac{1}{2}$ mm.

Habitat. Gyantse, 13,000 ft., June 1904, Thibet Expedition (*H. J. Walton*).

Numerous examples.

- 8 (5). Thorax widest behind the middle; lateral margins finely but distinctly reflexed . . . *concinus*, Bates.
- 9 (4). Elytral shoulders obtuse, but more or less prominent and dentiform 10.
- 10 (13). Sides of thorax and elytra with long hairs beneath. 11.
- 11 (12). Median lobe of head feebly separated from lateral lobes; elytral puncturation not muricate *assimilis*, Bates.
- 12 (11). Median lobe of head strongly separated from lateral lobes; elytral puncturation muricate *ciliatus*, Bates.
- 13 (10). Sides of thorax and elytra not ciliate . . . *intermedia*, Bates.
- 14 (3). Base of thorax notably bisinuate *grandis*, Bates.
- 15 (2). Median lobe of head not very prominent, nearly continuous with lateral lobes . . . 16.
- 16 (17). Humeral angles of elytra distinct *haagi*, Bates.
- 17 (16). Humeral angles of elytra rounded. 18.
- 18 (19). Elytra almost impunctate *everestina*, sp. n.
- 19 (18). Elytra evidently punctate *longstaffi*, sp. n.
- 20 (1). Sides of thorax straight or feebly sinuate before posterior angles, which are rectangular. 21.
- 21 (22). Thorax and elytra strongly punctured . . . *thibetana*, sp. n.*
- 22 (21). Thorax and elytra feebly and sparsely punctured. *nitida*, sp. n.†

* *Ascelosodis thibetana*, sp. n.

Pitchy black, moderately nitid, underside, legs, and antennæ reddish; head almost impunctate in the middle, clypeal lobe strongly prominent and sharply separated from the lateral lobes, with a number of fine furrows running up to above the eyes. Thorax about twice as wide as long, sides rounded in the middle but feebly sinuate before both anterior and posterior angles, rendering the former acute and prominent, the latter almost rectangular, base feebly rounded with an impression each side about the middle, disc strongly muricately punctate, more densely so towards the sides. Elytra shortly ovate, widest about the middle, the base feebly and broadly emarginate, basal carina entire, somewhat corrugated; disc convex, strongly and rather densely muricately punctate, especially towards the sides; reflexed portion rather sparingly ciliate.

Length $7\frac{1}{2}$ - $8\frac{1}{2}$ mm.

Habitat. Gyantse, 13,000 ft., June 1904, Thibet Expedition (*H. J. Walton*).

Numerous examples.

† *Ascelosodis nitida*, sp. n.

Very similar to the above, but more nitid, and more sparingly and finely punctate, the elytral punctures being obsolescent, the thorax much less strongly rounded at the sides, and, with the sides of the elytra, more densely ciliate beneath.

Length 7 mm.

Habitat. Sikkim, 1904, Thibet Expedition (*H. J. Walton*).

3 ex.

Gnaptorina brucei, sp. n.

Elongate-ovate, convex, nitid, black; upper surface moderately strongly irregularly punctate. Head much narrower than the thorax, the sides convergent and bisinuate before the eyes, clypeus widely but not deeply emarginate; antennæ stout, not or scarcely reaching base of thorax, 3rd joint nearly as long as the two following together, 4th to 7th submoniliform, nitid, slightly decreasing in length, 8th to 11th moniliform, opaque, slightly increasing in thickness. Thorax subquadrate, a little broader than long, widest before the middle, the sides rounded in front, almost straight behind, narrowly bordered throughout; anterior margin truncate, border widely interrupted in the middle, anterior angles rounded; base truncate, posterior angles rectangular; disc rather strongly convex transversely even at the base, with an indistinct median longitudinal impression. Scutellum invisible. Elytra broadly ovate, strongly convex transversely, the base fitting closely to and slightly overlapped by the base of the thorax, the sides rounded throughout, their greatest breadth behind the middle, the lateral carina visible from above for rather more than half its length, continuous to apex; disc more finely punctate than that of thorax with numerous irregular lines. Prosternal process narrow, with median impression, deflexed behind coxæ with the apex slightly prominent. Anterior tibiæ not or scarcely thickened towards apex, external apical angle not developed, a single large apical spur in both sexes; anterior tarsi simple in both sexes, claw-joint nearly as long as the rest together.

♂. Spur of anterior tibiæ stout, tapering, scarcely longer than first tarsal joint; spurs of hind tibiæ tapering, not sharply pointed, the inner slightly the larger.

♀. Spur of anterior tibiæ flattened, wider towards the apex than at the base, apex rounded, as long as first three tarsal joints, but apparently much subject to abrasion, spurs of hind tibiæ flattened, parallel-sided, blunt at apex, the inner the larger. Antennæ shorter.

Length 10–11 mm.

2 ♂, 1 ♀, Tengkye-La, Thibet, 16,000 ft., 14th June, 1922.

The species was also collected in Sikkim by the 1904 Expedition. Closely allied, *ex descr.*, to *G. felicitana*, Rtt., from Central Asia, but the latter is described as subopaque, with the first two joints of the anterior tarsi densely pubescent.

I retain the generic name *Gnaptorina*, Reitter, for this

species, as it is by no means certain that Reitter's genus (type *felicitana*, from Central Asia) is synonymous with *Tagonoides*, Fairm. (type *delawayi*, from Yunnan). It may be noted that *T. zabriiformis*, Fairm., is wrongly placed; it is a *Bioramix*, Bates (= *Botiras*, Fairm. = *Faustia*, Kr., doubtfully distinct from *Platyscelis*), while *Botiras striatellus*, Fairm. = *Bioramix asidioides*, Bates.

Blaps himalaica, sp. n.

Small, subcylindrical, rather strongly convex transversely, moderately nitid, black. Head moderately densely and finely punctate, clypeus broadly but feebly emarginate; antennæ not reaching base of thorax, 3rd joint nearly as long as the three following together, 4th to 7th equal, slightly longer than wide, 8th to 10th mouiliform, about as wide as long. Thorax slightly wider than long, narrower at apex than at base, widest before the middle, sides finely bordered, rounded in front, almost straight or feebly sinuate towards base, anterior margin feebly emarginate, not bordered in the middle, anterior angles rounded, base almost straight, posterior angles subrectangular but blunted at apex; disc rather strongly convex transversely even at the base, finely and less densely punctate than the head. Scutellum invisible. Elytra elongate-oval, about $\frac{1}{4}$ wider than the thorax, sides feebly rounded, lateral margin visible from above for about half its length, apex rounded with a small sutural excision, but no special thickening or prolongation in either sex, disc finely and not very densely asperately punctate, epipleura subparallel as far as the 2nd abdominal segment, the marginal carinæ thence converging to meet about halfway along anal sternite. Prosternal process sulcate, declivous behind the coxæ but with a blunt apical projection. Second abdominal segment about as long as anal segment; no hair-pad in the male. Legs normal, femora not markedly clavate, anterior tibiæ straight, anterior tarsi short, posterior tarsi moderately slender, first joint about as long as last and slightly longer than the 2nd and 3rd together, the inferior prolongation of the claw-joint bluntly rounded at apex.

♂. Antennæ a little longer than those of the ♀, and general outline more cylindrical, the elytra a little narrower, but with no obvious characters in the legs or abdominal sternites.

Length 15 mm.

2 ♂, 1 ♀.

Must be very close, *ex descr.*, to *B. helopioides*, Seidl.,

from Central Asia, which is stated to have the thorax longer than broad, subcylindrical, with the sides almost straight.

Platyscelis (Leipopleura) anescens, sp. n.

Elongate-oval, nitid, piceous black, with the underside, antennæ, mouth-parts, and legs reddish and the elytra with a distinct brassy tinge. Head strongly transverse, broadly rounded in front, the clypeal suture arcuate, very distinct, the clypeus somewhat upturned, not continuing the plane of the frons; antennæ just about reaching posterior angles of thorax, clothed with short rather dense golden pubescence, 3rd joint a little longer than 4th, 4th to 8th equal, a little longer than broad, 9th and 10th subtransverse, 11th longer, pyriform. Prothorax about $\frac{1}{4}$ as wide again as long, widest near base, the sides arcuately narrowed to apex, anterior angles slightly obtuse, rounded at apex, posterior angles subrectangular, also rounded at apex, sides flattened, the explanate border decreasing towards anterior angles; disc convex, distinctly but not very closely punctate. Scutellum small, usually concealed beneath the base of the thorax. Elytra ovate, punctures very fine, scarcely visible, the whole surface covered with shallow irregular depressions, upper carina of epipleura present throughout, distinctly explanate around the humeral angle, forming the lateral carina for the first half of its length, then somewhat deflexed and invisible from above.

♂. Anterior tibiæ strongly widened towards apex, external apical angle acute; anterior tarsi strongly expanded, 1st joint small, 2nd very large, 3rd and 4th gradually decreasing in size; intermediate tarsi less strongly expanded, the 2nd joint being the largest, the 1st about equal to the 3rd, 3rd and 4th decreasing.

♀. External apical angle of anterior tibiæ rounded, less strongly produced; all tarsi simple; 1st joint of anterior tarsi elongate, nearly as long as the two following together, 2nd to 4th transverse, subequal.

Length 9 mm.

Numerous examples.

Probably most closely allied to *P. micans*, Reitt., but differing in numerous points, the shape of the thorax giving it a more elliptical outline, its puncturation finer, while that of the elytra is scarcely visible.

Læna alticola, sp. n.

Elongate, moderately nitid, nearly glabrous, blackish piceous, with the antennæ, mouth-parts, and legs reddish.

Head strongly, rather unevenly punctate, usually with a median space clear of punctures and another above the base of each antenna. Antennæ slender, reaching a little beyond the base of the thorax, all joints longer than broad, 3rd joint about $1\frac{1}{2}$ times as long as 2nd or 4th. Thorax wider than head, transverse, convex, as strongly but rather more sparingly punctured than the head, both with scattered inconspicuous hairs, widest in front of the middle, the sides rounded with a fine lateral carina; base and apex not bordered, all the angles rounded. Elytra elongate-ovate, not much wider than the thorax, striæ scarcely impressed, but strongly and closely punctate, intervals nearly flat, each with a median row of fine punctures rather irregularly spaced; pubescence scarcely visible except at shoulders and at apex; suture narrowly depressed just behind scutellum and on apical declivity. Legs stout, femora rather strongly thickened but not toothed, tibiæ gradually thickened from base to apex, not appreciably curved.

Length 6-7 mm.

Numerous examples.

Must be very close, *ex descr.*, to *L. rosti*, Reitt., from Kashmir, but is not deep black, and has the legs, including the femora, distinctly reddish; the anterior tibiæ straight, and the thorax apparently more strongly transverse. The colour varies from reddish testaceous to blackish piceous, probably according to the age of the individual.

Fam. Meloidæ.

Mylabris przewalskyi, Dokhtoureff.

A single specimen represents the only species amongst those found by the 1921 Expedition that was found this year also.

[To be continued.]

XXXIII.—*Previously undescribed Scolytidæ and Platypodidæ from the Indian Area.*—Part II. By Lt.-Col. F. WINN SAMPSON, F.E.S.

Platypus abruptus, sp. n.

Dark reddish brown. *Front* flat, very slightly concave over the mouth, the surface shagreened, with shallow piliferous punctures and a few longitudinal striæ below the eyes, sparsely hairy. *Prothorax* subquadrangular, irregularly

punctate and variolous on a rimose surface, especially anteriorly and laterally; the median groove short and shallow, with sloping sides, broadened and ending abruptly before the centre, an obscure ridge extending to the apex, the surface on each side of the basal groove subopaque; along the base the varioles are large. *Elytra* the same breadth as, and nearly twice as long as, the prothorax; sides subparallel, slightly broadened towards the declivity, striate-punctate, the sutural striæ formed of confluent shallow punctures, the interstices slightly convex on the basal and dorsal portions, the first five more or less granulate basally, the third almost plain at the base, the rest irregularly and lightly punctured, the whole being rugose with larger punctures just before the declivity, which is almost perpendicularly truncate, the fundus being circular, margined, subconvex, and opaque, with six longitudinal rows of large, suboval, shallow punctures on the upper third, none of which reach the apex; the broad and flattened first and second interstices become narrowed to single rows of tubercles before the centre, the second being continued nearly to the apex and curved outwards to meet the seventh; the third and fifth meet and enclose the fourth before reaching the apex, the sixth ceasing at the juncture of the second and seventh; the apical fifth of the fundus is plain except a few irregularly placed tubercles; the upper edge of the declivity is margined with short golden hairs.

Length, 5 mm.; breadth, 1.5 mm.

India: Mandali, Jaunsar, 6000 ft. (*C. F. Beeson*), ex *Quercus* sp.

The declivity of this remarkable beetle is very similar to that found in many of the truncate forms in the genus *Xyleborus* of the family Scolytidæ, but I am not aware of any of the Platypodidæ to which it is closely allied.

Platypus curtatus, sp. n.

♂. Dark brown, the elytra darker towards the declivity. *Front* flat, dull, with shagreened surface, paler in colour on the anterior third, with a narrow, longitudinal, median impression. *Prothorax* oblong, shining, irregularly and sparsely covered with large umbilical and small punctures, especially basally, and with groups of small punctures on each side of the basal longitudinal groove. *Elytra* striate-punctate; basal margin smooth, shining, and black; the interstices flat, the third not enlarged basally, and provided with irregular biseriate punctures, becoming granulate and hairy at the gradually rounded declivity, the first interstice extending to the apex, the second becoming narrowed and

ceasing before reaching the centre of the declivity, the third and fourth coalescing at the centre, where there is a prominent tubercle, below which the surface is smooth, dull, and furnished with a few irregular tubercles representing the continuations of the interstices, the seventh interstice forming a lateral margin terminating before the apex in three or four teeth, which are plainly visible from above and give an appearance to the apex of being abruptly narrowed; the elytra are more or less broadened towards the apex and are very sparsely covered with yellow hair on the apical third; there is a narrow but plainly visible margin at the apex.

Length, 3·8 mm.; breadth, 1·2 mm.

♀. Differs from the male in size, the longer frontal median groove, the larger cordiform patch of punctures on the prothorax; the third interstice is broadened basally and transversely carinate, the declivity is without tubercles, densely covered with reddish hair, the apical depression subtriangular, the apical margin not sharply defined.

The prothoracic groups of punctures in both sexes are suboval, instead of being circular as is usual.

Pangjhora Block, Upper Tondou (*C. F. C. Beeson*), ex Sal felled tree.

Types in the British Museum.

Xyleborus recidens, sp. n.

Ferruginous. *Front* convex, slightly rugose, with narrow longitudinal median line. *Prothorax* longer than broad, laterally subparallel, rounded anteriorly, transversely rugose to the central transverse nodosity, posteriorly shining and punctate.

Elytra the same breadth as, and one-fourth longer than, the thorax, parallel-sided to the bluntly rounded apex, striate-punctate, the punctures clearly defined; the interstices flat, with uniseriate piliferous punctures; the first and third apically tuberculate, the third having a small but prominent tubercle one-third below the vertex of the declivity, which is abrupt and commences on the apical fourth, the second interstice depressed and plain; a few irregularly placed tubercles occur on the other interstices, the apex clearly but narrowly margined.

Length, 1·7 mm.; breadth, ·6 mm.

Khariabandar, Lower Tondou (*C. F. C. Beeson*), ex Sal.

Somewhat similar to *X. confusus*, Eichh., in the arrangement of the tubercles, but very much smaller, and having an abrupt declivity, smaller tubercles, etc.

Xyleborus turbineus, sp. n.

Head and prothorax yellow, the elytra a darker reddish brown. *Front* subconvex, with large but shallow punctures and a narrow, obscure, and interrupted median carina from the epistoma to the vertex; the eyes emarginate, with coarse facets. *Prothorax* oblong, declivous in front and rugose as far as the antemedian transverse elevation, posteriorly smooth and shining, with well-marked and numerous piliferous punctures; broadest anteriorly, decreasing from the rounded anterior margin to the rounded basal angle. *Elytra* very slightly broader than the base of the prothorax and one-third as long again, narrowed from the apical third to the very pointed apex, obscurely lineate-punctate, the interstices having stronger hairs than the striæ, the first being tuberculate from the base, the second from about the centre, and both ending apically in distinct spines, the first interstice having the longer one; the lateral interstices are tuberculate towards the apex.

Length, 3·3 mm.; breadth, 1 mm.

Bengal: Raja Bhat Khawa, ex Sal.

Closely allied to *X. andrewesi*, Blandf., but much larger, the apex not opaque, the sculpture of the elytra different, etc.

Xyleborus elegans, sp. n.

Pitchy black, legs testaceous. *Front* subconvex, hairy, with a longitudinal median line from the epistoma to the vertex, minutely transversely rugose on a shagreened surface. *Prothorax* subglobose and subopaque, slightly broader than long, evenly rugose as far as the transverse nodosity; the anterior edge closely but minutely tuberculate, posteriorly less rugose on a shagreened surface. *Scutellum* obsolete. *Elytra* the same breadth as, and one-fourth longer than, the prothorax, declivous from the centre, punctate-striate, basally depressed on each side of the suture, the base fringed with hair; the first interstice flat and subopaque from the declivity to the apex, the next six becoming costate before the declivity, the fourth being the most prominent, the second interstice narrowed and ceasing at the declivity, the third curved inwards towards the suture at the centre of the declivity, but outwards again before reaching the apex; the fourth is also somewhat incurved, becoming narrower and ceasing before the apex, the next three being very similar; the sides of the elytra are subparallel to the apical fourth and then rounded

to the apex; the apical margin well defined and crenulate, extending laterally halfway up the declivity.

Length, 2.1 mm.; breadth, .9 mm.

Bengal: Raja Bhat Khawa (*C. F. C. Beeson*), ex Sal twig.

Xyleborus bicolor, Blandf., var. α .

Head, legs, and prothorax yellow, the elytra dark reddish brown. *Front* subconvex, sparsely punctured, with short, obscure, median, longitudinal line over the epistoma; the eyes deeply emarginate. *Prothorax* longer than broad, the sides subparallel, slightly broader in front, the basal angles rounded, anteriorly transversely rugose as far as the transverse central nodosity, posteriorly shining and smooth, with a few minute punctures near the base especially. *Scutellum* very minute. *Elytra* the same breadth as the base of the prothorax and one-half longer; lineate-punctate, interstices flat, with uniseriate erect hairs, the sides subparallel, rounded on the apical fifth; viewed laterally, the apical declivity is abrupt, the first and second interstices tuberculate and setose, but not elevated.

Length, 1.7 mm.; breadth, .6 mm.

India: Sunderbans Div. (*C. F. C. Beeson*).

Probably only a local variety of the Japanese species *X. bicolor*, Blandf., from which it differs in the absence of the median longitudinal line on the prothorax, the shorter and more abrupt elytral declivity, and the flatter first and second interstices on the declivity, each of which differences appears to be constant.

XXXIV.—*A Revision of the Genera of the Family Liparidæ.*

By Colonel C. SWINHOE, M.A., F.L.S., F.Z.S., F.E.S.,
Member of the Entomological Society of France and of
the Bombay Natural History Society.

[Continued from p. 97.]

658. *Aroa incerta*.

Aroa incerta, Rog. Ann. Nat. Hofmus. vi. p. 164 (1891); Kirby, *l. c.*
p. 921.

Taveta.

659. *Aroa luisa*.

Aroa luisa, Pag. Jahrb. Nass. Ver. Naturk. xxxviii. p. 26, pl. xi. fig. 3
(1885); Semper, Het. Philipp. ii. p. 456 (1898).

Type, Nias, in Coll. Pagenstecker, Luzon, Philippines.

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660. *Aroa leucogramma*.*Cænina leucogramma*, Felder, Reise Nov. pl. xcix. fig. 7 (1875).*Aroa leucogramma*, Semper, *l. c.*

Type, Luzon, in Coll. Rothschild.

661. *Aroa nigrofascia*.*Aroa nigrofascia*, Wileman, Entom. 1911, p. 149.

Types, ♂ ♀, Kanshirei, Formosa, in Coll. Wileman.

662. *Aroa globula*.*Aroa globula*, Swinhoe, Ann. & Mag. Nat. Hist. (7) xvii. p. 544 (1910).

Type, ♂, Padang, W. Sumatra, in B.M.

663. *Aroa discalis*.*Aroa discalis*, Walker, iv. p. 792 (1855), ♂.*Aroa signata*, Walker, xxxii. p. 328 (1865), ♀.

Type, ♂, S. Africa; type, ♀, Natal: both in B.M. Mashonaland, Zululand, Port Ogowe, Kilimanjaro, Zomba, Pietermaritsburgh.

664. *Aroa bistigmigera*.*Aroa bistigmigera*, Butler, P. Z. S. 1896, p. 847, pl. xlii. fig. 7.

Type, ♂, Nyassaland, in B.M.; Zululand, Port Ogowe, Natal, Basutoland, Nigeria, British East Africa.

665. *Aroa dregei*.*Orgyia dregei*, Herr.-Schäff. Aussereur. Schmett. i. fig. 1121 (1854); Kirby, *l. c.* p. 495.

Cape.

666. *Aroa melaxantha*.*Orgyia melaxantha*, Walker, xxxii. p. 324 (1865).

Type, ♂, Cape, in B.M.

667. *Aroa socrus*.*Gynæphora socrus*, Geyer, Zutr. v. p. 12, figs. 837, 338 (1837).*Aroa socrus*, Kirby, *l. c.* p. 464.

Java.

668. *Aroa risoria*.*Aroa risoria*, Swinhoe, Trans. Ent. Soc. 1903, p. 457.

Type, ♂, Arjuno, Java, in B.M.

669. *Aroa charax*.
Neurophana charax, Druce, Ann. & Mag. Nat. Hist. (6) xvii. p. 352 (1896).
 Type, E. Africa, in Coll. Joicey; Nyassaland.
670. *Aroa ochraceata*.
Aroa ochraceata, Walker, xxxii. 327 (1865).
 Type, ♀, Natal, in B.M.; Salisbury, Mashonaland, Zomba.
671. *Aroa quadripunctata*.
Orygia quadripunctata, Wallgrn. Öfv. Vet.-Akad. Forh. xxxii. (1) p. 99 (1876).
 Transvaal, Bine, W. Africa.
672. *Aroa niasana*.
Aroa niasana, Swinhoe, Ann. & Mag. Nat. Hist. (7) xix. p. 203 (1907).
 Type, ♂, Nias, in B.M.
673. *Aroa flaveofusca*.
Aroa flaveofusca, Swinhoe, l. c. (7) ix. p. 80 (1902).
 Type, ♂, Lawas, Borneo, in B.M.
674. *Aroa mirma*.
Aroa mirma, Swinhoe, Trans. Ent. Soc. 1903, p. 455.
 Type, ♂, Sumatra, in B.M.
675. *Aroa plana*.
Orygia (?) *plana*, Walker, iv. p. 786 (1855).
Aroa plana, Strand, l. c. pl. xxii. d.
Charnidas junctifera, Walker, xxxii. p. 334 (1865).
 Type, ♂, N. India, in B.M.; type, *junctifera*, in Layard's lost collection.
676. *Aroa substrigosa*.
Aroa substrigosa, Walker, iv. p. 794; Butler, Ill. Het. v. p. 54, pl. xc. fig. 5 (1886); Strand, l. c. pl. xix. b.
 Type, ♂, Sylhet, in B.M.; Chin Hills, Khasia Hills.
677. *Aroa pyrrochroonia*.
Aroa pyrrochroonia, Walker, xxxii. p. 329 (1865); Strand, l. c. pl. xix. i.
Baziza detecta, Walker, xxxii. p. 399.
 Type, ♂, Cherapunji, in B.M.; Mandi Bukar, Bhootan, Sikkim, Jaintia Hills.

Hampson, in 'Moths of India,' puts these two and *clara* as one species, *substrigosa* and *pyrrhochroma* may be of one very variable species, but I have a fine series of both; *clara* is undoubtedly quite distinct, being of a different colour, pale yellowish fawn-colour. I have one male and three females in my collection.

678. *Aroa clara*.

Aroa clara, Swinhoe, *l. c.* fig. 10.

Type, Bombay, in B.M.; Poona.

679. *Aroa cinnamomea*.

Charnidas cinnamomea, Moore, Lep. Atk. p. 44 (1879).

Charnidas aurantiaca, Warren, P. Z. S. 1888, p. 296.

Type, ♂, Kunawar; type, ♂, *aurantiaca*, Attock: both in B.M.

680. *Aroa flavicollis*.

Crinola flavicollis, Leech, Entom. xxiii. p. 111 (1896), and P. Z. S. 1899, p. 120.

Aroa flavicollis, Strand, *l. c.* p. 121, pl. xxii. c.

Form *leucoides*, Strand, *l. c.*

Type, ♂, Chang-Yang; type, ♀, Chia-kow: both in B.M.

681. *Aroa callima*.

Aroa callima, Beth.-Baker, *l. c.* (8) vii. p. 546.

Type, ♀, Idakun, Lagos, in Coll. Bethune-Baker.

682. *Aroa perfida*.

Aroa perfida, Beth.-Baker, *l. c.*

Type, ♂, Gunnal, W. Africa, in Coll. Bethune-Baker.

683. *Aroa catori*.

Aroa catori, Beth.-Baker, *l. c.* p. 546.

Type, ♂, Lokoja District, in Coll. Bethune-Baker.

684. *Aroa pinodes*.

Aroa pinodes, Beth.-Baker, *l. c.* p. 547.

Type, ♂, N'Dalla Tondo, in Coll. Bethune-Baker.

685. *Aroa obliqua*.

Aroa obliqua, Beth.-Baker, *l. c.* p. 546.

Type, ♂, Lokoja District, in Coll. Bethune-Baker.

Genus LACHANA, Moore, P. Z. S. 1888, p. 397.

686. *Lachana ladakensis*.

Lachana ladakensis, Moore, *l. c.* p. 398; Butler, Ill. Het. vii. p. 30, pl. cxxi. fig. 6 (1889).

Type, ♂, Ladak, in B.M.; Skardo, Kashmir.

Genus ICTA, Walker, iv. p. 922 (1855).

687. *Icta fulviceps*.

Icta fulviceps, Walker, *l. c.*

Type, ♂, Australia, in B.M.

688. *Icta tanaopis*.

Icta tanaopis, Turner, Proc. Linn. Soc. N.S.W. xlv. (4) p. 477 (1920).

Type, Claudie River, N. Queensland, in Coll. Turner.

Genus VARMINA, Moore, P. Z. S. 1888, p. 405.

689. *Varmina indica*.

Gluphisia (?) *indica*, Walker, v. p. 1039 (1855).

Type, India, in Mus. Oxon.; Simla, Kangra, Dharmsala, Umballa.

Genus DASORGYIA, Staudinger, Stett. ent. Zeit. xlii.
p. 406 (1881).

690. *Dasorgyia pumila*.

Dasychira pumila, Staud. *l. c.* p. 605.

Saisan, Tarbagatai District.

691. *Dasorgyia selenophora*.

Dasorgyia selenophora, Staud. *l. c.* xlviii. p. 98 (1887).

Var. *pamirica*, Strand, *l. c.* pl. xxii. *b.*

Ferghana, Pamir.

692. *Dasorgyia alpherakii*.

Dasorgyia alpherakii, Gr.-Grsh. Hor. Soc. Ent. Ross. xxv. p. 464 (1891); Strand, *l. c.* pl. xxii. *b.*

Kuku-Nor and Amdo District.

693. *Dasorgyia grumi*.

Dasychira grumi, Staud. Cat. Pal. Lep. p. 115.

Dasychira semenovi, Gr.-Grsh. *l. c.*

Kuku-Nor (Tibet).

Genus *CASAMA*, Walker, xxxiii. p. 611 (1865).

694. *Casama vilis*.

Eproctis vilis, Walker, xxxii. p. 348, ♂.

Casama indeterminata, Walker, xxxii. p. 611, ♀.

Types, ♂ ♀, S. India, in B.M.; Nilgiris, Ceylon, Hyderabad, Sind, Muscat, Arabia, Somaliland, Abyssinia.

695. *Casama innotata*.

Spilosoma innotata, Walker, iii. p. 674 (1885).

Sierarctia innotata, Kirby, l. c. p. 243.

Egypt.

696. *Casama uniformis*.

Oeneria uniformis, Roths. Nov. Zool. xx. p. 118 (1913).

Casama uniformis, Roths. l. c. xxiv. p. 359 (1917).

Type, Algeria, in Coll. Rothschild.

Genus *THIACIDAS*, Walker, v. p. 1027 (1856).

697. *Thiacidas postica*.

Thiacidas postica, Walker, v. p. 1028, ♂.

Drymonia (?) *denotata*, Walker, xxxii. p. 414, ♀.

Heterocampa (?) *nigroscripta*, Walker, xxxii. p. 423, ♀.

Cnethocampa (?) *curvata*, Walker, xxxii. p. 429, ♂.

Cnethocampa (?) *basifurca*, Walker, xxxii. p. 430, ♂.

Type, Nepal; types of all the others, India: all in B.M. Poona, Bombay, Burma.

Genus *IROPOCA*, Turner, Trans. Ent. Soc. 1904, p. 477.

698. *Iropoca rotundata*.

Teara rotundata, Walker, iv. p. 851.

Iropoca rotundata, Turner, Proc. Roy. Soc. N.S.W. xlv. (4) p. 494 (1920).

Type, ♂, Tasmania, in B.M.; Moreton Bay, Brisbane; Jervis Bay, near Nowra; Beechworth; Gisborne.

Genus *AXIOLOGA*, Turner, Trans. Ent. Soc. 1904, p. 472.

699. *Axiologa pura*.

Teara pura, Lucas, Proc. Roy. Soc. Queensland, 1891, p. 75.

Type, Queensland, in Coll. Lucas.

Genus CADUCA, Swinhoe, Ann. & Mag. Nat. Hist. (7) xvii.
p. 546 (1906).

700. *Caduca venata*.

Caduca venata, Swinhoe, l. c.

Type, ♂, Bihé, W. Africa, in B.M.

Genus ORGYIA, Ochs. Schmett. Eur. ii. p. 208 (1810);
type, *pudibunda*, Linn.

Dasychira, Steph. Ill. Brit. Ent. Haust. ii. p. 58 (1829); type, *pudibunda*, Linn.

Psalis, Hübner, Zutr. ii. p. 19 (1823); type, *securis*, Hübner.

Olene, Hübner, l. c.; type, *mendosa*, Hübner.

Arestha, Walker, iv. p. 805 (1855); type, *antica*, Walker.

Melia, Walker, iv. p. 808; type, *costalis*, Walker.

Anaxila, Walker, iv. p. 810; type, *plagiata*, Walker.

Argila, Walker, iv. p. 811; type, *basalis*, Walker.

Niocha, Walker, v. p. 1069 (1855); type, *fusiformis*, Walker.

Dediana, Walker, v. p. 1074; type, *antica*, Walker.

Rilia, Walker, v. p. 1025; type, *lunceolata*, Walker.

Phineca, Walker, vii. p. 1745 (1856); type, *basistriga*, Walker.

Ilema, Moore, Cat. Lep. E. I. Co. ii. p. 341 (1859); type, *costalis*, Walker.

Anchyneura, Felder, Sitz. Akad. Wiss. Wien, xliii. (i.) p. 33 (1861); type, *præusta*, Felder.

Thelda, Walker, Journ. Linn. Soc. vi. p. 139 (1862); type, *patula*, Walker.

Boreconia, Walker, xxxii. p. 460 (1865); type, *subviridis*, Walker.

Tearosoma, Felder, Reise Nov. pl. c. fig. 6 (1868); type, *aspersum*, Felder.

Twiriga, Walker, Char. Undescr. Lep. Het. p. 15 (1869); type, *invasa*, Walker.

Cadrusia, Moore, Lep. Atk. p. 54 (1879); type, *virescens*, Moore.

Calliteara, Butler, Trans. Ent. Soc. 1881, p. 12; type, *argentata*, Butler.

Eudasychira, Mösch. Abh. Senck. Ges. xv. p. 75 (1889); type, *quinquepunctata*, Mösch.

Pseudonotodonta, Mösch. l. c. p. 76; type, *virescens*, Mösch.

Æcura, Holland, Psyche, vi. p. 339 (1893); type, *goodii*, Holland.

Euproctidion, Holland, l. c. p. 414; type, *gabunica*, Holland.

Notohyba, Holland, l. c. p. 434; type, *striata*, Holland.

Thamnocera, Holland, l. c. p. 454; type, *albinotata*, Holland.

Bathmochtha, Karsch, Ent. Nachr. xxi. p. 368 (1895); type, *albilunulata*, Karsch.

701. *Orgyia pudibunda*.

Bombyx pudibunda, Linn. Syst. Nat. x. p. 363 (1758).

Dasychira pudibunda, Leech, Trans. Ent. Soc. 1899, p. 124; Strand, l. c. pl. xix. d, ♀.

Geometra scopularia, Linn. l. c. i. p. 521 (1758).

Noctua justica, Müll. Faun. Fridr. p. 47 (1764).

Phalena porrecta, Retz. Gen. Spec. Ins. p. 38 (1783).

Bombyx juglandis, Hübner, Eur. Schmett. Bomb. figs. 84, 85 (1800).

Dasychira pudibunda, var. *concolor*, Staud. Cat. Lep. Eur. p. 29 (1861);
Strand, *l. c.* pl. xix. e.

S. Europe; Armenia; Syria; Amurland; Ussuri; N.E. China; Japan.

702. *Orgyia olga*.

Dasychira olga, Oberth. Etude d'Ent. v. p. 34, pl. ii. figs. 1, 2 (1881);
Strand, *l. c.* p. 113, pl. xix. g.

S.E. Siberia.

703. *Orgyia fascellina*.

Bombyx fascellina, Linn. Syst. Nat. i. p. 503 (1758).

Dasychira fascellina, Strand, *l. c.* pl. xix. f.

Bombyx medicaginis, Hübner, Eur. Schmett. ii. fig. 81 (1800).

Dasychira laricis, Schille, Soc. Ent. xiv. p. 403.

Orgyia obscura, Zeller, Ins. Lep. p. 927 (1809).

Dasychira unicolor, Schultz, Entom. Zeit. xxiv. p. 35.

Dasychira nivalis, Staud. Stett. Zg. 1887, p. 97.

Dasychira angelus, Tschelv. Rev. Russe. Ent. iv. p. 77.

Dasychira proletaria, Strand, *l. c.*

Europe; Altai, Mongolia, Vallais; Alai, Transalai, Samarkand, Tian Shan.

704. *Orgyia fortunata*.

Dasychira fortunata, Rog. Vehr. zool.-bot. Ges. Wien, 1891, p. 566;
Strand, *l. c.* pl. xix. g.

Canary Islands.

705. *Orgyia abietis*.

Bombyx abietis, Schiff. Syst. Verz. Wien, p. 55 (1776).

Dasychira mediobscura, Schultz, Entom. Zachr. Stuttgr. xxiv. p. 35.

Dasychira albietis, Strand, *l. c.* pl. xix. g.

Sweden; Russia; Germany; Carpathians; Bohemia; Austria.

706 *Orgyia pseudabietis*.

Calliteara pseudabietis, Butler, Cist. Ent. iii. p. 118 (1885).

Calliteara abietis, Leech (nec Schiff.), P. Z. S. 1888, p. 631.

Dasychira pryerz, Butler, *l. c.* p. 119.

Dasychira pulica, Staud. Rom. sur Lép. iii. p. 204 (1887).

Dasychira modesta, Kirby, Cat. Moths, i. p. 483 (1892).

Dasychira pseudabietis, Strand, *l. c.* pl. xix. h.

Types, ♂ ♀, Japan, in B.M.; Amur.

707. *Orgyia argentata*.

Dasychira argentata, Butler, Trans. Ent. Soc. 1881, p. 12.

Type, Japan, in B.M.

708. *Orgyia selenitica*.

Bombyx selenitica, Esper, Schmett. iii. (2) p. 18, pl. lxxxii. fig. 5, p. 49, pl. lxxxviii. fig. 2 (1783).

Bombyx paradoxa, Fabr. Mant. Ins. ii. p. 130 (1787).

Bombyx lathyræ, Hübner, Eur. Schmett. Bomb. figs. 79, 80 (1800).

Dasychira selenitica, Strand, l. c. pl. xix. b.

Germany; Austria; Russia; Finland.

709. *Orgyia lunulata*.

Dasychira lunulata, Butler, Ann. & Mag. Nat. Hist. (4) xx. p. 403 (1877); Butler, Ill. Het. ii. pl. xxiv. fig. 8 (1878).

Dasychira solitaria, Staud. Rom. sur Léop. iii. pl. xii. fig. 1 (1878).

Dasychira acronycta, Oberth. Etud. d'Ent. v. p. 35, pl. v. fig. 7, ♂ (1881).

Type, Japan, in B.M.; Askold, Vladivostock.

710. *Orgyia virginia*.

Dasychira virginia, Oberth. Diagn. Lep. Askold, p. 7 (1879); Oberth. Etud. d'Ent. p. 33, pl. v. fig. 5 (1881); Wileman, Trans. Ent. Soc. 1911, p. 271.

Askold, near Vladivostock; Japan.

711. *Orgyia dalbergiæ*.

Dasychira dalbergiæ, Moore, P. Z. S. 1888, p. 399; Strand, l. c. pl. xxii. a.

Dasychira kangrana, Strand, l. c. p. 115.

Type, Dharmasala, Khasia Hills.

712. *Orgyia invaria*.

Repena (?) *invaria*, Walker, vii. p. 1724 (1856).

Dasychira inclusa, Walker, vii. p. 1727.

Thelde patula, Walker, Journ. Linn. Soc. vi. p. 140 (1862).

Type, ♂, Philippines; type, ♂, *inclusa*, Java: both in B.M.
Type, *patula*, Sarawak, in Mus. Oxon.; Sumatra, Sumbawa, Hongkong.

713. *Orgyia juncta*.

Dasychira juncta, Wileman, Trans. Ent. Soc. 1911, p. 270; Wileman, The Philip. Journ. of Science, xiii. (4) p. 151, pl. i. figs. 1, 2 (1918).

Type, ♂, Yoshima Yama, Japan, in Coll. Wileman.

714. *Orgyia horsfieldii*.

Arctia horsfieldii, Moore, Trans. Ent. Soc. 1851, p. 162, pl. xii. figs. 1-3.

Dasychira horsfieldii, Swinhoe, Trans. Ent. Soc. 1903, p. 473 (note);

Turner, Proc. Linn. Soc. N.S.W. xlv. (4) p. 497 (1920).

Dasychira arga, Moore, Cat. Lep. E. I. Co. ii. p. 339 (1859).

Dasychira grotei, Moore, *l. c.* p. 338; Strand, *l. c.* p. 115, pl. xxii. a.

Dasychira varia (♀ only), Walker, iv. 868 (1855).

Daschira longipennis, Walker, Journ. Linn. Soc. vi. p. 13 (1862).

Dasychira kansalia, Moore, P. Z. S. 1879, p. 401.

Dasychira nilgirica, Hmps. Ill. Het. viii. p. 58, pl. cxiv. figs. 13, 14 (1891).

Teara farenooides, Lucas, Proc. Roy. Soc. Queensland, 1892, p. 75.

Types *horsfieldii* and *longipennis* should be in Mus. Oxon., but I have been unable to find them. Type, ♀, *grotei*, N. India; type, ♂, *kansalia*, Kasaoli; types, ♂ ♀, *nilgirica*, Nilgiris; types, ♂ ♀, *arga*, Java: all in B.M. Singapore and many parts of India and Ceylon, also in Australia, Cairns, Brisbane.

715. *Orgyia flavimacula*.

Dasychira flavimacula, Moore, P. Z. S. 1865, p. 804; Swinhoe, Trans.

Ent. Soc. 1903, p. 465 (note).

Form *yatonga*, Strand, *l. c.* p. 116.

Type, ♂, Bengal, in B.M.; Sikkim; Yatung, Tibet.

716. *Orgyia securis*.

Psalis securis, Hübner, Zutr. iii. p. 9, figs. 291, 292 (1823).

Dasychira securis, Strand, *l. c.* pl. xxii. c.

Aresta antica, Walker, iv. p. 805 (1855).

Rigema falcata, Walker, xxxii. p. 437 (1865).

Rigema tacta, Walker, *l. c.* p. 438.

Anticyru approximata, Walker, xxxii. p. 440.

Type, ♂, *antica*, Java; type, ♂, *falcata*, Ceylon; type, *tacta*, Australia; type, *approximata*: all in B.M. Australia, Cairns, Rockhampton, Duaringa, Brisbane, Philippines, and many parts of India and Africa.

717. *Orgyia olearia*.

Olene olearia, Swinhoe, P. Z. S. 1885, p. 297, pl. xx. figs. 14, 15.

Types, ♂ ♀, Poona, in B.M.; Nilgiris; Madras; Ahmednagar.

718. *Orgyia fusca*.

Anthora fusca, Walker, iv. 918 (1855), ♂.

Bareconia subviridis, Walker, xxxii. p. 460 (1865), ♀ (nec ♂).

Types, ♂ ♀, S. Africa, in B.M.; Cape; Knysna.

719. *Orgyia albiplaga*.

Dasychira albiplaga, Swinhoe, Ann. & Mag. Nat. Hist. (8) i. p. 62 (1908).

Type, ♀, E. Java, in B.M.; Talaut Island.

720. *Orgyia cæruleifascia*.

Thamnocera cæruleifascia, Holland, Pysche, vi. p. 469 (1893).

Type, ♀, Ogove River, in Coll. Holland; River Niger.

721. *Orgyia robusta*.

Acyphas (?) *robusta*, Walker, iv. p. 799.

Type, ♂, Sierra Leone, in B.M.

722. *Orgyia delicata*.

Notohyba delicata, Holland, l. c. p. 451, pl. xviii. fig. 4.

Type, ♀, Ogove River, in Coll. Holland.

723. *Orgyia citana*.

Utidava (?) *citana*, Schaus & Clements, Sierra Leone Lep. p. 26, pl. i. fig. 10 (1893).

Sierra Leone.

724. *Orgyia punctifera*.

Erastria (?) *punctifera*, Walker, xii. 809 (1857).

Type, ♂, Congo, in B.M.

725. *Orgyia peculiaris*.

Mardara peculiaris, Butler, Ann. & Mag. Nat. Hist. (8) iv. p. 240 (1879).

Type, ♂, Madagascar, in B.M.

726. *Orgyia basistriga*.

Phineca basistriga, Walker, vii. p. 1747 (1856).

Type, ♀, without locality, in B.M.

727. *Orgyia antica*.

Dediama antica, Walker, v. p. 1074 (1855).

Bathmochtha albilunulata, Karsch, Ent. Nachr. xxi. p. 368, pl. iv. fig. 12 (1895).

Type, ♂, without locality, in B.M.; type, *albilunulata*, Cameroons.

728. *Orgyia lignea*.*Nioda lignea*, Butler, Ann. & Mag. Nat. Hist. (5) iv. p. 241 (1879).

Type, ♂, Madagascar, in B.M.

729. *Orgyia basalis*.*Argila basalis*, Walker, iv. p. 811.

Type, ♂, Sierra Leone, in B.M.

730. *Orgyia quinquepunctata*.*Eudasychira quinquepunctata*, Mösch. Abhandl. Senck. Nat. Ges. xv. p. 75 (1887); Kirby, *l. c.* p. 485.

Accra.

731. *Orgyia lignifica*.*Rilia* (?) *lignifica*, Walker, Entom. v. p. 125 (1869).*Olene* (?) *lignifica*, Kirby, *l. c.* p. 488 (1892).

Red Sea.

732. *Orgyia basifurca*.*Anthora basifurca*, Walker, xxxii. p. 335 (1865).*Argila basifurca*, Kirby, *l. c.* p. 491.

Type, Caffraria, in B.M.

733. *Orgyia basigutta*.*Phineca basigutta*, Walker, vii. p. 1746 (1856).

Habitat. ignotus, type, in B.M.

734. *Orgyia orimba*.*Olene orimba*, Swinhoe, Ann. & Mag. Nat. Hist. (6) xiv. p. 435 (1894).

Types, ♂ ♀, Khasia Hills, in B.M.

735. *Orgyia anana*.*Dasychira anana*, Swinhoe, *l. c.* (7) xviii. p. 406 (1910).

Type, Java, in B.M.; Sumatra.

736. *Orgyia pulchra*.*Dasychira pulchra*, Swinhoe, *l. c.* (7) xvii. p. 544 (1906).

Type, ♂, Coomassie, in B.M.

737. *Orgyia postalba*.*Dasychira postalba*, Swinhoe, *l. c.* p. 545.

Type, ♂, Coomassie, in B.M.

738. *Orgyia kanshireiensis*.

Psalis (?) *kanshireiensis*, Wileman, Entom. 1917, p. 146.

Type, ♂, Kanshirei, Formosa, in Coll. Wileman.

739. *Orgyia transversa*.

Nioda transversa, Walker, xxxiv. p. 434 (1866).

Type, Ceylon, in B.M.

740. *Orgyia hieroglyphica*.

Dasychira hieroglyphica, Swinhoe, Trans. Ent. Soc. 1904, p. 144.

Type, ♀, Obuassi, Ashanti, in B.M.

741. *Orgyia præusta*.

Anchyneura præusta, Felder, Sitz. Akad. Wiss. Wien, xliii. (i.) p. 33 (1861).

Arestha præusta, Felder, Reise. Nov. pl. xcix. fig. 5 (1868).

Type, Amboina, in Coll. Rothschild.

742. *Orgyia davidi*.

Nerice davidi, Oberth. Etud. d'Ent. vi. p. 17, pl. ix. fig. 2 (1881);

Kirby, Cat. Moths, i. p. 487 (1892).

China.

743. *Orgyia bipartita*.

Nerice bipartita, Butler, Cist. Ent. iii. p. 119 (1885); Kirby, *l. c.*

Type, Japan, in B.M.

744. *Orgyia asvata*.

Dasychira asvata, Moore, Cat. Lep. E. I. Co. ii. p. 340 (1859).

Types, ♂ ♀, Java, in B.M.; Dinding Isl., Malaya.

745. *Orgyia rendalli*.

Dasychira rendalli, Distant, Ann. & Mag. Nat. Hist. (5) xx. p. 203 (1897).

Type, Transvaal, in Coll. Distant; Natal; Mashonaland.

746. *Orgyia municipalis*.

Lælia municipalis, Distant, *l. c.* p. 200, ♂.

Lacipa diffusa, Distant, *l. c.*, ♀.

Types, ♂ ♀, Transvaal, in Coll. Distant; Cape; Natal; Nyassaland.

747. *Orgyia extorta*.*Dasychira extorta*, Distant, *l. c.* p. 203.*Lymantria hera*, Druce, *Ann. & Mag. Nat. Hist.* (7) i. p. 209 (1898).Type, Transvaal, in Coll. Distant; type, *hera*, Dar-es-Salaam, in Coll. Joicey; Natal; Mashonaland.748. *Orgyia nubifuga*.*Dasychira nubifuga*, Holland, *Psyche*, vi. p. 451, pl. xviii. fig. 33 (1893).

Type, ♂, Ogove River, in Coll. Holland.

749. *Orgyia miserata*.*Ilema miserata*, Holland, *l. c.* pl. xvii. fig. 3.

Type, ♂, Ogove River, in Coll. Holland; Lokoja.

750. *Orgyia ocellifera*.*Cœura ocellifera*, Holland, *l. c.* p. 454, pl. xviii. fig. 5.*Dasychira ocellifera*, Swinhoe, *Trans. Ent. Soc.* 1903, p. 466 (note).

Type, ♂, Ogove River, in Coll. Holland.

751. *Orgyia glovera*.*Dasychira glovera*, Swinhoe, *Ann. & Mag. Nat. Hist.* (7) xvii. p. 545 (1906).

Type, ♂, Entebbe, Uganda, in B.M.

752. *Orgyia rocana*.*Dasychira rocana*, Swinhoe, *l. c.*

Type, ♂, Coomassie, in B.M.

753. *Orgyia pytna*.*Dasychira pytna*, Druce, *Ann. & Mag. Nat. Hist.* (7) i. p. 210 (1898).

Type, ♂, Gambia, W. Africa, in Coll. Joicey.

754. *Orgyia maligna*.*Parorgyia maligna*, Butler, *Cist. Ent.* iii. p. 17 (1882).

Type, ♂, Madagascar, in B.M.

755. *Orgyia phasiana*.*Parorgyia phasiana*, Butler, *l. c.*

Type, ♂, Madagascar, in B.M.

756. *Orgyia chalana*.

Dasychira chalana, Moore, Cat. Lep. E. I. Co. ii. p. 339 (1859).

Lacida costiplaga, Walker, Journ. Linn. Soc. vi. p. 126 (1862).

Type, ♀, Java, in B.M.; type, ♂, *costiplaga*, Sarawak, in Mus. Oxon.

757. *Orgyia misana*.

Dasychira misana, Moore, *l. c.* p. 340, pl. ii. *a*, fig. 2; Snellen, Tijds. v. Ent. xxii. p. 110 (1879).

Type, ♂, Java, in B.M.; Celebes.

758. *Orgyia ostracina*.

Lælia ostracina, Turner, Trans. Roy. Soc. S. Australia, 1902, p. 181.

Dasychira ostracina, Turner, Proc. Linn. Soc. N.S.W. xlv. (4) p. 497 (1920) (note).

Cape York.

759. *Orgyia whitei*.

Æcura whitei, Druce, Ann. & Mag. Nat. Hist. (7) i. p. 209 (1898).

Type, ♂, Old Calabar, in Coll. Joicey; Natal; Durban.

760. *Orgyia goodii*.

Æcura goodii, Holland, Psyche, vi. p. 390, pl. vii. figs. 3, 4 (1893).

Type, ♂, Ogove River, in Coll. Holland; Sierra Leone.

761. *Orgyia libella*.

Dasychira libella, Swinhoe, Trans. Ent. Soc. 1904, p. 145.

Type, ♂, Obuassi, Ashanti, in B.M.

762. *Orgyia costalis*.

Melia costalis, Walker, iv. p. 808 (1855).

Type, ♀, Java, in B.M.; Heipaw, Burma.

763. *Orgyia cuneifera*.

Melia cuneifera, Walker, Journ. Linn. Soc. vi. p. 127 (1862).

Type, Sarawak, in B.M.

764. *Orgyia cromptoni*.

Dasychira cromptoni, Swinhoe, Trans. Ent. Soc. 1903, p. 467 (note).

Type, ♂, Old Calabar, in B.M.; River Niger.

765. *Orgyia anaha.*

Dasychira anaha, Swinhoe, Ann. & Mag. Nat. Hist. (7) xviii. p. 406 (1906).

Type, ♂, Padang, Sumatra; type, ♀, Batavia, Java: both in B.M.

766. *Orgyia bhana.*

Dasychira bhana, Moore, P. Z. S. 1865, p. 804; Swinhoe, Trans. Ent. Soc. 1903, p. 468 (note).

Type, ♂, Darjiling, in B.M.

767. *Orgyia nigrifula.*

Dasychira nigrifula, Walker, xxxii. p. 360 (1865); Swinhoe, *l. c.* (note).

Type, ♂, N. India, in B.M.; Sikkim, Khasia Hills.

768. *Orgyia feminula.*

Mardara feminula, Hmps. Ill. Het. viii. p. 58, pl. cxli. fig. 1-7 (1891).
Dasychira feminula, Swinhoe, *l. c.* (note).

Types, ♂ ♀, Nilgiri Hills, in B.M.

769. *Orgyia magnalia.*

Dasychira magnalia, Swinhoe, Ann. & Mag. Nat. Hist. (7) xii. p. 198 (1903).

Types, ♂ ♀, Khasia Hills, in B.M.

770. *Orgyia cerebosa.*

Lymantria cerebosa, Swinhoe, Trans. Ent. Soc. 1903, p. 483.

Type, ♂, Solon, Simla, in B.M.

771. *Orgyia chloroptera.*

Dasychira chloroptera, Hmps. Moths of India, i. p. 450 (1880).

Type, ♂, Khasia Hills, in B.M.

772. *Orgyia angiana.*

Dasychira angiana, Joicey, Noakes, & Talbot, Trans. Ent. Soc. 1915, p. 382, pl. lxii. fig. 1.

Type, ♂, Arfak Mts., Dutch N. Guinea, in Coll. Joicey.

773. *Orgyia nigra.*

Dasychira nigra, Hmps. Journ. Bombay Nat. Hist. Soc. xiii. p. 416, pl. ii. fig. 19 (1900); Wileman, Trans. Ent. Soc. 1911, p. 270.

Type, ♀, Sikkim, in B.M.; Japan.

[To be continued.]

XXXV.—New Species and Forms of Geometridæ.

By LOUIS B. PROUT, F.E.S.

Subfam. *ÆNOCHROMINÆ*.1. *Dolichoneura missionis*, sp. n.

♂.—34 mm.

Head deep grey, the face browner below. Palpus at base pale brownish. Antennal ciliation slightly over 1. Thorax and abdomen above dark drab-grey, the patagia, tegulæ, and abdomen somewhat marked with brown; beneath, with the legs, pale wood-brown. Tarsal spinules not prominent.

Fore wing dark drab-grey, inclining to slate-grey; a black-brown cell-dot; lines crenulate, russet, with paler brown edgings; antemedian from nearly one-third costa to just beyond one-third hind margin; postmedian from about two-thirds costa to three-fifths hind margin, about parallel with termen, obsolescent at costa; an extensive apical portion (postmedian to termen and costa to R^3 or M^1 , irregularly and indefinitely bounded posteriorly) predominantly light wood-brown or cinnamon, only very feebly shaded with grey (chiefly as a distal boundary to the subterminal); subterminal vaguely indicated on the grey toral area; termen narrowly brown, with two or three blackish interneural dots anteriorly; fringe brown, slightly dark-spotted.

Hind wing with R^2 from one-third DC; dark drab-grey, with the two principal lines of fore wing continued, similarly edged, the antemedian at scarcely one-fourth, the postmedian in middle of wing; cell-dot obsolescent; terminal line brown; fringe mostly dark grey.

Underside pale brown, with a tinge of fawn; some slight grey shadings on both wings, especially on the fore wing in and behind cell; hind margins slightly pallid.

Argentina: Misiones, October. Type in coll. Deutsch. Ent. Mus.

Near *squalida*, Schaus, or fairly near *albidentata*, Warr. A badly damaged ♀ from "Santa Rosa" in coll. Brit. Mus., with more falcate fore wings, seems to belong with it.

Subfam. *HEMITHEINÆ*.2. *Dooabia puncticostata*, sp. n.

♂.—40 mm.

Near *viridata*, Moore, and *lunifera*, Moore, but distinguished by a number of characters.

(Antennæ lost.) Abdomen apparently without the dorsal ornamentation (slightly discoloured).

Fore wing narrower, termen with the anterior excision at least as deep as in *viridata*, posterior half more strongly oblique; costal margin with larger, more conspicuous, dark dots; antemedian line much less regular (angulated behind middle); postmedian rather more proximal, deeply crenulate; cell-dot with larger white pupil; termen with a thicker dark line, which expands into a shallow blotch between the radials; tornal blotch rather large, anteriorly with a pointed proximal projection across M^1 to near R^3 .

Hind wing rather narrower; discal ocellus roundish as in *viridata*, but rather larger; first line obsolete; termen with thick dark line, which expands irregularly into small spots between the veins, and a rather larger one from R^1 to apex.

Underside similar, rather deeper green (at least on hind wing) than in the two Indian species.

Selangor: Bukit Kutu, 3457 ft., April 1915. Type in coll. Brit. Mus., kindly presented by the Raffles Museum and Library.

Generic characters absolutely as given in Gen. Ins. cxxix. p. 68, except that the fore wing has DC rather less deeply incised and R^1 separate, not connate, but this latter, at least, sometimes holds for *lunifera* and probably also for the type-species.

Subfam. STERRHINÆ.

3. *Scopula monosema*, sp. n.

♂.—25 mm.

Related to *pulchellata*, Fab. = *addictaria*, Walk. (cfr. the large form *grandicularia*, Swinh.), structure and shape similar. Antennal ciliation scarcely so long. Hind tarsus relatively a little longer. Face blackish brown, not quite so black as in *pulchellata*. Abdomen with small dark dorsal spots at ends of segments.

Fore wing ochreous whitish, about as in *pulchellata*; antemedian line obsolescent; cell-dot minute, closely followed by narrow grey-brown median shade, which is much less curved baseward at costal end; postmedian nearly as in *pulchellata*, the inward curves still slighter and less blackened; subterminal line accompanied proximally by a black-grey subapical mark as in *pulchellata*, in the rest of its course by an almost uniform, rather indistinct, grey shade, more recalling that of *incanata*, Linn., than the blotched area of *pulchellata*; terminal line as in *pulchellata*, very

fine, slightly thickening between the veins, continued in light brown round the apex, accompanied proximally throughout by a fine whitish line; fringe with a few very minute dark dots.

Hind wing with cell-dot less small than on fore wing; distinguishable from that of *pulchellata* by the less sinuous lines, the postmedian more proximally placed, more denticulate; subterminal line placed between rather uniform greyish shades, the proximal one the less indistinct; termen and fringe as on fore wing, but the terminal line not extending round apex.

Underside distinguishable from that of *pulchellata* by corresponding differences in the lines.

Kashmir (probably at about 1000 feet), on ground, 12 November, 1911 (*Bhup Narain*). Type in coll. Brit. Mus., kindly presented by the Agricultural Research Institute, Pusa.

4. *Scopula tosariensis*, sp. n.

♂.—29 mm.; ♀.—28 mm.

Face black, the lower edge pale. Palpus blackish, pale beneath. Vertex whitish, suffused with pale ochreous. Antennal shaft proximally dark-spotted; joints very slightly projecting, the slender fascicles of cilia little over 1. Thorax and abdomen above whitish ochreous, with some slight dark irroration; beneath paler and clearer. Hind tibia in ♂ just over 3 mm. long, strongly dilated, the hair-pencils white; hind tarsus little over 1 mm., with the first joint little longer than the second (at most 3:2).

Fore wing smooth-scaled, whitish ochreous, with minute (in the ♀ rather stronger) dark irroration, the base slightly more suffused and irrorated; cell-dot minute, black; antemedian line faint, rather strongly oblique outward from one-fourth hind margin to cell-fold, here apparently sharply angled and retracted to costa, but becoming scarcely traceable; median shade rather thick, somewhat recalling that of the European *nigropunctata*, Hufn., similarly formed anteriorly but slightly more oblique still behind the angle and slightly straighter; postmedian line fine and indistinct, about 2 mm. from termen (with the usual sinuosities), dentate, the outward teeth very minutely black-dotted on the veins; subterminal not very sinuous, placed between very weak shades; terminal interneural dots minute, black, with slight traces of dark connecting-line; fringe with ill-defined dark central spots opposite the veins.

Hind wing with apex moderately and tornus strongly pronounced, termen very feebly bent in middle; cell-dot larger than on fore wing, median shade continued, straight, proximal thereto, the rest nearly as on fore wing; terminal line and fringe-spots slightly better developed, postmedian 3 mm. from termen.

Underside whiter. Fore wing suffused, especially in and before cell, between base and median shade; cell-dot, median shade, and a rather firm postmedian line developed, traces also (strong in the ♀) of the subterminal shades; terminal line rather strong. Hind wing with cell-dot and traces (strong in the ♀) of postmedian line; terminal line and dots rather strong.

Java: Tosari, 6 July, 1910 (*E. A. Cockayne*). Type ♂, in coll. L. B. Prout, allotype ♀ in coll. Brit. Mus., kindly presented by the discoverer. Also from Bali, in coll. Tring Mus.

Perhaps nearest in markings to *kagiata*, Bastelb. ('Iris,' xxii. p. 172), as identified by me in Mitt. Deutsch. Ent. Mus. iii. p. 241; but that is a coarser-looking, more strongly marked species, with the ♂ hind tarsus scarcely over $\frac{1}{5}$ of the tibial length.

5. *Anisodes palingenes*, sp. n.

♂.—29 mm.

Head and body concolorous with wings. Vertex slightly pale-mixed in front. Palpus reddish above; terminal joint long. Hind leg long and slender, tibia with a pair of unequal terminal spurs. Abdomen with small dark dorsal spots, the first two the darkest.

Fore wing less broad than in *urcearia*, Guen., termen rather more oblique; areole moderately large, SC⁵ from its apex, R² from slightly before middle of DC; pale fleshy ochreous, with fine and weak darker irroration; markings dark olive-grey, consisting mainly of lines of dots; discal ring very small; a few irregular dots near base, the most conspicuous one just behind base of cell; antemedian series (as in the allies) double, consisting of more proximal ones on margins, C, M, and SM² (the anterior two nearest base), and a more distal pair (aligned parallel with median and postmedian) on the folds; median series rather thicker on all the veins and submedian fold; postmedian smaller and sharper, parallel with median; subterminal and terminal series interneural, the former obsolete in cellules 6 and 3; fringe rather pale, with very minute brown basal dots at vein-ends.

Hind wing slightly narrower than in *urcearia*, termen similarly crenulate; DC³ weak, M¹ from close to R³ but not quite connate; discal ring larger than on fore wing, markings otherwise almost the same, the subterminals not quite obsolete in cellules 6 and 3.

Underside more whitish, especially the distal and posterior parts of fore wing and the whole of hind wing. Fore wing with the cell-mark more oval and thicker-edged than above, the markings beyond suggested, though very shadowy. Hind wings with the markings nearly obsolete, the cell-mark, postmedian, and terminal least so.

E. Peru: Chanchamayo, 1000 m., October–November 1903. Type in coll. L. B. Prout.

Except in the shape—which gives more of the aspect of some of the Indo-Australian species—very similar to *urcearia*, Guen., though with more disparity between the sizes of the discal rings and with no appreciable enlargement of the subterminal dots between the radials. From *stigmatilinea*, Prout (Nov. Zool. xxvii. p. 278), it differs in the absence of the hair-pencil, in the venation of the hind wing, weaker irroration and markings, and rounder cell-rings.

Subfam. LARENTIINÆ.

6. *Triphosa umbrifacta*, sp. n.

♂.—38 mm.

Face with rather long pointed cone of scales. Palpus elongate ($2\frac{1}{2}$), rather heavily scaled, third joint distinct. Antenna with very short ciliation. Abdomen relatively rather short. Head and body concolorous with wings.

Fore wings shouldered at base, here swollen, beneath with a membranous plate overhanging an ample cavity and partly covered by longish hair from base, the retinaculum attached to the plate (section *Strepsizuga*, Warr.); apex scarcely so acute as in *aberrans*, Warr., and *gavara*, Druce, termen rather more curved, slightly waved, but not crenulate; blend of colours nearly as in those species (ochreous-brown marked with red-brown and irregularly clouded in distal half with black-brown); basal patch rather smaller, ill-defined, bordered by a curved line which runs obliquely to hind margin close to base; a pair of moderately distinct lines midway between this and the central band, mostly parallel with termen, straightish; a slightly paler, feebly bisected area between these and central band; central band of medium width, scarcely darkened (slightly clouded with red-brown); antemedian line partly blackened, about vertical from costa,

bending subcostally, thence parallel with termen but subsinuate, the deepest sinus outward at M; five similar lines succeeding, placed on the median band, rather distinct behind M, the middle ones obsolete before M; the last of these lines (the postmedian) slightly more denticulate, more blackened, accompanied distally by whitish vein-dots; the dark clouding of distal area ill-defined, obsolete costally, running to termen about the radials, otherwise strongest proximally to the subterminal line, posteriorly encroaching on central band; subterminal pale line interrupted and feebly lunulate anteriorly, continuous posteriorly, accompanied by a scarcely less pale spot (cloud) between R^3 and M^1 , slightly incurved and thickened between M^2 and SM^2 ; terminal line shallowly lunulate inward between the veins, slightly interrupted by pale dots at the veins; fringe with a pale line at base and ill-defined pale tips, mostly darker between.

Hind wing relatively rather small, otherwise nearly as in *gavara*; concolorous with fore wing or slightly darker, the lines being predominantly black-brown; three broad but not very sharply defined ones on proximal half of wing; postmedian scarcely beyond middle, scarcely curved, formed nearly as on fore wing, accompanied proximally by a dark shade; a slightly paler, indistinctly bisected band beyond, bounded by a denticulate dark line nearly as strong as the postmedian; subterminal interrupted anteriorly, thicker and uninterrupted posteriorly; terminal line and fringe as on fore wing.

Underside rather paler and much more uniform, both wings with a cell-dot and indistinct indications of most of the lines of upperside.

Peru: Chanchamayo, 1000 m., Oct.-Nov. 1906. Type in coll. L. B. Prout. A ♀ from Santo Domingo, Carabaya, 6500 ft., Dec. 1902, wet season (*G. Ockenden*), in coll. Tring Mus.

7. *Scordylia hypophlebica*, sp. n.

♂.—32 mm.

Face somewhat rounded, with dense projecting scales, giving the appearance of a frontal prominence; black, mixed with whitish. Palpus long, black, the projecting hairs beneath first joint greyer, scaling of second joint rather short and close. Vertex and antennæ black, the latter slightly thickened in proximal part, almost simple. Tegula above with an orange spot on each side. Body grey (blackish mixed with white).

Fore wing moderately broad, termen with the curvature in middle well appreciable; all the subcostals stalked beyond the areole (type) or SC^1 just separate (paratype); black, with a rather large (circ. 5 mm. long) white subbasal patch occupying a large part of cell (but not crossing cell-fold in distal part) and the area behind, bounded posteriorly by SM^2 , vein M and fold remaining more or less black; a round white spot between R^3 and M^1 near their origin.

Hind wing white, with a rather broad (circ. 4 mm.) black distal border, which is somewhat sinuous-edged proximally and is costally cut off rather abruptly opposite the bifurcation of SC^2 and R^1 .

Fore wing beneath with the white area extended behind, its distal edge running obliquely (though not quite regularly) from base of M^2 to near tornus; an ill-defined black area beyond, narrow at radials, then broadening so as to embrace the outer white spot, which is as above; the rest brown-grey, with the veins blackened. Hind wing white, with the border as above, but brown-grey, the veins blackened, a small black mark from costa to R^1 at its commencement; a minute cell-dot at anterior end of DC^2 .

E. Peru: Oxapampa, 6400 ft., type in coll. L.B. Prout; Chanchamayo, paratype in coll. Brit. Mus.

Rather noteworthy for the *Devarodes*-like underside.

8. *Erateina haenschi*, sp. n.

♂.—43 mm.

Face black, a very pale yellowish band at side. Vertex black. Postorbital rim and a mark on collar pale yellow. Palpus black, narrowly whitish beneath. Antenna with fascicles of slender cilia about as long as diameter of shaft. Thorax above black, marked with whitish; beneath predominantly pale. Abdomen above blackish, with narrow pale edging to the segments, anal end with large white-yellow spots; beneath buff or reddish, with blackish bands. Fore coxa, fore femur, and middle and hind legs predominantly pale.

Fore wing rather elongate, termen (except near apex) straight, strongly oblique; brown-black, proximally (to about 6 mm. at costa, 8 at hind margin) paler and more olivaceous; a narrow yellowish-white band from close to midcosta towards tornus, mostly 2 mm. wide but tapering behind M^2 , slightly incurved, ending in a point before SM^2 ; fringe mixed with white distally.

Hind wing strongly elongate and produced into a long tail (length of wing from base to end of R^2 17 mm., from

base to tip of tail 33 mm.); no flap beneath; DC extremely oblique, R^2 arising very near R^3 ; brown-black, becoming lighter towards abdominal margin; the band extremely narrow at costa, yellowish white to R^1 , then red-orange, becoming redder, posteriorly slightly irrorated with black, gradually widening, but scarcely 3 mm. wide before commencement of tail, in which it again tapers, ending in a point 6 mm. before extremity; distal part of abdominal margin and proximal part of tail behind the red band blackish, containing four yellow-white, anteriorly red-edged spots; end of tail and its anterior fringe white.

Fore wing beneath similar to those of *julia*, Dbld., etc. Hind wing beneath with the ground-colour redder than in that species and almost uniform in tone, the pale band almost uniform in width (circ. 1.5 mm.) from costal margin to the acute angle near tornus, then narrower.

Ecuador: Santa Inéz (*R. Haensch*), type in coll. Deutsch. Ent. Mus., received through W. Neuburger; Balzapamba, a ♂ in coll. Tring Mus.; Paramba, a ♀ in the latter collection, similar but with rather shorter tail.

Possibly a subspecies of *staudingeri*, Snell. (Tijd. Ent. xxi. p. 150, t. viii. figs. 14-16), with the band of fore wing slightly narrower, the red of hind wing much more restricted, the black between it and abdominal margin more extended, black streak on tail broader, white of tail more extended. Snellen's locality "Peru," suggested with a query, was certainly erroneous; like his *Heterusia dividata*, received from the same source, it will probably have been from Chiriqui (*cf.* Druce, Biol. Centr.-Amer., Lep. Het. ii. p. 180). But the tail seems a little longer than in *staudingeri*, and a form which I believe to be the Colombia race thereof has the bands *broad*, that of hind wing more orange than in *haenschi*.

9. *Gymnoscelis inexpressa*, sp. n.

♀.—20 mm.

Face with rather strong cone. Palpus almost 2, the scales forming projecting tufts, predominantly blackish. Head and body concolorous with wings, or slightly more whitish beneath; abdomen rather elongate, the crests (on somites 2-7) all well developed, rather pale.

Fore wing slightly more elongate than in the type-species (*pumilata*, Hb.); areole long, SC^1 arising beyond two-thirds of it, anastomosing fairly strongly with C, R^1 about connate; almost uniform fawn-colour, the veins dotted here and there with black; most of the waved lines almost obsolete,

only the antemedian and postmedian distinct, and even these not very strong, grey with a slight olivaceous tinge; antemedian from costa at nearly one-third, excurved (and very slightly angulated) in cell, more oblique inward posteriorly than anteriorly; postmedian from costa at about two-thirds, slightly oblique outward at first, incurved between the radials, very slightly lobed about R^3-M^1 , then about parallel with termen, irregularly lunulate-dentate throughout, the inward teeth with minute black dots on the veins; cell-dot darker, slightly elongate; a faint waved median line suggested from it to hind margin; terminal line weak, almost obsolete posteriorly; fringe almost unicolorous.

Hind wing somewhat elongate, apex nearly rounded, termen scarcely waved, strongly convex; cell-dot indicated, but very weak; only the postmedian line distinct, similar to that of *pumilata*, but finer and rather less bent in middle.

Underside paler, rather glossy; both wings with slightly elongate cell-mark, in some lights also slight indications of the postmedian line and (at least on hind wing) of a dusky subterminal band.

Assam: Shillong, 5000 ft., Oct. 1916 (*T. B. Fletcher*). Type in coll. Brit. Mus., presented by the Agriculture Research Institute, Pusa.

A ♀ from the same district in coll. Brit. Mus., rather smaller, broader-winged, and darker, seems to belong here, though the projecting scales of the palpus are mostly lost, presumably by abrasion.

10. *Eupithecia subinduta*, sp. n.

♂ ♀.—19–24 mm.

Head and body light grey, irrorated with brown, the abdomen pale beneath, darkened posteriorly. Palpus heavily scaled, in ♂ rather less, in ♀ more, than twice as long as diameter of eye. Antenna of ♂ somewhat lamellate, with short (scarcely $\frac{1}{2}$), even ciliation. Fore tibia and tarsus infuscated on upper and inner sides, pale-spotted at ends of joints.

Fore wing strongly elongate (shaped much as in *innotata*, Hufn., or with costa and termen slightly straighter, angles slightly less rounded); pale grey, slightly irrorated with brown; the lines numerous, brown, mostly very weak and confused, inclined (especially in proximal area) to break up into irroration; in well-marked specimens eleven may be counted, the proximal ones curved near costa, then parallel with termen but more or less sinuate, especially the sixth,

the distal three commonly a little more distinct, the approximated pair which represent the postmedian sharply broken near the costa (as in *innotata*), thence nearly straight, separated from the last line by an appreciably pale line or narrow band, the last line followed distally by indefinite dark shading; cell-dot weak; terminal line blackish, interrupted at the veins, slightly thickened between; fringe very slightly darker in proximal than in distal half.

Hind wing elongate; abdominal area concolorous with fore wing or rather darker, with the beginnings of lines, a narrow terminal area also a little darkened in the ♀; the rest almost unmarked, in the ♀ quite pale, in the ♂ densely covered with coarse, slightly erect scales of an ochreous-brownish tinge, apparently specialised in correlation with similar scales on hind-marginal area of fore wing beneath.

Both wings beneath with longer and stronger cell-marks; fore wing in costal, apical, and distal areas with the markings of upperside more or less reproduced, hind wing quite pale, with similar markings.

Ecuador: Riobamba, 3 ♂♂, 17 ♀♀. Type ♂, allotype ♀, and others in coll. Deutsch. Ent. Mus., 1 ♂, 2 ♀♀ in coll. L. B. Prout, kindly presented by the Museum.

Subfam. *GEOMETRINÆ*.

11. *Opisthograptis swanni*, sp. n.

♂.—55 mm.

Head yellow, cheek with a brown spot, which is continued on patagium; face without projecting scales. Palpus scarcely $1\frac{1}{4}$, third joint quite short; brown. Antenna serrate, with quite short fascicles of cilia; shaft proximally brown, distally whitish. Thorax, abdomen, and legs yellow (fore legs lost); middle and hind legs with tips of femur, tibia, and tarsus mostly brown; all spurs brown.

Fore wing ample; SC^{1-2} long-stalked, separating little before origin of SC^5 ; yellow, with some excessively shadowy interneural greyish spots; markings red-brown, clouded in part with dark purple-grey (as is the darker aberrations of *tridentifera*, Moore); a very small basal patch in costal half, continued as a spot on patagium; antemedian line represented by short dashes on both margins and minute dots on M and SM^2 ; an extremely large, roundish blotch beyond middle, from costa to near M^2 , its longitudinal diameter about 8 mm., one-third in the cell and two-thirds beyond, its distal edge slightly dentate outward on the radials and M^1 , a minute white discocellular dash in this blotch at base of R^2 ; a small

spot in cellule 6, almost coalescing with blotch; a row of minute postmedian vein-dots near termen, arising from a thick dash on costa; still minuter terminal vein-dots.

Hind wing without basal or antemedian markings; discal patch very much smaller than on fore wing, reaching from SC^2 almost to hinder end of DC^3 , slightly concave on distal side, the discocellulars in its middle; postmedian row of dots more proximal than on fore wing, especially posteriorly, terminating in a spot on SM^2 , but with none costally; an extremely shadowy macular greyish band just proximal to the postmedian; fringe spotted at the vein-ends.

Underside similar, but with the postmedian wanting, except for the costal spot of fore wing, which here gives birth to a rather weak, but rather thick, lunulate-dentate subterminal greyish line, which on both wings shows some minute vein-dots on the (distal) points of the teeth.

N. Burma: Hparé Valley, near the Chinese frontier, 5500 ft., 29 Aug., 1922 (*Capt. Arthur E. Swann*). Type in coll. L. B. Prout, kindly presented by Rev. C. R. N. Burrows.

A very fine species, evidently near *tridentifera*, but larger, with much larger blotches and with quite different antenna.

12. *Macaria unigeminata*, sp. n.

♂.—28 mm.

Face with rather sharp, white-mixed cone. Palpus moderate (about $1\frac{1}{2}$), the rough scaling of its underside mixed with white. Antenna with the ciliation even and rather slender, about as long as the diameter of shaft. Hind tibia not dilated. Head and body in general colourous with wings.

Fore wing shaped nearly as in *lalaria*, Walk., the termen scarcely even so appreciably concave in anterior half as in that species; SC^1 arising from C, anastomosing with SC^2 ; white, very closely marked with fine, largely confluent (especially transversely), dark strigulation, leaving only numerous very small spots of the ground-colour; distal area more solidly drab, except for a few small white spots in the middle and posteriorly close to termen; cell-dot not sharp; costal edge irregularly dotted with black, which coalesces into short streaks at the origin of the lines; these indistinct, the median diffuse; antemedian very oblique outward from one-fifth costa, acutely bent in cell, then slightly sinuous; median from beyond two-fifths, strongly excurved beyond cell and strongly inbent at fold; postmedian oblique outward to R^1 , this part blackened and almost meeting a

conversely oblique brown (posteriorly black) shade beyond, much as in *notata*, Linn., *natalensis*, Warr., and others of the genus, the rest of its course irregularly lunulate-dentate; a single pair of quite small black postmedian marks (the outer slightly elongate) in cellule 3, the pair which usually accompanies it in cellule 4 in *lataria* and the allies obsolete, only a few black scales indicating the position of the proximal one; termen with rather weak interneural dots; fringe with pale line at base, then feebly mottled.

Hind wing shaped as in *lataria* (termen only feebly bent at R^3); median and postmedian lines stronger than on fore wing; cell-dot strong, no other black markings; distal area almost uniformly drab.

Underside with the reticulations much coarser, sparser, and darker than above, the line also strong and dark; proximal area (to median shade) and veins tinged with bright ochreous-brown; distal area strongly contrasted; that of fore wing with a bright brown anterior cloud beyond the postmedian, crossing R^2 , some blackish-fuscous clouding therein, especially in cellule 6 proximally, and blackish-fuscous clouds at termen anteriorly (tapering to points at apex and about R^3) and behind R^3 near the postmedian (widening to tornus), leaving white subapical dash and posterior blotch; that of hind wing with irregular blackish-fuscous subterminal band, widening gradually to radial fold, then suddenly narrowed to only about 1 mm. width, the retrocession being on its distal side.

Cameroons: Bitje, Ja River, September. Type in coll. Deutsch. Ent. Mus., received through A. Heyne.

Extremely similar on upperside to some Cameroons forms of the variable *lataria*, Walk., the difference from which I have named it perhaps inconstant; but, as that has the ♂ hind tibia dilated, there can be no question as to its specific distinctness. The British Museum has a lighter ♀ of, apparently, the present species from Lagos, rather more ochreous-brown, lines still weaker both above and beneath, fore wing beneath with apex more broadly pale.

13. *Macaria exsuperans*, sp. n.

♂ ♀.—41-44 mm.

Face with rather long but thin projecting tuft below; dark brown. Palpus about $1\frac{3}{4}$, second joint tufted above; blackish brown, beneath pale ochreous-brown. Antenna of ♂ subserrate-fasciculate, the cilia fine, slightly longer than

diameter of shaft. Hind tibia of ♂ not dilated. Head and body concolorous with wings.

Fore wing with termen faintly waved, scarcely concave between SC^5 and R^3 , the bend at R^3 very slight; SC^{1-2} coincident, free or anastomosing at a point with C; whitish or ochreous-whitish, densely irrorated (but variably, according to the individual) with brown; lines dark brown; ante-median from costa at about 5 mm., very oblique outward to SC, thence somewhat oblique inward, its costal end generally thickened; cell-dot black, not minute; median shade rather diffuse, thickest in anterior part, where it curves round (in one specimen across) the cell-dot; postmedian arising from costa about 6 mm. from apex, almost vertical at first but curving so as to become extremely oblique outward, forming an acute angle at R^1 about 2 mm. from termen, then oblique inward and almost straight to hind margin 5-6 mm. from tornus; a small round whitish spot in cellule 6 just outside the angle of postmedian; a subterminal row of ill-defined dark spots between the veins; terminal dots slightly elongate, not very strong; fringe scarcely mottled.

Hind wing with termen waved or subcrenulate, and with more marked teeth at SC^2 and R^3 ; slightly paler (less densely irrorated) than fore wing; first line obsolete; median shade continued, but generally faint, proximal to or crossing the cell-dot, which is here generally minute; postmedian line rather fine, straight, weakest anteriorly; subterminal spots obsolescent anteriorly, rather large and more or less confluent posteriorly, but still not sharply defined; termen and fringe as on fore wing.

Underside equally variable, for the most part similarly coloured and marked, but with proximal half of fore wing more suffused; both wings with the tawny shades beyond the postmedian (characteristic of so many *Macaria*) generally well developed, inclined to diffuse towards termen; white subapical spot of fore wing well expressed.

Java: Tosari, Tengger Crater, 5-6 July, 1910 (*E. A. Cockayne*), 3 ♂♂, 2 ♀♀, in coll. L. B. Prout, presented by the discoverer.

The typical ♂ form is suffused in bands accompanying the lines, while a ♂ ab. is almost wholly dark-suffused. The ♀♀ have the ochreous tint more pronounced; one is rather sharply marked above and beneath, the other very weakly. Easily recognizable in all the forms by its large size.

14. *Macaria elongaria*, Leech, ♀.

Macaria elongaria,* Leech, Ann. & Mag. Nat. Hist. (6) xix. p. 308 (1897), ♂ (Moupin).

Of this apparently scarce species, Mr. C. T. Bowring has sent me 2 ♂♂ and 1 ♀, collected at Yachiaolin, E.S.E. of Ichang, by Père Van der Voorden. The ♀, hitherto unknown, is (as in some others of the genus, e. g. *avitusaria*, Walk.) broader-winged than the ♂, with the termen of the fore wing less strongly oblique, the dark cloudings in the distal area of both wings strong both above and beneath; in addition, the teeth in the termen of the hind wing are slightly stronger.

15. *Macaria vandervoordeni*, sp. n.

♂ ♀.—31–32 mm.

Head yellowish, spotted with brown. Face with small pointed cone below. Palpus about $1\frac{1}{2}$. Antennal ciliation in ♂ short (scarcely $\frac{1}{2}$), even. Thorax and abdomen concolorous with wings, the abdomen pale beneath. Hind tibia in ♂ moderately dilated, with hair-pencil.

Fore wing with excision in termen scarcely perceptible (shape of *estimaria* group); SC^{1-2} coincident, free; whitish buff, somewhat suffused with ochreous and with violet-grey, the irroration violet-grey, rather coarse and irregular; costal edge irregularly dotted; lines moderate, grey, mixed with ochreous; antemedian at three-tenths, angulated outward in cell; median angulated outward near costa, passing just outside (sometimes touching) the weak, rather elongate, grey cell-mark, slightly incurved at fold; postmedian from costa 3 or 4 mm. from apex, vertical (or even very slightly oblique inward) to R^1 , here quite feebly bent, thence straightish or extremely slightly lunulate-dentate to hind margin about 4 mm. from tornus; a pale line accompanying the postmedian distally; paired black marks at R^3 proximally and distally to the postmedian, the two before the vein always very small (the distal one sometimes evanescent), the two behind it stronger, especially the distal, which is about 1 mm. long; faint indications of an interrupted whitish subterminal, accompanied proximally by some slight grey shading, most distinct costally; apex whitish; terminal line fine, black, interrupted at the veins; fringe weakly mottled.

Hind wing with termen subcrenulate, weakly bent at R^3 (as in *estimaria* group); cell-dot rather more distinct than on fore wing, less elongate; median line well proximal thereto, incurved in cell; postmedian continuing that of

fore wing, rather more crenulate, weakly bent before R^1 , slightly curved outward at abdominal margin; subterminal much as on fore wing, but bent in middle; terminal line and fringe as on fore wing.

Underside much suffused with bright yellow-ochre, leaving a quadrate apical spot and the posterior region of fore wing, most of the distal and abdominal margins of hind wing, and a patch between the radials of hind wing at their base whitish—sometimes other slighter, less defined, and more variable whitish spots or patches indicated; markings rather heavy, the postmedian and sometimes the median line irregularly double.

Central China: Yachiaolin, 30 miles E.S.E. of Ichang, 1922 (*Père Van der Voorden*), 3 ♂♂, 3 ♀♀, in coll. L. B. Prout, kindly presented by C. Talbot Bowering, Esq., Ichang, June 1922, 1 ♂ subsequently received from the same donor.

16. *Cleora grisea vandervoordeni*, subsp. n.

♂.—Both wings less irrorated with black-grey, the light violet-grey ground-colour and the brown shadings consequently more manifest, the median shade brown rather than black-grey, rather more distally placed (but often obsolete, or nearly so, in both races). Fore wing with the cell-dot weaker; postmedian less bent outward at the radials, especially on the underside, where its course is comparatively straight throughout, forming only a couple of very gentle curves, the anterior one outward, the posterior inward.

Central China: Yachiaolin, 30 miles E.S.E. of Ichang, 1922 (*Van der Voorden*), 2 ♂♂, in coll. L. B. Prout, presented by C. Talbot Bowering, Esq.

Although hitherto overlooked, this appears to be the regular Chinese race of *grisea*, Butl. (*Ann. & Mag. Nat. Hist.* (5) i. p. 396, Japan), as the British Museum has a ♂ from Ningpo, a ♂ from Kiukiang, and a ♀ from Chungking. It may even prove a separate species.

17. *Bronchelia repressa*, sp. n.

♂.—51–59 mm.

Face brown. Palpus rather short; brown, dark-mixed on outer side. Vertex and collar pale brown. Antennal pectinations moderately long, continuing to about the 37th joint. Thorax and abdomen light brown, the thorax mixed with whitish. Legs mostly pale, the anterior slightly infuscated; hind tibia not dilated.

Fore wing slightly less elongate than in the *fraternaria*

group, termen slightly smoother and more regular; SC^{1-2} very shortly stalked or exceptionally just separate, SC^2 in one examined specimen anastomosing slightly with SC^{3-4} ; whitish, with the irroration fairly close but rather uneven, olive-grey and ochreous-brown, the general tone less warm than in most of the brown species; cell-spot moderate; lines somewhat thickened at the costa, especially the median, which is here opposite, or almost proximal to, the cell-dot, then makes a moderately strong curve just outside or across it, then runs straighter than in most of the allies (approximately parallel with termen) to hind margin; the other lines somewhat as in *fraternaria*, Guen., but with the postmedian more inbent in front of R^1 , its distal duplication feeble throughout, the teeth of the subterminal shorter and more rounded.

Hind wing with the termen only moderately crenulate; cell-dot not strong; median line rather thin, crossing cell-dot or well proximal thereto; outer markings normal.

Both wings beneath whitish. Fore wing with the costa ochreous, with some dark spots and irroration; the irroration on the rest of the wing mostly weak; cell-dot and ante-median line indicated, also the anterior part of postmedian; a distal bordering of dense dark irroration about 3 mm. wide (slightly more anteriorly) from costa to M^2 , often including at its proximal edge a denser dark line. Hind wing almost unmarked, except for a narrow incomplete subterminal shade, which does not reach abdominal margin and oftenest fades out about the middle of the wing.

Paraguay: Sapucay (*W. Foster*), type in coll. L. B. Prout, dated 29 October, 1903, many other ♂♂ in various collections. Also occurs in Brazil (Sao Paulo, Castro, Porto Alegre) and in N. Argentina (Misiones).

Seems to have been constantly misidentified as *transitaria*, Walk., of which the type (from San Domingo) is shaped as in ordinary *fraternaria* or rather longer-winged.

The ♀♀ (S.E. Brazil, ex coll. E. D. Jones) are rather larger and paler, weakly marked.

18. *Pseudomiza argentilinea eugraphes*, subsp. n.

♂.—38 mm.

Both wings above and beneath more strongly marked than in *a. argentilinea*, Moore (Proc. Zool. Soc. Lond. 1867, p. 617, as *Drepanodes*), from N. India, the "narrow silvery band" (which in the Sikkim and Khasi specimens before me widens appreciably on the fore wing posteriorly) reduced to an inconspicuous line; fore wing with the oblique line

between cell-dot and hind margin thick and black (in both forms this line—which is sometimes so weak that Moore overlooks it and which Hampson, Faun. Ind. Moths, iii. p. 237, calls “waved”—is angulated inward on M).

N. Burma: Htawgaw, 6000 ft. 22 August, 1922 (*Capt. Arthur E. Swann*). Type in coll. L. B. Prout, presented by Rev. C. R. N. Burrows.

This may possibly prove merely a remarkable aberration, but, in addition to the geographical probabilities of a racial difference, it is to be noticed that in this specimen SC¹ of fore wing anastomoses at a point with C, while in all the six N. Indian examples which I have examined, as well as in the Bhután which Hampson describes, it is well free.

19. *Plutodes moultoni*, sp. n.

♂.—41 mm.

Head and body coloured as in *costatus*, Butl.; antennal pectinations the same.

Fore wing very slightly narrower than in *costatus*, termen (as in that species) almost evenly rounded; SC¹ just stalked with SC²⁻⁵, anastomosing with C; ground-colour the same, but without the rufous suffusions at its edges; yellow costal area bounded posteriorly by cell-fold as far as end of cell, except for a very small triangular projection as in *costatus*; the yellow triangle beyond cell truncate, not quite (as in *costatus*) reaching R³; distal area all yellow, separated from the costal triangle and the ground-colour by an ill-defined orange suffusion; no lines; a pair of subterminal black spots, one on SC⁵, the other on R¹; fringe uniform yellow.

Hind wing slightly less broad than in *costatus*; ground-colour nearly as in that species, without noticeable reddish suffusion, but with coarse, slightly irregular, dark strigulæ; a yellow distal border, very narrow from tornus to R³, then gradually widening, so as to become, near apex, about twice as broad as that of *costatus*; fringe yellow.

Fore wing beneath pale yellowish, except behind M and M², where it is coloured more as above, this patch bounded by a (proximally ill-defined) curved dark streak from near base of medians to hind margin near tornus; terminal area more whitish yellow. Hind wing with basal area slightly paler than above, terminal area whitish yellow for about 2 mm., the rest of the wing occupied by a very large, dark fuscous blotch.

Selangor: Bukit Kutu, 3457 ft., April 1915. Type in *Ann. & Mag. N. Hist.* Ser. 9. Vol. xi. 21

coll. Brit. Mus., presented by the Raffles Museum and Library, to whose energetic Director, Major J. C. Moulton, O.B.E., T.D., B.A., M.Sc., I have dedicated the species.

20. *Plutodes warreni*, sp. n.

Plutodes costatus, Warr. Proc. Zool. Soc. Lond. 1893, p. 388 (nec Butl.).

Smaller than *costatus*, Butl. (= *triangularis*, Warr.), antennal pectinations rather less long, colouring slightly paler, antemedian triangle larger, with antemedian line from its distal side, postmedian triangle normally narrower than in *costatus*, variable, very occasionally continued narrowly to join tornal patch; apical patch of hind wing separated from ground-colour by a "manifestly sinuous" (or indented) dark line; underside more weakly marked, the oblique dark central line of fore wing almost obsolete.

N.W. India: Sabathu, type ♂ and 4 ♀ ♀ in coll. Brit. Mus., 1 ♂ in coll. Tring Mus.

To Mr. Warren belongs the credit of discovering that there were two species mixed under the name of *costatus*, Butl., but he unfortunately overlooked that the true *costatus* (Darjiling) was the same form which he so carefully differentiated as *triangularis* (*loc. cit. supra*, Sikkim and Assam), and that it was the N.W. Himalayan which really required a name.

XXXVI.—Notes on *Arctonyx*.

By EINAR LÖNNBERG, F.M.Z.S. &c.

Arctonyx leucolæmus milne-edwardsii, subsp. n.

IN his well-known work 'Recherches des Mammifères' (1868-1874) A. Milne-Edwards mentions and shortly describes (p. 340) a specimen of *Arctonyx*, which he had received from southern Shensi among other collections from "M. l'abbé David." One of the most important characteristics of the skull of this animal was that it was provided with a small premolar more than other specimens of *Arctonyx*.

The R. Nat. Hist. Museum in Stockholm has recently received a specimen of *Arctonyx*, which has been collected 15. x. 1921 in the Minshan Mountains in southern Kansu by

Mr. D. Sjölander. The skull of this one is provided with a small p^1 and a similar p_1 on both sides, thus agreeing with Milne-Edwards's specimen. The latter is somewhat larger than our specimen, which, however, may be due to the fact that the specimen from Minshan is a female. The absolute identity is not proved, but the close relationship is apparent, and, as this *Arctonyx* is without name, I take the liberty of dedicating it to the author quoted. The specimen from Kansu, which is to be regarded as the type, may be described as follows:—

General colour much darker even than that of *A. l. obscurus* from Eastern Tibet—in fact, black above, only grizzled, with brownish-white tips to the hairs on a patch on the upper neck and on the hind-quarters, the white underfur being quite covered by the entirely black hairs. The creamy-white fronto-nasal band practically ceases a little behind the eyes, but is to some extent continued by some whitish-tipped hairs which are scattered mesially to the above-mentioned grizzled patch on the upper neck. The black band through the eye extends forwards to the edge of the upper lip, which is brownish black to the angle of the mouth, and there continuous with the black of the chin and the interramial space. The light mark below the eye consists of a horizontal brownish-white streak, more brownish in its posterior part. The ear-rim is rather broadly pure white. The light throat-patch is creamy white, thus lighter or more whitish than the same of *A. obscurus*, according to Milne-Edwards's figure of the latter. The lower parts behind the throat are black, with a sparse brownish-grey underfur on the belly. Legs and feet black, claws pale horn-coloured. Tail brownish white basally, quite white towards the tip.

Head and body 68, tail 14 cm.

Skull: condylo-basal length 123 mm.; basal length 112; greatest breadth 70; interorbital breadth 27; palate-length to one of the posterior corners 90.5, mesially 79; breadth of brain-case 47.6; mastoid breadth 69; greatest diameter of m^1 13.8.

Thomas, in 1911, described a new subspecies—*Arctonyx leucolemus orestes*—from Tsin-ling Mountains, S.W. Shensi. This is evidently very different from the Kansu race as well with regard to the colour-pattern as with regard to size. In opposition to the specimen from Minshan, S. Kansu, which appears to be one of the darkest, *A. l. orestes* is very light-coloured, with white upper lip, white interramial space, etc., and with the back "more broadly washed with whitish than

appears to be the case in *leucolæmus*." The type of *orestes* being a "young adult" female, its cranial measurements are directly comparable with those of our specimen from Kansu. The latter prove, however, to be very much smaller in every dimension. Especially noteworthy is the difference in size of m^1 , the greatest diameter of which is 16 mm. in *orestes*, but only 13·8 mm. in the present specimen from Kansu. This, together with the great differences in colour, convinces me that these two forms of *Arctonyx* are quite distinct from each other.

Quite recently Jacobi*, when describing the mammals of Stötzner's expedition to China, has pointed out that the coloration etc. of *A. obscurus* is subjected to considerable variation, and he has also had a specimen, which he refers to this species, which has the whole back black. It is rather difficult to express any opinion in this case, as the author

Fig. 1.

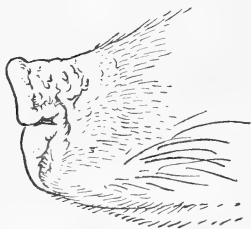


Fig. 2.

Fig. 1.—End of snout of *Arctonyx*, lateral view.Fig. 2.—Rhinarial disk of *Arctonyx*.

quoted has not recorded any measurements of skulls and teeth etc. It might be possible that, when more material has been examined, the present specimen may prove only to represent a variety of *A. obscurus*; but, on the other hand, the development of local races in a country with such natural conditions as western China is almost to be expected.

As the specimen from Kansu is in a very good state of preservation, I am able to add some remarks about structural details, which may be of more general interest than the description of a subspecies.

Blanford's description of the snout of *Arctonyx*—"long, mobile, naked towards the end, and truncated, the terminal

* Abh. u. Ber. d. Mus. f. Tierk. u. Völkerk., Dresden, 1922, Bd. xvi. Nr. 1.

disk containing the nostrils being much like that of a pig"—appears to be very suitable for this species as well. This organ is thus rather different from that of *Meles*, as also is proved by the accompanying figures (figs. 1 and 2), which have been drawn from the present specimen*. The upper side of the snout behind the rim of the disk is more broadly naked than in *Meles*. The upper lip below the disk is, although sharply defined from the same, almost naked, only beset with a few scattered short and coarse hairs.

The facial vibrissæ appear to be rather reduced in number. I cannot see but two above the eye, and on the cheeks only one corresponding to the lower genal tuft.

Fig. 3.



Fig. 4.

Fig. 3.—Left fore foot of *Arctonyx*, showing arrangement of pads.Fig. 4.—Left hind foot of *Arctonyx*, " " "

The fore feet of *Arctonyx* (fig. 3) are, of course, fossorial, with big claws, but their structure differs evidently from that of the genera *Meles*, *Taxidea*, and *Mellivora*, as those are described by Pocock (1920). The digits are connected about to the middle of the digital pads. The pollex is set further up the foot than the other digits, which are almost on a level with each other, but the former is as closely connected to the side of the foot as the others *inter se*. The digital pads are well defined, and the space between them and the plantar

* The median groove at the lower side of the rhinarial disk *might* be an artefact produced by the drying of the skin.

pads is naked. The latter are irregular in shape, but quite well defined all round, and thus exhibiting a condition different from that in *Meles* and other genera of badgers (*vide* Pocock). The plantar pad behind the pollex is the smallest, and the one on the outer side the largest. Behind the plantar pads follow after an interspace two carpal pads (as in *Meles*, but unlike *Taxidea*), the outer of which is much the larger, and also more pronounced. The whole plantar surface is naked; thus the characteristic tuft of hair found in the interspace between the plantar and carpal pads of *Meles* is missing*.

The hind foot (fig. 4) is in every dimension smaller than the fore foot, and has also smaller claws, although they appear to be comparatively rather larger and more fossorial in shape than those of *Meles*. Digits 3 and 4 sit on a level, then follows the second, while the fifth is somewhat behind those mentioned, and the hallux still more so. Unlike the condition in *Meles*, the pads of digits 3 and 4 are fully separated, even if the toes themselves sit a little closer together than the others. The space between the digital and the plantar pads is naked, and the latter are four in number, quite well defined, unlike in *Meles*, etc. The plantar pad on the hallucal side is the smallest, and that on the opposite side the largest. Behind these pads is a naked space, and then two metacarpal pads are found which are quite well defined, but the one on the outer side is much the larger. With regard to the metacarpal pads as well *Arctonyx* thus differs from *Meles*, and still more so from *Taxidea* and *Mellivora*, which two latter genera, as Pocock has shown, only have a single metacarpal pad.

The author just quoted shortly mentions (P. Z. S. 1920, i. p. 426) unpublished sketches of the feet of *Arctonyx*, which have been drawn by Hodgson, and which are said to "resemble the feet of *Meles* in general features." The description above may prove that the differences are rather important, and that *Arctonyx*, as well by the structure of its feet as with regard to its skull, is very well defined from *Meles* and the other genera mentioned above. The structure of the feet of *Arctonyx* may be considered to be less specialized, as its pads are hardly ever fused, but retain a more primitive condition. In this it resembles to some degree *Helictis*.

* I have stated the presence of this tuft also on the fore feet of *M. leptorhynchus* from China, so that it is certainly a generic character.

XXXVII.—*The Systematic Position of the Burmese Fish Chaudhuria*. By N. ANNANDALE, D.Sc., F.A.S.B., Director, and SUNDER LAL HORA, D.Sc., Assistant Superintendent, Zoological Survey of India.

[IN 1918* I described a minute eel-like fish from the Southern Shan States which I called *Chaudhuria caudata* and regarded as a type of a distinct family (Chaudhuriidæ) of primitive Apodes. Mr. Whitehouse † at the same time was kind enough to prepare an account of the structure of the tail, which in his opinion was that of a typical eel. Shortly afterwards, Mr. Tate Regan wrote to me pointing out that in certain respects my description and figures indicated that *Chaudhuria* was rather related to *Mastacembelus*. He courteously invited me to re-examine my material. This I was unable to do at the time, as I was just starting for Eastern Persia on special war work. Mr. Tate Regan ‡, therefore, published a note definitely assigning my genus to the Opisthomi.

On a second visit to the Inlé Lake early in 1922, Dr. Sunder Lal Hora and I obtained abundant fresh material of *Chaudhuria*. This we have examined anatomically, comparing it in detail with specimens of *Mastacembelus*.—N. A.]

IN order to discover the exact taxonomic position of *Chaudhuria* we have paid special attention to the skull, the pectoral girdle, the gross structure of the alimentary canal, and the air-bladder.

External characters.—We have nothing to add to or change in the original description, except as regards the existence of scales. These were said to be present and described as minute and buried in the skin. Re-examination of both old and new preparations convinces us that this was an error. In certain regions there is a kind of reticulation in the pigment, but no true scales appear to exist.

Skull.—In dorsal view (fig. 1, A) the skull only differs from that of *Mastacembelus* in the relative proportions of the various bones, in the great development of the otic region, and in the fact that the occipital region is nearly horizontal. The ethmoid is slightly expanded on either side in front, and its lateral posterior region projects strongly on either side in the form of an acute triangle. The nasals are large and expanded. The frontals are large and broad, with the orbital margin strongly sinuate, but with a greater part of the lateral outline straight and almost parallel on the two sides. The central suture is slightly sinuate in front, but not otherwise asymmetrical. Posteriorly the two bones form a broad transverse suture on either side

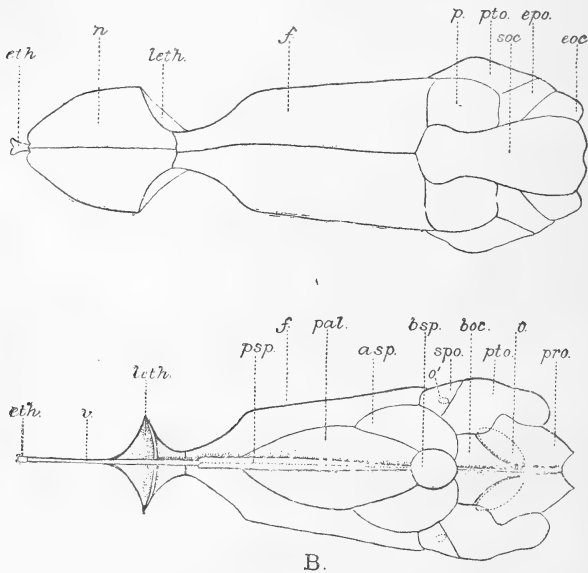
* Annandale, Rec. Ind. Mus. xiv. p. 40, pl. i. fig. 1; pl. iv. figs. 1-10 (1918).

† Whitehouse, Rec. Ind. Mus. xiv. p. 65 (1918).

‡ Regan, Ann. & Mag. Nat. Hist. (9) iii. p. 198 (1919).

with the parietals and a somewhat narrower oblique suture with the supraoccipital. The parietals are of relatively large size and of subquadrate form, considerably longer than broad. They are rather widely separated from the margin of the skull, except at the antero-lateral angle, by the greatly enlarged and inflated pterotics. The sphenotics are not visible in this view. The epiotics are well developed, but rather narrow, and a comparatively large triangular

Fig. 1.



Chaudhuria caudata. Skull: A, dorsal view; B, ventral view.

asp., alisphenoid; *boc.*, basioccipital; *bsp.*, basisphenoid; *eoc.*, exoccipital; *epo.*, epiotic; *eth.*, ethmoid; *f.*, frontal; *leth.*, lateral region of ethmoid; *n.*, nasal; *o.*, *o'*, otoliths; *p.*, parietal; *pal.*, palatine; *pro.*, prootic; *psp.*, parasphenoid; *pto.*, pterotic; *soc.*, supraoccipital; *spo.*, sphenotic; *v.*, vomer.

process of the exoccipital is visible from above and runs forwards for at least two-thirds of the distance from the posterior margin of the skull to the antero-central angle of the epiotic. The supraoccipital is very large and is separated into two distinct regions—a subcircular anterior region, contained between frontals and the anterior half of the parietals, and a posterior vase-shaped region of about three times the length of the anterior part and occupying a little more than a third the breadth of the skull. The inflation of the pterotic capsules gives the posterior region

of the skull a very characteristic appearance in this view. The bones are transparent and the semicircular canals are very conspicuous through them, rendering it difficult to see the limits of the different bones without very careful examination under a fairly high power of the microscope. The posterior margin of the skull is as broad as the maximum transverse diameter of the frontal region.

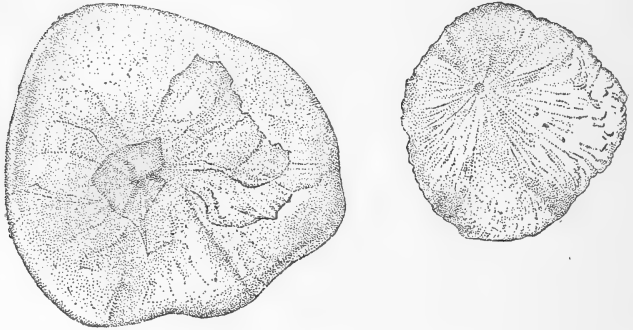
In lateral view there is nothing very particular to be noted which is not also seen in the dorsal view, except that the sphenotic bone is conspicuous.

In ventral view (fig. 1, B: the nasals omitted) the nasal region only differs from that of *Mastacembelus* in the outlines and proportions of the bones, and in that the anterior expansion of the ethmoid is distinctly visible. The lateral expansions of this bone bear a strong ventral ridge, which extends outwards and forwards from the junction of the vomer and the ethmoid. The vomer resembles that of *Mastacembelus*, and runs into the parasphenoid about the same point. The palatines, however, are much larger and situated further backwards, distinctly behind the orbits. Each forms practically a sector of a circle considerably less than a semicircle, and is joined to the alisphenoid by a long suture. The parasphenoid forms a long narrow ridge with a distinct median longitudinal groove, which gives the bone the appearance of being paired. Behind it a basisphenoid is present in the form of a comparatively large, flat, circular bone, which forms a suture with the palatines, alisphenoids, and basioccipital. The alisphenoids are also large, broad, and flat. They are nearly semicircular in outline. The sphenotic in this view is conspicuous, forming an irregular subquadrate plate, through which the smaller of the two otoliths can be seen by transparency. The pterotic, which is greatly inflated and has an irregular outline, is the largest bone in this part of the skull. The prootic is also relatively large and considerably inflated. The larger of the two otoliths is conspicuous by transparency through its anterior inner region, extending below the pterotic for a short distance and lying in the sacculus in a prominent capsule composed of the two bones. The basioccipital is very narrow between the prootics, where it consists of a prominent ridge. This ridge extends forwards to the posterior margin of the basisphenoid, which separates it from the parasphenoid ridge. On either side the bone expands in front into a broad plate of irregular outline in contact with the prootic, pterotic, alisphenoid, and basisphenoid.

Two otoliths (fig. 2), as we have already indicated, are present on either side of the skull. Both are relatively

large, and both have a somewhat similar outline, but one, apparently the sagitta, which lies in the sacculus, is about twice the size of the other. Both are subcircular in outline, but somewhat irregular, flat on one surface and raised

Fig. 2.

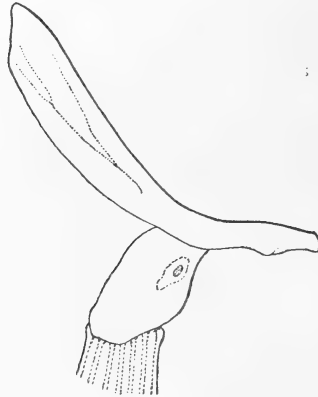


Chaudhuria caudata. The otoliths.

on the other into a slight eminence, which is eccentric in position. They are formed of very dense white calcareous matter.

Shoulder-girdle (fig. 3).—There is no post-temporal, and

Fig. 3.



Chaudhuria caudata. Shoulder-girdle.

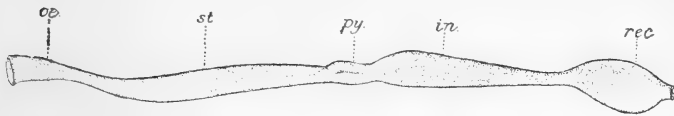
the supracleithrum is completely fused with the cleithrum. The girdle is attached to the vertebral column by a ligament. The primary girdle is degenerate and very imperfectly ossified, the bones consisting of a single honeycombed mass, sometimes with independent islets present at the margin.

No distinct elements can be detected with certainty, but there is a large and conspicuous perforation in the region that may be taken to represent the hypercoracoid*. The radials are not differentiated.

Pharyngeal bones.—The pharyngeal bones resemble those of *Mastacembelus*, and bear numerous sharply pointed recurved teeth.

Caudal fin.—We have nothing to add to Whitehouse's description (*op. cit.*) of the caudal fin, except to point out that the upper part of the hypural projects further than the lower, giving the tail a slightly heterocercal form, as is well shown in the figure in Whitehouse's paper and on plate i. of Annandale's account of the fishes of the Inlé Lake (*op. cit.*).

Fig. 4.

*Chaudhuria caudata.* Alimentary canal.

Alimentary canal (fig. 4).—The alimentary canal consists of a straight or almost straight tube, extending from the mouth to the anus and without pyloric appendages. The oesophagus, which is narrowly funnel-shaped, passes gradually into the stomach, which is long and tubular. The pylorus is a still narrower and very much shorter tube, and opens into the intestine directly without curvature when empty; but when it is dilated, owing to the presence of the remains of food or of parasites, a slight curvature can be detected. The intestine is quite straight, and is swollen towards the end to form a rectum. The anus is surrounded by a series of small tubular glands. The liver is very large, and so is the gall-bladder.

Air-bladder.—The air-bladder resembles that of *Mastacembelus*, being a long tubular structure lying immediately below the vertebral column. The walls of the posterior extremity in some specimens are thickened for a short distance, and this region is marked off in such individuals by a narrow transverse constriction. In others, however, it is apparently homogeneous in structure and not constricted. In our preparations we have not been able to find any definite connection between the bladder and the auditory apparatus.

Gonads.—Most of the specimens we have dissected are

* Regan, Ann. & Mag. Nat. Hist. (8) ix. p. 219 (1912).

females. The ovaries are very large and occupy a great part of the body-cavity. They contain eggs in many different stages of development mingled together. The eggs have already been described and figured by Annandale (*op. cit.*). We found a single male, in which the testes were comparatively small, the one on the right side being a little longer than the other. They formed a pair of flat band-shaped bodies joined together along the middle line and having a short stout duct which opened beside the anus into a cloaca.

The facts stated above show clearly enough in our opinion that Mr. Regan (*op. cit.* 1919) was right in postulating a relationship between *Chaudhuria* and *Mastacembelus*. The special points of resemblance are :—

- (i.) The general form and facies of the whole animal and of the skull.
- (ii.) The structure of the unpaired fins and to some extent of the pectoral girdle.
- (iii.) The absence of any trace of pelvic girdle and fin.
- (iv.) The structure of the jaws and the anterior part of the skull.
- (v.) The supraoccipital separating the parietals.
- (vi.) The presence of the same elements in the otic capsules, and other minor points.

Points iv. and v. clearly indicate that the genus cannot be retained in the Apodes.

There are, however, several important differences between *Chaudhuria* and *Mastacembelus*, not only in external characters, but also in the structure of the skull, the upper part of the shoulder-girdle, and the alimentary canal. Those in the primary pectoral girdle are probably of less importance, although this part of the skeleton does not altogether conform to Mr. Regan's definition of *Opisthomi* (*op. cit.* 1912). The main points in which his definition of the order will have to be amended, if *Chaudhuria* is to be included, are the following :—

- (i.) The absence of scales.
- (ii.) The absence of a fleshy tentacle on the snout.
- (iii.) The absence of spines from the fins.
- (iv.) The presence of a basisphenoid.
- (v.) The smaller number of vertebræ.
- (vi.) The complete fusion of the supracleithrum and the cleithrum.
- (vii.) The degenerate character of the primary shoulder-girdle.

Of these we consider points ii., iii., and especially iv. and vi. the most important. The absence of scales, etc., is probably due to degeneration. Another important character is the condition of the alimentary canal. It differs from that of *Mastacembelus* and *Rhynchobdella** in the absence of cæcal pyloric appendages, and in its straight course and simple structure.

All these points, considered together, we regard as quite sufficient justification for retaining the family Chaudhuriidæ, which we may redefine as follows:—Minute and probably degenerate Opisthomi devoid of spines in the fins, of a fleshy tentacle on the snout, and of scales; with a basisphenoid in the skull; with the otic capsules of exceptionally large size and complex structure; with the supracleithrum and cleithrum completely fused together, and with the elements of the primary shoulder-girdle degenerate and barely distinguishable; with the alimentary canal almost straight and devoid of pyloric appendages.

XXXVIII.—*Preliminary Descriptions of Three new Parasitic Nematodes.* By H. A. BAYLIS, M.A., D.Sc., British Museum (Natural History), and R. DAUBNEY, M.Sc., M.R.C.V.S., Ministry of Agriculture and Fisheries.

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THE following new forms occurred among material belonging to the Zoological Survey of India, which unfortunately reached us too late for inclusion in a report prepared by us on the main collection of parasitic nematodes. Fuller descriptions, with figures, will be published later, together with a report on the rest of this material.

Crossocephalus brevicaudatus, sp. n.

Host: Indian rhinoceros (*Rhinoceros indicus*).

Position: stomach.

Locality: Nepal, India.

Three females only. Length 5.3–6.2 mm. Maximum thickness up to 0.4 mm. No cervical papillæ seen, except those on the cuticular collar. Oesophagus 0.945–0.955 mm. long. Excretory pore at 1.22–1.35 mm. from anterior end (buccal armature inverted), connected with an ovoid bladder measuring 0.13 × 0.08 mm. Tail short and blunt, about 0.25 mm. long. Vulva at about 0.13 mm. from anus. Uterus contains 6–8 embryos of various sizes.

This species differs from *C. longicaudatus*, Baylis, already

* Day, Fish. India, p. 238 (1878).

recorded from a rhinoceros, in having a tail (in the female) only about one-seventh as long as that of *C. longicaudatus*, and also in having the excretory pore situated much nearer to the anterior end.

Strongyluris calotis, sp. n.

Host: *Calotes nigrilabris*.

Position: rectum.

Locality: Ceylon.

Length: male, 8.9–11.1 mm.; female, 11–13.65 mm. Maximum thickness: male, 0.4–0.5 mm.; female, 0.55–0.75 mm. Diameter of head 0.06–0.08 mm. Lips with lateral and anterior cuticular flanges. Neck forms a "shoulder" behind base of lips, and a second "shoulder" is formed further back by a cuticular inflation covering part of the pharyngeal and œsophageal regions. Distance from anterior end to end of œsophagus (including bulb) 1.75–2.25 mm. Intestine expanded at junction with œsophagus, and again in front of rectum. Tail, in both sexes, with a minute terminal spike.

Male.—Caudal end abruptly truncate, sucker and cloaca opening almost posteriorly. Chitinous wall of sucker very deep (0.12–0.16 mm.), and 0.14–0.17 mm. in outside diameter. Spicules subequal, 0.75–0.8 mm. long. Ten pairs of caudal papillæ (seven postanal and three at sides of sucker).

Female.—Tail 0.22–0.25 mm. long, bluntly rounded except for terminal spike. Vulva a transverse slit with prominent lips, at 4.7–5.65 mm. from posterior end. Eggs measure 0.0875–0.0975 × 0.05–0.0525 mm., and contain early embryos when ready for laying.

Tetragomphius procyonis, gen. et sp. n.

Host: raccoon (*Procyon* sp.).

Locality: Zoological Gardens, Calcutta.

Length: male, 13–15 mm.; female, 16–20 mm. Maximum thickness: male, up to 0.46 mm.; female, up to 0.65 mm. Head small, about 0.14 mm. in diameter, bent dorsally and followed by a long, tapering neck. Buccal capsule cup-shaped, less elongated than in *Uncinaria*, furnished at its entrance with a pair of poorly-developed ventral semilunes. At its base two pairs of teeth: a subdorsal pair, bicuspid and 11–18 μ high, and a subventral pair, bi- or tridentate (usually the latter), about 43 μ high. Dorsal gutter a blunt tubercle at base of capsule-wall. Stout, backwardly-directed cervical spines at 0.6–0.7 mm. from anterior end. Œsophagus about 0.65 mm. long and up to 0.13 mm. thick.

Male.—Bursa small and short, resembling that of *Uncinaria* in form of lateral lobes and in arrangement of lateral and ventral rays. Dorsal lobe shorter than lateral lobes. Main trunk of dorsal ray short and stout, dividing a little behind origin of externo-dorsal rays into two branches, each of which is again divided at its tip. The inner of these terminal divisions is grooved. Genital cone much broader than long, apparently without appendages. Spicules 7–8 mm. long, filiform and barbed.

Female.—Tail about 0·34 mm. long and bluntly pointed. Vulva a transverse slit with prominent lips, at 3·6–4 mm., or about one-fifth of body-length, from posterior end. Vagina short, with feebly-muscular ovejectors running anteriorly and posteriorly. Uterine branches divergent. Eggs in vagina measure 0·076–0·082 × 0·045–0·05 mm.

XXXIX.—*Papers on Oriental Carabidæ*.—IX.

By H. E. ANDREWES.

DESCRIPTIONS OF SOME FURTHER NEW SPECIES OF THE
GENUS *CHLÆNIUS*.

Chlænium himalayicus, sp. n.

Length 16·0–19·0 mm.; width 5·75–7·0 mm.

Black, underside shiny and iridescent; labrum yellow, head metallic green with disk purple, prothorax metallic green at sides, chiefly in front; joints 1–3 of antennæ, palpi at base, and legs testaceous, palpi towards apex and tarsi brown; each elytron with yellow epipleuræ and three yellow spots, the first small, covering shoulder and extending inwards to stria 4, the second larger, a little before middle, joined to first along interval 9 and margin, tapering inwards and extending to stria 3, the third small, near apex, covering intervals 4–8.

Head small, convex, finely rugose, but nearly smooth in middle, vertex coarsely punctate at sides, some finer punctures on front, eyes rather flat, labrum truncate, palpi short, hardly dilated at extremity, antennæ thick, joint 3 elongate, 3–11 compressed and slightly sulcate at sides. *Prothorax* slightly convex, a third as wide again as head, and barely wider than long, more contracted in front than behind and widest behind middle, extremities truncate, sides with narrow reflexed border, gently rounded in front, more strongly behind, front angles close to neck, hind angles strongly rounded; median line just visible on disk, other impressions obsolete, surface densely, coarsely, and confluent punctate,

less densely over green area at front of sides. *Elytra* elongate-ovate, moderately convex, one and three-quarter times as wide as prothorax, and a little more than half as long again as wide, widest just behind middle, shoulders almost obsolete; punctate-striate, striae fairly long, intervals nearly flat, each with two rows of very clear umbilicate punctures, here and there irregular, surface dull. Upper-side covered with a short, dense, yellow pubescence, conspicuous only when viewed from the side. Underside with some coarse puncturation on sterna, fine on venter, pubescence fine and very sparse, metepisterna nearly as wide as long, without grooves, prosternal process unbordered, pilose.

A *Homalolachnus* very closely allied to the African *C. sexmaculatus*, Dej., but smaller and a little less elongate. Prothorax more contracted in front than behind, surface more closely and confluent punctate; on the elytra the yellow margin does not extend back beyond the intermediate spot, and all the spots are more compact (in *sexmaculatus* the colour on each interval is almost detached from that on the neighbouring ones). The species is also much like *C. sykesi*, Hope, but in that species the head and prothorax are relatively larger, the two front spots are not joined along margin, 1 extends to stria 3, 2 to stria 2, and 3 covers intervals 4-9.

ASSAM: Brahmaputra River, above Jorhat, at light (*T. B. Fletcher*—Agric. Res. Inst. Pusa), 1 ex., ♀. KUMAON: West Almora (*H. G. Champiom*), 1 ex., ♀, Jaunsar (For. Res. Inst. Dehra Dun), 1 ex. (very defective). I have made the Jorhat ex. the type and placed it in the British Museum.

Chlænium junceus, sp. n.

Length 10·5–11·0 mm.; width 3·8–4·0 mm.

Blue-black, iridescent and shining beneath; head dark bronze, prothorax with faint metallic lustre, explanate margins dark blue; joint 1 of antennæ, femora, and an apical spot on each elytron testaceous; joint 2 of antennæ and palpi brown; rest of antennæ, knees, tibiæ, and tarsi black.

Head small, neck narrow and very slightly constricted, frontal foveæ rugose, shallow, diverging behind, surface moderately punctate, nearly smooth on vertex, eyes rather prominent, labrum truncate, antennæ long and slender, joint 3 nearly glabrous and equal to 4; last joint of maxillary palpi ♂ diamond-shaped, compressed at the pointed extremity, and more or less hollowed out at sides, ♀ more elongate, obliquely truncate and compressed at apex, last

joint of labial palpi ♂ ♀ strongly securiform, ♂ with apex of longer side truncated and hollowed out externally, ♀ not so truncated, but strongly compressed (I think that the form of the palpi in this and allied species probably changes in drying, and that in fresh specimens it might be very different). *Prothorax* convex, much wider than head, nearly circular, though a little wider than long, extremities truncate, base rather wider than apex, sides strongly rounded, without border, the explanate margin moderately reflexed and increasing in width from apex to base, hind angles obtuse and rounded, but quite distinct; median line fine, foveæ rather shallow and elongate, diverging behind towards the angles, the whole surface rather coarsely and confluent punctate and shortly pubescent. *Elytra* moderately convex, elongate-ovate, a third as wide again as prothorax and two-thirds as long again as wide, shoulders cut away, with a rounded border; striæ moderately deep and finely punctate, not reaching base, intervals convex, surface closely but not very finely punctate, and shortly pubescent, testaceous spot transverse, at about a third from apex, covering intervals 4-8, the colour on 6 extending further both backwards and forwards than on the other intervals. Underside glabrous, sterna with few but rather coarse punctures, very coarse on sides of metasternum, finer but sparse on sides of venter, prosternal process strongly bordered, with only one or two minute setæ visible on it, metepisterna very long, outwardly sulcate, upper surface of tarsi minutely setose, protarsi ♂ rather widely dilated.

Very close to *C. orbicollis*, Chaud., and with similar palpi, but the prothorax is nearly black with blue side-margins (not cupreous), joint 3 of antennæ, tibiæ, and tarsi black, the elytral spot transverse and with more irregular outline. Head similar, prothorax with more rounded sides, a little more coarsely punctate, as are the elytra.

There are 4 ex., ♂ ♀, in the British Museum. Three of these came from the Bowring Collection, and are labelled "China"; in all probability they came from Hong Kong. The fourth example was taken by Fortune in "N. China," and may have come from Shanghai.

Chlænium exilis, sp. n.

Length 11.0 mm.; width 3.9 mm.

Blue-black, strongly iridescent beneath; head and prothorax dark metallic-green, side-margins of latter blue; joint 1 of antennæ, femora, tibiæ, and an apical spot on each elytron testaceous, joints 2-3 of antennæ and palpi brown, rest of antennæ fuscous.

Head small, finely and sparsely punctate, more closely behind, nearly smooth in middle, foveæ shallow, eyes fairly prominent, labrum truncate, antennæ long and slender, joint 3 practically glabrous, shorter than 4, apical joint of palpi (♀) as in previous species. *Prothorax* convex, much wider than head, nearly circular in outline and as long as wide, extremities truncate, base a little wider than apex, sides moderately rounded, without border, the explanate margin rather gently reflexed and increasing in width from apex to base, hind angles distinct, but obtuse and rounded; median line fine, foveæ shallow and elongate, inconspicuous, surface rather closely, coarsely, and to some extent confluent punctate, shortly pubescent. *Elytra* moderately convex, elongate-ovate, a little more than a third as wide again as prothorax, and rather less than two-thirds as long again as wide, border rounded at shoulder; striæ fairly deep, finely punctate, striae rather long, intervals moderately convex, surface closely and rather finely punctate, shortly pubescent, testaceous spot transverse, at a little more than a third from apex, covering intervals 4-8, the colour on 6 extending further both backwards and forwards than on the other intervals. Underside glabrous, sterna moderately, sides of venter rather slightly punctate, prosternal process bordered, metepisterna elongate, outwardly sulcate, upper surface of tarsi minutely setose.

This species is also close to *C. orbicollis*, Chaud., but with head and prothorax blue-green instead of cupreous, the elytral spot more irregular in outline, joints 2-3 of the antennæ darker. Head more finely punctate, prothorax a little wider, with more rounded sides, the margin behind more explanate, elytra rather wider and a little more rugosely punctate.

BURMA: Tharrawaddy (*G. Q. Corbett*), 1 ex., ♀. My collection.

Chlænium montivagus, sp. n.

Length 13.5 mm.; width 5.25 mm.

Deep black, underside slightly iridescent; head and prothorax deep metallic-green, latter deep blue at sides; joint 1 of antennæ red, apex of palpi and an apical spot on each elytron testaceous.

Head convex, finely punctate, middle of front nearly smooth, foveæ very small and rounded, labrum truncate, palpi slender, antennæ rather thick, joint 3 glabrous, a little longer than 4. *Prothorax* rather convex, quadrate, wider than head, about a fourth as wide again as long, very little more contracted in front than behind, extremities truncate, sides very narrowly bordered, the margin slightly explanate

and reflexed, gently rounded in front and nearly straight behind, hind angles obtuse but very little rounded; median line fine, foveæ fairly deep, elongate, curving outwards at extremities, surface closely but not very coarsely punctate, less closely along sides, densely and confluent along middle of base, more coarsely near hind angles. *Elytra* convex, ovate, a little more than half as wide again as prothorax, and as much longer than wide, widest at apical third, border rounded at shoulder; striate-punctate, the striæ only moderately deep, the punctures larger near base, striole fairly long, intervals flat, surface densely and finely punctate, a little more coarsely near apex, testaceous spot at apical third, covering intervals 4-8, more or less rounded, an indentation on interval 5 behind. Underside minutely and sparsely setose, sterna moderately punctate, venter with some fine punctures and striæ at sides, prosternal process bordered, metepisterna longer than wide, outwardly sulcate, upper surface of tarsi minutely setose.

Not far from *C. bimaculatus*, Dej., but with black legs and sides of prothorax blue. Head wider, prothorax much more densely punctate, elytra more convex, more dilated behind, the testaceous spot rounder, propisterna distinctly punctate.

CHINA: Yunnansen, 2150 metres, 1 ex., ♂. I am indebted for this specimen to Mr. René Oberthür, who has other examples in his collection.

Chlænium ocellatus, sp. n.

Length 13.0 mm.; width 5.4 mm.

Blue-black, iridescent beneath, moderately shiny, head and, to a very slight extent, prothorax metallic-green; joints 1-3 of antennæ (rest piceous), legs, and a round spot a little before apical third of elytra, covering intervals 4-7, testaceous; palpi and tarsi brown. The whole upper surface covered by a short, grey, and fairly visible pubescence.

Head small, convex, finely punctate, clypeus quite and middle of front nearly smooth, labrum truncate, eyes rather prominent, palpi short and slender, antennæ rather short, joint 3 glabrous, hardly longer than 4. *Prothorax* moderately convex, hardly more contracted at apex than base, not quite half as wide again as head, and barely a third as wide again as long, extremities truncate, sides evenly rounded, hind angles obtuse and rounded, though quite distinct; median line short but clear, foveæ rather deep, surface moderately and rather closely punctate, some very small punctures between the larger ones. *Elytra* moderately convex, ovate, wide, quite half as wide again as prothorax, and as much longer than wide, shoulders well-

marked with rounded border; striæ moderately deep and finely punctate, striole long, intervals rather convex, surface covered with moderate and fairly close punctures. Beneath there are some coarse punctures on the sterna, a few fine ones on venter at sides, prosternal process very clearly bordered, metepisterna much longer than wide, sulcate along outer margin, tarsi glabrous above.

Closely allied to *C. bioculatus*, Chaud., but a much wider insect, dark blue instead of cupreous, the elytral spot round and placed further forward. Eyes less prominent, prothorax much wider, with small punctures between the larger ones, elytra wider, striæ deeper and intervals more convex, surface more coarsely and less closely punctate.

CENTRAL PROVINCES: Nagpur (*E. A. D'Abreu*), 1 ex., ♀, at light; Jubbulpore (*S. H. Ribeiro*—Ind. Mus.), 1 ex., ♀. Mr. D'Abreu has kindly allowed me to retain the type (Nagpur) in my collection.

Chlænium ptuchodes, sp. n.

Length 17·0 mm.; width 6·75 mm.

Black, underside slightly iridescent; head and prothorax metallic-green, latter blotched with purple on disk, and bluish in marginal channels, elytra dark blue-black, faintly green close to base; joint 1 of antennæ and legs testaceous, rest of antennæ, palpi, knees, and tarsi more or less brown.

Head small, convex, minutely strigose-punctulate, nearly smooth on vertex, labrum truncate, eyes moderately prominent; palpi slender, antennæ long and slender, joint 3 much longer than 4. *Prothorax* rather flat, quadrate, contracted a little more in front than behind, nearly half as wide again as head, and a fourth as wide again as long, sides of base a little oblique, sides rather gently and evenly rounded, nearly straight behind, hind angles obtuse and moderately rounded; median line fine but clear, foveæ almost linear, not very deep, diverging a little both before and behind, surface minutely punctulate, and also moderately but sparsely punctate, middle of base and apex finely strigose. *Elytra* slightly convex, subovate, with nearly parallel sides, quite half as wide again as prothorax, and two-thirds as long again as wide, the border forming a distinct though obtuse angle at shoulder; striæ fine, finely and very clearly punctate, striole deep, intervals convex, appearing more shiny along middle than the general surface, a row of fine punctures along the sides of each, 8-9 more closely punctate, 3 convex right up to basal border, surface both shagreened and minutely punctulate, pubescence short and hardly noticeable except along margins. Underside rather finely and

sparsely punctate, but nearly smooth along median line; prosternal process bi-impressed, but hardly bordered at apex, which is pilose, metepisterna distinctly longer than wide, not sulcate, upper surface of tarsi sparsely pilose.

I cannot place this species satisfactorily in Chaudoir's table, but it cannot be very far from *C. dimidiatus*, Chaud., from Persia and Palestine, which shows, though in a much less degree, the same minute surface-puncturation. The new species has longer antennæ and more prominent eyes, the prothorax wider, with more rounded sides and hind angles, elytra much darker, with intervals more distinctly convex, especially towards apex.

BURMA: Tharrawaddy (*G. Q. Corbett*), 1 ex., ♂. My collection.

Chlænium masoni, sp. n.

Length 13·0–14·0 mm. ; width 4·75–5·0 mm.

Black, moderately shiny, head and prothorax dark blue, antennæ, palpi, and tarsi piceous.

Head small, convex, closely and finely punctate, some larger punctures and longitudinal striæ near eyes, labrum and clypeus smooth, the former truncate, foveæ obsolete, palpi and antennæ slender, joint 3 of latter sparsely pilose, considerably longer than 4. *Prothorax* rather flat, quadrate, a third as wide again as head, very little wider than long, a little more contracted in front than behind, both extremities a little emarginate, sides gently rounded, nearly straight behind, hind angles right but rounded; median line slight, foveæ deep, linear, not quite reaching base, surface finely but sparsely punctate, finely strigose along base. *Elytra* oval, moderately convex, a third as wide again as prothorax, and about two-thirds as long again as wide, border forming a sharp angle at shoulder; striæ rather deep and very finely punctate, intervals convex, with a row of fine punctures along sides of each, surface otherwise smooth, but shortly and inconspicuously pilose. Surface beneath glabrous and very nearly smooth, prosternal process bordered at apex, metepisterna rather wider than long, slightly punctate, tarsi glabrous on upper surface.

Most nearly allied to *C. apollo*, m., but I will compare it with the better-known *C. quadricolor*, Oliv. A little smaller, narrower, and much darker in colour. Head very finely punctate, eyes flatter; prothorax duller, less contracted in front, puncturation finer, hind angles more rounded; elytra more contracted towards base, intervals more convex, the rows of punctures and the pubescence a little less obvious; underside glabrous and nearly smooth, metepisterna slightly

transverse. From *C. atripes*, Chaud., it is easily distinguished by the coloration of the upper surface.

MADRAS: Palni Hills (ex coll. F. R. Mason), 1 ex., ♂, Shembaganur (coll. C. Alluaud), 2 ex., ♂♂. The type, from Palni Hills, is in my collection, and I am indebted for it to Mr. F. R. Mason, after whom I have named the species.

Chlenius lioderus, sp. n.

Length 15·0 mm.; width 6·0 mm.

Black, shiny, iridescent beneath; head and prothorax metallic-green or cupreous; joint 1 of antennæ, base of palpi, and legs testaceous; joint 2-3 of antennæ, rest of palpi, and tarsi brown; rest of antennæ fuscous.

Head small, convex, finely and slightly rugose-punctate at sides and across vertex, nearly smooth in middle, eyes prominent, labrum truncate, palpi slender, joint 3 of antennæ slightly pilose, quite half as long again as 4. *Prothorax* slightly convex, quadrate, a little more contracted in front than behind, wider than head but not much wider than long, sides of base oblique, sides gently rounded, almost straight behind, hind angles obtuse, but not much rounded; median line fine, deeper at each end, though not reaching extremities, foveæ deep, curving outwards at base, surface smooth, with few and extremely fine punctures. *Elytra* moderately convex, oval, more than half as wide again as prothorax, and longer than wide in the same proportion, border forming a distinct though obtuse angle at shoulder; striæ rather deep, very finely punctate, intervals moderately convex, with a row of minute punctures along each side, 8 on outer side and 9 rather closely punctate, surface otherwise smooth, with an extremely short pubescence, almost imperceptible except at sides. *Sterna* with a few moderate punctures, venter nearly smooth, prosternal process clearly bordered and pilose at apex, metepisterna longer than wide, not sulcate, upper surface of tarsi minutely and sparsely punctate, protarsi in ♂ narrow and elongate.

Very closely allied to *C. phænderus*, Chaud., but wider, the elytra black instead of violet-blue. Prothorax with basal foveæ shorter and deeper, not reaching base; elytra with shoulders more evident, the puncturation of the striæ finer; apex and declivity of prosternal process, as also middle of venter at base distinctly pubescent.

BURMA: Rangoon (*E. A. D'Abreu*), 1 ♂, 2 ♀♀. Mr. D'Abreu has kindly allowed me to retain the type (♂) in my collection, and I am placing one of the ♀ examples in the British Museum.

Chlænium championi, sp. n.

Length 11·5–12·0 mm.; width 4·25–5·0 mm.

Black, shiny beneath, dull above; upper surface, especially head, with a faint purplish tinge; front and sides of head, side-margins of prothorax (more widely in front than behind) and of elytra up to stria 8 (to stria 7 near shoulder) metallic-green; joints 1–3 of antennæ and legs flavous, palpi and tarsi reddish. Upper surface covered with a fairly long but not very conspicuous grey pubescence.

Head convex, densely and coarsely punctate, less densely on middle of front, clypeus nearly smooth, foveæ small and rounded, labrum truncate, depressed in middle, palpi slender, antennæ rather thick, joint 3 very little longer than 4. *Prothorax* moderately convex, distinctly wider than head, but not much wider than long, base emarginate in middle with its sides a little oblique, sides evenly rounded and very slightly sinuate before hind angles, which are obtuse but hardly rounded; median line a little faint, foveæ short, linear, fairly deep, and reaching base, the whole surface coarsely, closely, and confluent punctate. *Elytra* convex, ovate, a third as wide again as prothorax, and nearly two-thirds as long again as wide, border forming a sharp angle at shoulder; striæ deep and clearly punctate, intervals moderately convex, the whole surface densely and somewhat confluent punctate, the punctures, without being fine, much smaller than those on prothorax. Underside closely punctate, except along median line, venter more finely and sparsely, prosternal process very finely bordered, metepisterna slightly transverse, upper surface of tarsi moderately pilose.

The species does not seem to fit into any of the groups in Chaudoir's table. Were the labrum emarginate, I should consider it as belonging to the *chlorodius* group, and allied more particularly to *C. henryi*, m., which it resembles in many ways. It is, however, smaller, and has a prothorax of different shape, the elytra more deeply striate, the surface more coarsely punctate.

KUMAON: Central and West Almora (*H. G. Champion*), 3 ex. (2 ♂♂, 1 ♀). The type is in the British Museum.

Chlænium fraterculus, Maindr. Bull. Soc. Ent. Fr. 1899, p. 250.

This species, taken by Mr. E. Durel at Maria Basti in British Bhutan, has at the apex of the elytra a fairly wide apical border of a flavous colour, the outline of its front margin somewhat dentate. In this pattern it resembles at least one European species, *C. vestitus*, F., and a number of Eastern ones, such as *C. inops*, Chaud., *C. frater*, Chaud., etc. In some specimens, similar in other respects to the

type, this border is wanting, though the narrow marginal border remains flavous to apex. For this form I propose the name *atupus*: it can hardly be a local race, and, pending the receipt of more exact information regarding its occurrence, should be treated as a variety of the typical form. Examples of both were taken by Mr. Durel at Maria Basti, and have also been taken by Mr. H. Stevens in Sikkim, both at Gopaldhara, 4720 ft., and at Gielle Kholā in the Tista Valley, 600 ft. The type (Gopaldhara) is in my collection.

Chlænium melanopus, sp. n.

Length 11·5–12·0 mm.; width 4·25–4·50 mm.

Very dark blue-black, iridescent beneath; head bluish green, prothorax dark blue, joints 1–2 of antennæ, palpi, legs, and a common spot at apex of elytra testaceous red, tarsi brown.

Head small, convex, finely and closely punctate, foveæ small and slight, eyes rather flat, labrum truncate, palpi slender, antennæ thick, joint 3 pubescent, a good deal longer than 4. *Prothorax* rather flat, much wider than head, nearly as long as wide, equally contracted at extremities, both of which are emarginate, sides rather strongly and evenly rounded, margin slightly explanate and reflexed, hind angles a little obtuse and rounded; median line fine, foveæ elongate, shallow, the whole surface finely and very closely punctate, and shortly pubescent, the punctures transversely confluent. *Elytra* oval, moderately convex, a third as wide again as prothorax, half as long again as wide, border rounded at shoulder; striæ rather shallow and finely punctate, striole short, surface finely asperate-punctate, shortly and inconspicuously pubescent; the common spot is a small transverse oval, at about a fourth from apex, barely reaching stria 4, slightly produced behind along interval 1. Under-side shortly and sparsely pubescent, sterna finely punctate at sides, sides of venter finely strigose-punctate, prosternal process not bordered, minutely setose, metepisterna nearly as wide as long, tarsi pubescent on upper side.

Near *C. guttula*, Chaud., but even nearer *C. unnotatus*, m. A little longer and wider than the latter, head blue-green, prothorax dark blue, apical spot on elytra a little larger and more regular in outline. Head similar, prothorax wider, the sides distinctly reflexed, surface less dull, punctures more transversely confluent, the punctures on the elytra more asperate and conspicuous.

CHINA: Yunnan, Djoukoulā, 2 ex., ♀ ♀ (coll. H. de Touzalin). Mr. de Touzalin has kindly allowed me to retain the type in my collection.

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[NINTH SERIES.]

No. 64. APRIL 1923.

XL.—*Notes on African Non-marine Mollusca, with Descriptions of many new Species* (cont.). By M. CONNOLLY.

[Plate I.]

Family Achatinidæ, von Martens, 1879.

In dealing with the members of this family I would explain that all my measurements are taken with the shell lying flat on its back, aperture upwards, and that the length of last whorl is the distance between the extreme base of the aperture and the centre of the suture immediately above it. Although not strictly accurate, the term *length* of whorl denotes the vertical distance between sutures, in order to avoid any confusion with the *breadth* of spire.

Subfamily STENOGYRINÆ, Fischer, 1883.

Genus PSEUDOGLESSULA, O. Boettger, 1892.

Thin, corneous shells, more or less elongate, sculptured to the apex with prominent transverse striæ.

Subgenus PSEUDOGLESSULA, s. s.

Shell elongate, imperforate.

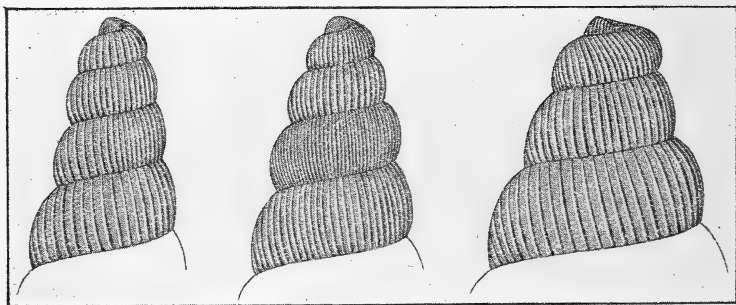
Pseudoglessula mutabilis, sp. n.
(Pl. I. fig. 22 ; text-fig. 1, p. 346.)

Shell of moderate size, imperforate, turriform, thin, asperate, translucent, corneous brown. Spire produced, sides regular, extremity of apex involute. Whorls 7, not very convex, gradually increasing, carinate round the base, sculptured to the apex with regular, slightly curved and oblique, transverse costulæ, which are closer together on the 2nd and 3rd than on the first whorl, and become very gradually wider apart again on the 4 later ones, there being 9 in 2 mm. on the face of the last, which is smooth on its base ; between the costulæ are some fainter transverse striæ and an occasional faint trace of microscopic spiral sculpture ; suture

Fig. 1.

Fig. 2.

Fig. 3.

*Ps. mutabilis.**Ps. mutandana.**Ps. transenna.*Apical structure, $\times 12$.

simple, nearly horizontal, well-defined. Aperture quadrate, peristome simple, acute, columella short, rather concave, sharply truncate at base, of paler colour than the rest of the shell.

Long. 7·9, lat. 2·7 ; apert., alt. 2·1 ; lat. 1·2 ; last whorl 3·7 mm.

Hab. KENYA, Kekumega (*Percival*).

A more slender species than *cruda*, Pilsbry, and with shorter whorls than *lemairei*, D. & G., whose first 2 whorls, moreover, must be far smoother than in the new species. It agrees rather closely in form with *Pseudoglessula gracilis* (Mts.), but is more closely sculptured, especially on the first whorl.

Pseudoglessula mutandana, sp. n.
(Pl. I. fig. 23; text-fig. 2, p. 346.)

Shell of fair size, turriform, imperforate, thin, asperate, semitransparent, corneous yellow-brown with an occasional dark red streak. Spire produced, sides slightly convex, extremity of apex minutely involute. Whorls 8, fairly convex, regularly increasing, subcarinate round the base, sculptured to the apex with regular, nearly straight and vertical, transverse costulæ, which are close together on the first, much further apart on the 2nd, and close again on the 3rd whorl, after which they increase gradually in distance, there being 8 in the space of 2 mm. on the face of the last whorl, which is rather smoother on its base; the intervals between the costulæ are filled with a few faint irregular transverse striæ and a general appearance of corrugation, rather than spiral sculpture; suture simple, well-defined. Aperture subrhombic, peristome simple, acute, columella rather pale, straight, erect, sharply truncate at extreme base; paries white.

Long. 10·1, lat. 3·2; apert., alt. 2·5, lat. 1·7; last whorl 4·5 mm.

Hab. UGANDA, Lake Mutanda (*Kemp*).

Possibly only a local race of *Ps. cruda*, Pilsbry, from which, however, Dr. Pilsbry informs me that it differs in its ribs being nearly twice as far apart as in his species.

Pseudoglessula perobtusa, sp. n. (Pl. I. fig. 8.)

Shell rather large, elongate-turriform, imperforate, thin, silky, transparent, pale olivaceous. Spire produced, sides regular, apex rounded. Whorls 9, moderately convex, regularly increasing, faintly bluntly carinate towards the base, sculptured practically to the apex with close, regular, prominent, nearly straight and vertical transverse striæ, which are slightly closer together on the first and become almost obsolete on the base of the last whorl; suture simple, well-defined. Aperture subovate, peristome simple, acute; outer lip straight in profile, receding a little to the base; columella short, erect, strongly truncate at base.

Long. 22·1, lat. 5·4; apert., alt. 5·0, lat. 2·5; last whorl 9·0 mm.

Hab. BELGIAN CONGO, Burunga, Mt. Mikenno, 6000 ft. (*Kemp*).

A rather ordinary yellowish shell with somewhat unusually obtuse apex, not particularly resembling any species known

to me ; it is slightly narrower and more carinate on the last whorl than *pileata*, Mts., with nearly a whorl more in the same length, while the striation in *pileata* is more distant on the first two than on the later whorls, whereas in *perobtusa* it is nearly equidistant throughout.

It is rather doubtful whether the group of large yellow shells to which this and the next species belong, and which appear to lay round, rather than elongate, eggs, should be placed in *Pseudoglessula* or *Subulina* ; owing, however, to their agreeing in apical sculpture with *Pseudoglessula*, it is certainly more convenient to attribute them to that genus until the anatomy is fully known.

Pseudoglessula batesi, sp. n. (Pl. I. fig. 6.)

Shell rather large, elongate-turritiform, imperforate, rather thin, silky, nearly transparent, pale yellowish olivaceous. Spire produced, sides regular, apex obtusely rounded. Whorls 10, convex, gradually increasing, without margination on the last, sculptured almost to the extreme apex with regular, well defined, nearly straight and vertical, transverse striæ, equidistant and very close on the last 7 whorls, very slightly more distant on the 3rd and a little more so on the 2nd ; suture simple, well defined. Aperture ovate ; peristome simple, acute, outer lip nearly straight in profile, receding a little to the base ; columella slightly concave, sharply truncate.

Long. 25·2, lat. 6·2 ; apert., alt. 6·2, lat. 2·7 ; last whorl 10·2 mm.

Var. ex forma *major*. (Pl. I. fig. 7.)

A rather more obese form, with slightly, but noticeably, longer whorls, though the same in number as in the type.

Long. 26·8, lat. 7·1 ; apert., alt. 7·0, lat. 3·5 ; last whorl 11·6 mm.

Hab. CAMERUN, Bitze (*Bates*).

Although it is remarkable that this conspicuous shell does not appear to have been already described, I cannot reconcile it with any recorded species. It is nearest to *Pseudoglessula strigosa* (Morelet) from Angola, from which it differs in having finer apex and rather shorter whorls.

Pseudoglessula fasciata, nom. nov.

As *Bulimus kirki*, Craven (P. Z. S. 1880, p. 217), is undoubtedly a *Pseudoglessula*, the name must yield precedence to that of *Buliminus kirki*, Dohrn (P. Z. S. 1865,

p. 232), which is also a *Pseudoglessula* of the subgenus *Pseudocerastus*.

I therefore rename Craven's species *fasciata* as being the only banded *Pseudoglessula* yet recorded, although the bands are not a constant feature in the species.

Section KEMPIOCONCHA, Preston, 1913.

Shell large, elongate, perforate.

Pseudoglessula (*Kempioconcha*) *pilsbryi*, nom. nov.

Pilsbry has rightly pointed out that *Ena kivuensis*, Preston, is a *Pseudoglessula*. It was described on p. 50 of the Rev. Zool. Africaine, 1913, while on p. 53 appears *Kempia kivuensis*, Preston, which is also a *Pseudoglessula*, possibly of the same subgenus as the above-mentioned species.

Kempia kivuensis must therefore be rechristened, and I have much pleasure in naming it after the greatest conchologist of our time, in particular recognition of his work on the Congo mollusca.

Section PSEUDOCERASTUS, Germain, 1918.

Founded for perforate species of the group of *Ps. boivini* (Morelet). There does not appear to be room in the genus for both the perforate groups, *Kempioconcha* and *Pseudocerastus*, and the latter will probably have to retire into synonymy, but there is a slight difference in appearance between them, which may render it advisable to maintain the distinction until the anatomy of *Ps. pilsbryi* is known.

Pseudoglessula (*Pseudocerastus*) *transenna*, sp. n.

(Pl. I. fig. 17 ; text-fig. 3, p. 346.)

Shell of fair size, subconoid, perforate, thin, silky, semi-transparent, corneous bronze. Spire moderately produced, sides regular, apex slightly involute. Whorls 6, convex, regularly increasing, the last showing faint basal margination, the first portion of the protoconch a trifle lower than the remainder, so that the apex is distinctly hollow ; sculptured to the apex with strong, regular, transverse costae, which are sinuous and closer on the first 2 whorls, and nearly straight, slightly oblique, and gradually increasing in distance on the remainder, which are also covered with close, oblique, criss-cross striation, forming, under a microscope, a regular pattern of lattice-work all over the shell ; suture simple, well defined ; aperture subovate, peristome simple, acute ; outer lip well curved outward, straight in profile ;

columella slightly concave, margin whitish, narrowly reflexed, half covering the narrow umbilicus; callus none.

Long. 12·7, lat. 6·1; apert., alt. 5·0, lat. 2·9; last whorl 7·7 mm.

Hab. KENYA, forests N. of Mt. Kenya (*Percival*).

A beautiful species, remarkable for its involute apex and micro-cancellate sculpture.

Pseudoglessula (Pseudocerastus) solitudinum, sp. n.
(Pl. I. fig. 18.)

Shell of moderate size, conoid, perforate, thin, silky, semi-bleached in the type, but normally semitransparent and brownish corneous. Spire moderately produced, sides regular, apical angle about 43° , apex rather blunt. Whorls 6, moderately convex, regularly and rather rapidly increasing, with only the faintest trace of basal margination, sculptured to the apex with close, regular, well-defined, slightly curved, and oblique transverse striæ, almost equidistant except on the 2nd whorl, where they are very slightly further apart than on the remainder; suture simple, well defined. Aperture subovate, slightly oblique; peristome simple, acute; outer lip nearly straight in profile, receding but little to the base; columella concave, margin evenly reflexed, umbilicus narrow but deep.

Long. 11·5, lat. 5·8; apert., alt. 4·7, lat. 2·7; last whorl 7·2 mm.

Hab. KENYA, Taru Desert (*Percival*).

An ordinary little species, apparently mature, bearing some resemblance to several of the smaller forms of the *boivini* group, but not conspecific with any of them. It has rather finer striæ and longer whorls than *kidetensis*, Smith—perhaps its nearest relation.

Pseudoglessula (Pseudocerastus) ingloria, sp. n.
(Pl. I. fig. 19.)

Shell of moderate size, turritiform, perforate, thin, silky, semitransparent, normally brownish corneous. Spire produced, sides almost regular, apical angle about 30° , apex bluntly submamillate. Whorls 7, not very convex, regularly increasing, the last showing only a faint trace of basal margination, all but the extreme apex covered with close, regular, well-defined, nearly straight, slightly oblique, transverse striæ, very slightly more distant on the first 2 than on the later whorls and fainter on the base of the last; suture simple, well defined. Aperture sub-oval, peristome simple,

acute; columella erect, very slightly tortuate, margin narrowly triangularly reflexed, nearly covering the very small umbilicus.

Long. 10·9, lat. 4·8; apert., alt. 4·5, lat. 2·2; last whorl 6·5 mm.

Hab. KENYA, Taru Desert (*Percival*).

A still more ordinary little shell, rather weather-worn and probably somewhat immature, but in no way recognisable as the young of any of the larger species of the *boivini* group. *Ps. marguerite* (Preston), from a somewhat adjacent locality, has a relatively shorter aperture and appears to be an altogether smaller species, while the striae on its 2nd whorl are closer together and do not show such a marked difference in distance between them and those on the third; the umbilicus, too, in *marguerite* is considerably less hidden than in *ingloria*. Except for these differences, which may not, perhaps, prove to be constant, the latter might well be considered a more adult example of the former.

Pseudoglossula terrulenta (Morelet), 1883.

Originally described from Gaboon as a *Bulimus*, and tentatively placed by Pilsbry (1906) in *Curvella*, this species, whose type is in the British Museum, is a small *Pseudoglossula*, so near akin to the better-known *P. stuhlmanni* (Mts.) that the two may eventually prove to be conspecific. *P. terrulenta* may now be recorded from Bitze, Camerun (*Bates*), whence it has been rather widely distributed by Preston as a *Cerastus*, bearing the name of the province last mentioned; this, however, has never been published, and need not be introduced into literature.

Genus HOMORUS, Albers, 1850.

Homorus burnessi, sp. n. (Pl. I. fig. 1.)

Shell large, elongate-turriform, imperforate, comparatively thin, smooth, shining, nearly transparent, pale yellowish corneous. Spire much produced, sides regular except for slight attenuation at the 5th whorl, apex narrowly conoid. Whorls 11, flattish, gradually increasing, sculpture limited to very faint, flat, fairly regular, nearly straight, slightly oblique transverse striae; suture simple, rather oblique. Aperture acuminate-ovate, peristome simple, acute, outer lip moderately curved outward, nearly straight and not receding much to the base in profile; columella concave, rectangularly truncate at base.

Long. 58·0, lat. 13·2 ; apert., alt. 13·3, lat. 6·7 ; last whorl 22·0 mm.

Hab. KENYA, Kiu District (*Burness*).

A fine species, with longer flatter whorls than *H. egregius*, Preston.

Homorus egregius, Preston, 1911.

This species is rather widely distributed in Kenya Colony, varying considerably in contour, though very little in sculpture or volution. The most slender specimen that I have seen, from Urguess, contains $12\frac{3}{4}$ whorls, and measures :—

Long. 52·0, lat. 10·6 ; apert., alt. 11·2, lat. 5·8 ; last whorl 17·9 mm.

The following form seems worthy of varietal rank :—

Var. *ex forma inflata*. (Pl. I. fig. 5.)

Differs from type in greater breadth of spire and very slightly more convex whorls, which number $11\frac{1}{2}$ in a shell measuring :—

Long. 49·5, lat. 12·0 ; apert., alt. 11·4, lat. 6·3 ; last whorl 18·0 mm.

Hab. KENYA, Larogi Hills, 6000–7000 ft. ; Igembi Hills (*Percival*) ; Darugu R. Valley (*Harries*) ; Lari (*Gooch*).

Homorus woodhousei, sp. n. (Pl. I. fig. 9.)

Shells rather large, elongate, imperforate, thin, smooth, shining, transparent, pale yellowish olivaceous. Spire much produced, a little attenuate from the 7th whorl ; apex rounded. Whorls 10, rather convex, the first 3 smoothly, sparsely punctate, with a very faint appearance of rather irregular, scratchy, microscopic spiral striation, continuing at intervals on the later whorls, which are also closely covered with extremely faint, straight, oblique, transverse striæ, hardly visible except just below the suture ; suture moderately oblique, simple, rather shallow. Aperture sub-ovate ; peristome simple, acute ; outer lip nearly straight, receding considerably to the base ; columella erect, narrowly truncate.

Long. 23·6, lat. 5·3 ; apert., alt. 5·7, lat. 2·8 ; last whorl 10·3 mm.

Hab. UGANDA, Mt. Elgon (*Woodhouse*).

Nearly allied to *H. clarus*, Pilsbry, which was collected by Kemp on Mt. Mikeno and the E. coast of Lake Kivu, in the Belgian Congo. The latter, however, seems to be a rather larger form, and should always be separable from the more northern species, unless intermediates are subsequently found to occur.

Homorus illitus, sp. n. (Pl. I. fig. 2.)

Shell large, elongate-turriform, imperforate, rather solid, rather rugose, but shining, translucent, chestnut-brown. Spire produced, sides regular, apex acutely mamillate. Whorls 11, rather flat, gradually increasing, the first micropunctate, 2nd and 3rd nearly smooth, with very faint, irregular, scratchy spiral lines: commencing faintly in the suture of the 3rd whorl, the remainder are covered with regular, nearly flat, curved, moderately oblique transverse striae, curved backward in the upper suture and fainter on the lower half of each whorl; the spiral sculpture continues nearly throughout, being visible, in patches, with a weak lens; suture simple, shallow. Aperture subovate, interior pale blue with a narrow brown border; peristome simple, acute; outer lip nearly straight in profile, receding moderately to the base; columella short, concave, abruptly truncate at its extreme base; paries white, devoid of epidermis.

Long. 31·5, lat. 7·9; apert., alt. 6·7, lat. 3·9; last whorl 11·5 mm.

Hab. KENYA, Lari (*Gooch*).

Type in British Museum.

A fine species, whose solid, varnished, unicoloured chestnut shell appears to differ from any other of the genus.

Homorus involutus (Gould), 1844.

1837. *Helix funiculata*, Valenciennes MS. (in Paris Museum).

1844. *Achatina involuta*, Gld. Proc. Boston Soc. i. p. 158.

1846. *Achatina fraseri*, Pfr. Symb. iii. p. 90.

1861. *Achatina foxcrofti*, Pfr. P. Z. S. p. 25.

The above synonymy may be accepted as correct. Pfeiffer himself acknowledged that *fraseri* was identical with *involutus*, and careful examination of the unfigured *foxcrofti*, the type of which is in the British Museum, proves it to be quite inseparable. As mentioned by d'Ailly, a prominent feature in *H. involutus* is the strong, distant rib-striation in, or just below, the early sutures after the first $1\frac{1}{2}$ whorls. The type set of *foxcrofti* are much bleached, but retain enough of the epidermis to show that it was originally dark brown, while they agree both in form and sculpture with Gould's species.

Homorus zebra, sp. n. (Pl. I. fig. 3.)

Shell rather large, elongate-turriform, imperforate, rather thin, smooth, shining, pale yellow, the first 4 whorls rather

worn in the type, remainder painted with numerous narrow, nearly vertical, rufous streaks, for the most part straight, but occasionally irregular. Spire produced, sides nearly regular, apex acutely conic. Whorls 10, but little convex, gradually and regularly increasing, the first 2 much worn and malleate, the 3rd closely microscopically spirally striate, 4th similar to 3rd, but with faint transverse striæ, which continue more strongly on the remaining whorls, on all of which are occasional, irregularly spaced, rather distant, deep, spiral grooves; suture shallow. Aperture subovate, peristome simple, acute; outer lip but little outcurved, nearly vertical in profile; columella rather long, very slightly convex, narrowly obliquely truncate at base; callus not thick, but continuous up the columella and across the paries.

Long. 33·8, lat. 12·0; apert., alt. 9·7, lat. 5·4; last whorl 15·5 mm.

Hab. KENYA, Kekumega (*Percival*).

Perhaps nearest to *H. elliotti* (Smith) *, from which it appears to differ in being a slightly more slender form, with finer apex and rather shorter whorls.

Genus *NOTHAPALUS*, von Martens, 1897
(= *Kenia*, Preston, 1911).

Nothapalus iredalei (Preston), 1911.
(Pl. I. figs. 20 (type), 21.)

The type of this species is, unfortunately, in such indiffer-ent condition that, until topotypes come to hand, it is inadvisable to attempt to differentiate from it a variety of races which hail from many parts of Kenya Colony and may, in some cases, represent distinct species. The extreme form from Kekumega, illustrated by fig. 21, is obviously far more obese than the type, but differs little from it in sculpture and length of whorl, and, as intermediates occur, I prefer to regard them all, for the present, as one species.

Nothapalus ugandanus, sp. n. (Pl. I. fig. 26.)

Shell small, subfusiform, imperforate, thin, smooth, shining, transparent, normally pale olivaceous. Spire produced, sides rather convex, apex narrowly rounded. Whorls 6, not very convex, rather rapidly increasing, the first 2 practically smooth, remainder engraved with rather close, but irregular, shallow transverse grooves, usually bent backward just below

* *Achatina elliotti*, Smith, Proc. Malac. Soc. i. (1895) pp. 323, 325.

the suture of the later whorls; there are usually, also, patches of very close, regular, microscopic spiral sculpture, but this is very faint and by no means a distinguishing feature; suture simple, shallow, Aperture subovate, peristome simple, acute; outer lip straight and nearly vertical in profile; columella short, concave, sharply truncate at base.

Long. 11·6, lat. 4·5; apert., alt. 4·5; lat. 2·2; last whorl 7·4 mm.

Hab. UGANDA, Kigezi, 6000 ft.; Ingezi, Mfumburu Mountains. BELGIAN CONGO, Buhamba; Burunga, Mt. Mikenno (*Kemp*).

Different broods vary slightly in contour, and were distributed before the war under manuscript names of the first three localities above mentioned, but the engraved sculpture is common to all, and there appear to be no geographical or other valid grounds for separating them.

Dr. Pilsbry kindly informs me that *N. ugandanus* differs from all of the species dealt with by him in his recent work on the Congo.

Nothapalus adelus, sp. n. (Pl. I. fig. 27.)

Differs from the preceding species in having a broader spire and rather closer sculpture, which is also of more normal pattern, the striæ being raised and imparting less the appearance of grooves than in *N. ugandanus*. The shell contains $6\frac{1}{2}$ whorls, and measures:—

Long. 11·25, lat. 4·7; apert., alt., 4·3, lat. 2·1; last whorl 7·25 mm.

Hab. Probably BELGIAN CONGO, between L. Mutanda and L. Kivu (*Kemp*).

Dr. Pilsbry informs me that *N. adelus* stands very close to *N. ptychoraphe*, Pilsb., but, though possessing the same number of whorls, it is smaller throughout and relatively wider than his species.

Nothapalus paucispira (von Martens), 1892.

1892. *Subulina paucispira*, Mts. Sitz.-Ber. Ges. nat. Fr. Berlin, p. 177.

1912. *Kenia obesa*, Prest. Rev. zool. Africaine, i. p. 326.

Paratypes of both the above are in the British Museum; they are quite inseparable, and Preston's species must be placed in synonymy.

Nothapalus unctus (Smith), 1903.

Described as a *Subulina*, this species is a *Nothapalus*,

apparently of pale yellow horn-colour, rather than brown, and with more convex whorls than *N. iredalei* (Preston), which it otherwise much resembles.

Nothapalus dohertyi (Smith), 1903.

This may probably also be placed in *Nothapalus*, which it resembles in its long last whorl and the straight profile of its outer lip. The transverse striation, however, is much more prominent than in other known members of the genus.

Genus *EUONYMA*, M. & P., 1896.

Euonyma lanceolata (Pfr.), 1854.

1854. *Bulimus lanceolatus*, Pfr. P. Z. S. p. 292.

1857. *Bulimus micans*, Pfr. Mal. Blätt. iv. p. 156.

1905. *Obeliscus natalensis*, Bnp. Proc. Malac. Soc. vi. p. 304.

These three species are identical.

I have previously pointed out that specimens in the British Museum identified as *micans* by Pfeiffer himself are entirely conspecific with his type of *lanceolata*. *Natalensis* was differentiated from the latter on account of having supposedly stronger sculpture; Mr. Burnup, however, has kindly permitted me to examine a large series of the species, which prove that the sculpture varies, to a great extent, in accordance with the state of preservation of the individual, being on the whole more prominent in fresh than in rubbed or weather-worn specimens. The type of *natalensis* was a beautiful fresh young shell, while all the older examples, labelled *lanceolata* and *micans*, in the British Museum are somewhat bleached and of smoother appearance, but the additional series shown me by Mr. Burnup prove that the sculpture is really the same throughout them all, and, except for slight dimorphism, there is practically no real difference between any of them.

Euonyma lymneæformis (M. & P.), 1901. (Pl. I. fig. 4.)

1901. *Obeliscus lymneæformis*, M. & P. Ann. & Mag. Nat. Hist. viii. p. 317, pl. ii. fig. 5.

Ever since its publication this species has been completely misunderstood. The authors' original figure accurately portrays their type, but a large series, kindly furnished by Mr. Burnup from the type-locality Karkloof and other districts prove that the type is abnormal. This shell shows no fewer than three fractures, at the apex, the fourth and the penultimate whorls, which are quite sufficient to account for

the malformation of its elongate, comparatively swollen later whorls and shortened aperture. As a matter of fact, Burnup has actually been able to match this deformed shell with another from the same locality, which has been broken at more than one stage of growth, and exhibits almost exactly the same deformities.

It is now clear that the normal form of *E. tymneiformis*, illustrated on Pl. I., is a well-known species, smoother and rather smaller than *E. lanceolata*, Pfr. (= *natalensis*, Bnp.), which has been misidentified and distributed during recent years as the true *lanceolata*, Pfr.

Euonyma magilensis (Craven), 1880.

1880. *Bulimus magilensis*, Crvn. P. Z. S. p. 217.

1913. *Euonyma achilles*, Prest. Rev. zool. Africaine, iii. p. 54.

This remarkable species is almost unique in its combination of broad blunt apex, shortened aperture, and perforation. The type of *magilensis* is merely a half-grown example of the beautiful *achilles* of Preston, and the latter name cannot be retained. Being of somewhat solid texture, even the most immature shells present a peculiarly mature appearance about the aperture, and some of these were distributed prior to 1914 under a manuscript Latin name recalling their very short form; they are quite inseparable from *magilensis*.

As *Homorus* and *Subulina* are invariably imperforate, it may be advisable to retain the present species in the South African genus *Euonyma* until something is known of its anatomy.

Genus NEOGLESSULA, Pilsbry, 1909.

Neoglessula paritura (Gould), 1850.

1850. *Achatina paritura*, Gld. Proc. Boston Soc. iii. p. 196.

1885. *Glessula bretignerei*, Chaper, Bull. Soc. Zool. Fr. x. p. 46.

1894. *Homorus assiniensis*, Chaper, Kob. Conch. Cab. p. 91.

Ancey suggested, in 1888, that *bretignerei* might prove to be identical with *paritura*, and comparison of authentic specimens in the British Museum leaves no room for doubt that Chaper's species must be placed in synonymy. Pilsbry has pointed out that the *assiniensis* mentioned by Kobelt is a misprint for *bretignerei*.

Paritura has been distributed in the past by at least one German authority under the name of *maloguettana*, Rang, but if Rang's figure and description are reliable the latter is perfectly distinct, having a darker and more slender shell than Gould's species.

Genus SUBULINA, Beck, 1837.

Subulina taruensis, sp. n. (Pl. I. fig. 16.)

Shell comparatively large, lanceolate, imperforate, thin, smooth, shining, normally transparent, and olivaceous. Spire much produced, sides nearly regular, apex mamillate. Whorls $12\frac{1}{2}$, nearly flat, slowly and regularly increasing, with practically no basal margination; the first 2 quite smooth, the sculpture on the remainder, only visible under a strong lens, consisting of close, straight, nearly vertical, transverse striæ, very faintly puckered just below the suture, which is simple and shallow. Aperture subovate, peristome simple, acute; outer lip straight in profile, receding to the base; columella concave, sharply and abruptly truncate at base.

Long. 22·3, lat. 4·3; apert., alt. 3·5, lat. 2·2; last whorl 6·7 mm.

Hab. KENYA, Taru Desert (*Percival*); UGANDA, between Mbarara and Kigezi (*Kemp*).

Although it hails from 600 miles westward, I am quite unable to separate a younger and fresher shell from the last-mentioned locality from the typical form; it contains 10 whorls and measures:—Long. 17·7, lat. 3·9; apert., alt. 3·3, lat. 2·1; last whorl 5·3 mm.

S. taruensis is easily distinguishable from most of the genus by its slender form and short flat whorls. The embryo contains 3 whorls, sculptured as described above, with markedly truncate columella.

Subulina turtoni, sp. n. (Pl. I. fig. 24.)

Shell of moderate size, elongate-turritiform, imperforate, thin, smooth, glossy, yellowish olivaceous. Spire produced, sides regular, apex submamillate. Whorls 8, convex, rounded at the periphery, regularly and gradually increasing, the first 2 or 3 smoothly microscopically punctate, remainder sculptured with close, faint, regular, straight, slightly oblique, transverse striæ; suture simple, rather deep. Aperture irregularly rhombic, peristome simple, acute; outer lip moderately outcurved, receding a little in a straight line to the base; columella short, inclined to the left, rather obliquely, though decidedly, truncate at the base.

Long. 11·1, lat. 3·1; apert., alt. 2·8, lat. 1·6; last whorl 4·8 mm.

The largest shell seen measures 15·2 × 3·9 mm.

Hab. S. RHODESIA, Khami (*Turton*); Bulawayo (in S. African Museum); Lusanyama District (*Quekett*).

Larger than any species hitherto described from South Africa, and not very closely resembling any known to me from further north, being a rather smaller form, with comparatively longer whorls, than *S. octona*, Brug., and its allies. I have much pleasure in naming this South African land-shell after its discoverer, Colonel W. H. Turton, as a tribute to the great work accomplished by him in regard to the marine fauna of the subcontinent.

Subulina viridula, sp. n. (Pl. I. fig. 25.)

Shell of fair size, elongate-turritiform, imperforate, thin, rather silky, transparent, dark olivaceous. Spire produced, slightly attenuate from the 6th whorl, apex narrowly rounded. Whorls 10, almost flat, regularly increasing, the first 2 smooth, remainder sculptured with well-defined, close, regular, nearly straight, vertical, transverse striae, very faint on the 3rd whorl and gradually increasing in strength; suture but little oblique, crenulate from the base of the 3rd whorl onward. Aperture subovate, peristome simple, acute; outer lip straight and almost vertical in profile; columella concave, sharply and abruptly truncate at base.

Long. 18·0, lat. 4·2; apert., alt. 4·1, lat. 2·0; last whorl 6·7 mm.

Hab. UGANDA, Kigezi, 6000ft.; BELGIAN CONGO, Mukanda, near Lake Kivu (*Kemp*).

A pretty species of rather unusual colour, clearly differing in apical sculpture from *S. glyptocephala*, Pilsbry.

Subulina entebbana, Pollonera, 1907.

1907. *Subulina octona*, Chem., var. *entebbana*, Pollon. Boll. Mus. Torino, No. 568, p. 2.

1913. *Subulina victoriae*, Kob. Rev. Suisse Zool. xxi. p. 73.

Examples of this species were collected by Kemp at Jinja, Entebbe and Kampala, and distributed by Preston under the name of the first-mentioned locality. They appear to agree in every respect with *S. victoriae*, Kobelt, described from the Busoga District, in which Jinja is situated, and with *S. octona entebbana*, Pollon., and establish synonymy between them. Pollonera's name has precedence, and appears worthy of specific rank; the shell is far more strongly sculptured than that of *S. octona*.

Genus *SUBULINISCUS*, Pilsbry, 1919.

Subuliniform shells with spirally striate, acutely conoid, apical whorls.

Subuliniscus adjacens, sp. n. (Pl. I. fig. 12.)

Shell comparatively large, acuminate-turritiform, imperforate, thin, smooth, glossy, transparent, olivaceous. Spire produced, sides nearly regular, apex acute. Whorls 10, not very convex, gradually and regularly increasing, without basal margination; first $1\frac{1}{2}$ worn in the type and sparsely malleate, the sculpture of the remainder, under a strong lens, consisting of close, regular, nearly straight, slightly oblique, transverse striæ, chiefly visible just below the suture, and extremely close, regular, slightly undulating spiral striation, covering the transverse striæ and becoming plainer on each succeeding whorl; suture simple, moderately oblique, well defined. Aperture ovate, peristome simple, acute, outer lip straight in profile, receding a little to the base; columella slightly concave, abruptly, though not very noticeably, truncate at its extreme base.

Long. 22·3, lat. 5·7; apert., alt. 5·7, lat. 3·1; last whorl 9·6 mm.

Hab. KENYA, Larogi Hills (*Percival*).

This species appears to vary considerably in strength of sculpture, both the spiral and transverse striation being sometimes much fainter than as described above, in shells coinciding in all other respects.

Subuliniscus nyiroensis, sp. n. (Pl. I. fig. 14.)

Differs from *S. adjacens* in having very slightly more convex and longer whorls and in the apparent absence of spiral sculpture, except on the second whorl, on which there is a faint appearance, under a strong microscope, of distant, feather-formed, spiral lines; the transverse striæ, also, are a little fainter, and slightly more puckered below the suture. The shell contains 8 whorls, and measures:—

Long. 18·3, lat. 5·2; apert., alt. 4·9, lat. 2·8; last whorl 8·7 mm.

Hab. KENYA, Mt. Nyiro, 8300 ft. (*Percival*).

Subuliniscus marsabitensis, sp. n. (Pl. I. fig. 13.)

Very similar to *S. adjacens*, from which it differs chiefly in having noticeably shorter whorls; the spiral sculpture, also, is far fainter, being almost absent on the three earlier,

though clearly visible under a strong microscope on the later whorls. The shell contains $10\frac{1}{2}$ whorls, and measures :—

Long. 19·0, lat. 5·1 ; apert., alt. 5·0, lat. 2·5 ; last whorl 7·8 mm.

Hab. KENYA, north slope of Mt. Marsabit, 4600 ft. (*Percival*).

It is obvious that the last three species are very closely allied, being possibly derived from one parent stock, the members of which have gradually developed individual characters under diverse environmental conditions. Unless, however, intermediates subsequently occur, all seem entitled to distinct specific rank.

Subuliniscus urguessensis, sp. n. (Pl. I. fig. 11.)

A more obese form than *S. adjacens*, with slightly flatter whorls. The sculpture is considerably stronger, being visible under a single lens and consisting of fairly strong, regular, straight, slightly oblique, transverse striæ on all but the first two whorls, and extremely close, regular, spiral striation first visible on the 2nd whorl and crossing the transverse sculpture ; under a microscope there is, further, an appearance of coarser, more distant, flat, spiral lines, interrupting the transverse ridges but not cutting the epidermis. The shell contains 9 whorls, and measures :—

Long. 18·8, lat. 6·7 ; apert., alt. 6·2, lat. 3·2 ; last whorl 9·5 mm.

Hab. KENYA, Urguess (*Percival*).

S. urguessensis closely resembles in form *S. alticola* (d'Ailly) from Meru, but differs widely from it in sculpture, the transverse striæ in *alticola* being fainter and coarser and the spiral striation much weaker, so that it is impossible to confuse the two species unless intermediates occur.

Subuliniscus cornu-orycis, sp. n. (Pl. I. fig. 15.)

Shell of fair size, elongate-turritiform, imperforate, thin, smooth, nearly transparent, dark olivaceous. Spire produced, very slightly alternate about the 6th whorl, apex acute. Whorls 9, nearly flat, very gradually increasing, the last angulate at the periphery, the first 3 almost devoid of transverse sculpture, which appears weakly on the second whorl, the remainder with close, faint, nearly straight, slightly oblique transverse striæ, stronger and bent backward just below the suture, and all the whorls covered with extremely close, fine, undulating, spiral sculpture ; suture simple, shallow, only slightly oblique. Aperture subrhombic, rounded at base ; peristome simple, acute ; outer lip almost

straight, receding moderately to the base; columella almost rectangularly truncate.

Long. 13.5, lat. 3.8; apert., alt. 3.2, lat. 1.7; last whorl 6.0 mm.

Hab. KENYA, Mt. Nyiro, 8300 ft. (*Percival*).

The type is somewhat immature, but differs beyond compare from the last four species. It is far more nearly allied to *S. lucasi*, Pilsbry, from which it may be distinguished by its less regular spire, darker colour, and slightly coarser transverse sculpture, while the spiral striation is far more clearly visible under equally strong magnification. It must be admitted that none of these features are in themselves of much specific value, but taken together, and considering the wide distance between the localities of the two species, it seems advisable to accord *S. cornu-orycis* specific, rather than subspecific, rank.

Subuliniscus alticola (d'Ailly), 1910. (Pl. I. fig. 10.)

1910. *Petriola alticola*, d'Ailly, Kilimandjaro, i. 6, p. 27.

As the publication in which this little-known species was described is not commonly available, I give a photograph of a paratype from Meru.

EXPLANATION OF PLATE I.

- Fig.* 1. *Homorus burnessi*, Conn.
Fig. 2. — *illitus*, Conn.
Fig. 3. — *zebra*, Conn.
Fig. 4. *Euonyma lymneæformis* (M. & P.), normal form.
Fig. 5. *Homorus egregius*, Preston, var. *inflata*, Conn.
Fig. 6. *Pseudoglessula batesi*, Conn.
Fig. 7. — —, var. *major*, Conn.
Fig. 8. — *perobtusa*, Conn.
Fig. 9. *Homorus woodhousei*, Conn.
Fig. 10. *Subuliniscus alticola* (d'Ailly).
Fig. 11. — *urguessensis*, Conn.
Fig. 12. — *adjacens*, Conn.
Fig. 13. — *marsabitensis*, Conn.
Fig. 14. — *nyiroensis*, Conn.
Fig. 15. — *cornuorycis*, Conn.
Fig. 16. *Subulina taruensis*, Conn.
Fig. 17. *Pseudoglessula transenna*, Conn.
Fig. 18. — *solitudinum*, Conn.
Fig. 19. — *ingloria*, Conn.
Fig. 20. *Nothapalus iredalei*, Preston.
Fig. 21. — —, (?) forma *tumida*.
Fig. 22. *Pseudoglessula mutabilis*, Conn.
Fig. 23. — *mutandana*, Conn.
Fig. 24. *Subulina turtoni*, Conn.
Fig. 25. — *viridula*, Conn.
Fig. 26. *Nothapalus ugandanus*, Conn.
Fig. 27. — *adelus*, Conn.

All figures actual size.

XLI.—*Descriptions of new Species of Staphylinidæ from the West Indies.* By MALCOLM CAMERON, M.B., R.N., F.E.S.

PART II.

[Concluded from vol. ix. 1922, p. 652.]

MYREDONIINI.

PSEUDOTHAMIARÆA, gen. nov.

Tarsi 4, 5, 5: the anterior pair with the first three joints short and equal, the fourth as long as the three preceding together; middle pair with the first four joints rather short, equal; posterior pair with the first joint a little longer than the second, the second to the fourth of equal length. Epi-pleuræ of the prothorax not visible to side view. Mesosternum gradually narrowed to the rounded apex, and extending two-thirds of the length of the intermediate coxæ (which are rather widely separated), and furnished with a median keel throughout its whole extent. Metasternal process truncate, meeting the preceding. Temples strongly bordered throughout. Maxillary palpi 4-jointed: the first small; the second elongate, lightly thickened towards the apex; the third as long as the second and similarly thickened; the fourth long, subulate, more than half as long as the third. Labial palpi 2-jointed (indistinctly 3-jointed): the first joint rather long and stout, with an oblique suture passing from the inner border at the level of the junction of the second and last thirds forwards and outwards, imperfectly defining another joint; second joint narrower and a little shorter than the first. Tongue narrow and elongate, extending as far as the level of the apex of the first joint of the labial palpi, and split for one-fourth of its length into two narrow diverging lobes, the apex of each carrying a long seta curved backwards and the external margin with two similar setæ; the inner margin before the apex with two weaker, shorter, and straight setæ.

The species on which this genus is founded might be taken for a broad and robust *Atheta* of the *Acrotona* group, but in the structure of the labial palpi approximates to *Thamiaræa*; the tongue, however, is quite different, and remarkable in the long curved setæ which it carries.

107. *Pseudothamiaræa brunnea*, sp. n.

Rather shining, brown; the head reddish, the abdomen black. First three joints of the antennæ and legs reddish testaceous.

Length 2-3 mm.

Head transverse, reddish, very finely and moderately closely punctured, finely pubescent; the eyes large, their diameter much greater than the length of the temples. Antennæ slender, setiferous, the second and third joints of equal length, the fourth to the seventh longer than broad, gradually decreasing in length, the eighth and ninth as long as broad, the tenth slightly traversing the eleventh as long as the two preceding together. Thorax strongly transverse, nearly twice as broad as long, widest a little before the posterior angles, narrowest in front, the sides gently rounded, the posterior angles completely rounded; the epipleura not visible when examined from the side, the base bordered; very finely and moderately closely punctured, finely pubescent. Elytra one-third longer and distinctly broader than the thorax, transverse, the posterior margin sinuate internal to the postero-external angle, not quite so finely but about as closely punctured as the thorax. Abdomen a little narrowed behind, very finely but not very closely punctured throughout, finely pubescent.

Haiti. Type in my collection.

108. *Falagria (Anaulacaspis) cephalotes*, sp. n.

(Fauvel, *in litt.*)

Black, shining; elytra brownish-testaceous. Antennæ brown, the first two joints reddish-testaceous. Legs testaceous-yellow.

Length 2 mm.

Remarkable by the large head, which is considerably wider than the thorax, but narrower than the elytra at the shoulders.

Head large, transversely quadrate, the posterior angles rounded, the eyes rather large, their diameter not so great as the length of the temples, the vertex anteriorly rather deeply and longitudinally impressed in the middle line; very finely and by no means closely punctured and finely pubescent. Antennæ with the second and third joints of equal length, the fourth to the seventh slightly longer than broad and gradually decreasing in length, the eighth to the tenth about as long as broad and differing but little between

themselves, the eleventh nearly as long as the two preceding together. Thorax of the usual shape of the subgenus, deeply sulcate in the middle and rather more finely though about as closely punctured as the head. Scutellum without groove or keels. Elytra about as long as, but broader than the thorax, square, very finely and not very closely punctured for the greater part, but in the scutellary region obviously more coarsely and much more closely punctured. Abdomen very finely and not very closely punctured and pubescent throughout.

Grenada (*H. H. Smith*). Type in the British Museum.

109. *Stenagria basiventris*, sp. n.

Black, shining; the elytra pitchy-black, the third (first visible) dorsal segment of the abdomen yellow. Antennæ elongate, black, the first joint pitchy, the terminal pale yellow. Legs black, the tarsi yellow.

Length 2.75 mm.

Head orbicular, as broad as the thorax, extremely finely and rather sparingly punctured at the base and sides, the vertex and front impunctate. Antennæ elongate, all the joints distinctly longer than broad, gradually decreasing in length from the fourth, the eleventh joint longer than the tenth. Thorax widest just before the middle, the sides from thence rounded and narrowed in front, pretty strongly contracted in a lightly curved line to the obtuse but somewhat prominent posterior angles; disc deeply sulcate, the base immediately adjacent to the posterior margin closely and rather coarsely punctured, the rest of the surface extremely finely and rather sparingly punctured. Scutellum with smooth median keel, somewhat coarsely and closely punctured. Elytra as long as, but broader than, the thorax, scarcely transverse, very finely and moderately closely punctured at the base, the rest of the abdomen very finely and not very closely punctured.

Jamaica. Type in my collection.

PSEUDOGNYPETA, gen. nov.

Labrum transverse, truncate, the sides and anterior angles rounded. Mandibles rather slender, sharply pointed, the right with a minute tooth about the middle of the inner border, the left simple, both with a ciliated membrane at the base. Maxillary palpi 4-jointed, the first joint small, the second elongate, slightly curved and thickened towards the apex, the third a little longer than the second, narrowed

at the base, a little longer, and wider at the apex, than the preceding, the fourth subulate, about half as long as the third. Inner lobe of the maxilla with seven or eight teeth along the inner margin anteriorly, posteriorly closely ciliated; outer lobe with the apex ciliate-plumose at the antero-external angle and ciliate internally to this. Tongue moderately wide at the base, extending nearly to the level of the apex of the first joint of the labial palpi, deeply and rather widely emarginate nearly to the base, thus dividing the structure into two narrow and rather widely separated lobes with briefly rounded apices. Paraglossæ apparently wanting. Labial palpi 3-jointed, the first rather long, cylindrical, the second scarcely half as long as the first and a little narrower, the third much narrower, about double the length of the preceding, cylindrical. Gular sutures slightly divergent posteriorly. Temples completely bordered below. Neck rather broad, about a third of the width of the base of the head. Prosternum broadly rounded behind. Mesosternum gradually narrowed, extending one-half the length of the intermediate coxæ and bluntly pointed. Metasternum moderately broadly rounded, not meeting the mesosternum, the intersternal piece rather short. Intermediate coxæ moderately separated. Tarsal formula 4, 5, 5. Anterior pair with the first three joints short and subequal, the fourth longer than the three preceding together. Middle pair with the first four joints rather short (but longer than broad), subequal. Posterior pair with the first four joints moderate and of equal length, the fifth about as long as the three preceding together. Tibiæ ciliate. Abdomen with first three (visible) segments transversely impressed at base.

This genus has the facies of *Gnypeta*, but the temples are distinctly margined.

110. *Pseudognypeta picta*, sp. n.

Black, shining; the posterior fourth of the thorax and the first two (visible) abdominal segments bright testaceous-yellow, each of the latter in the middle with a black spot extending from the anterior to the posterior border; elytra brown, with coppery metallic reflex; antennæ with the first three joints and apex of the last testaceous. Legs testaceous.

Length 3 mm.

Facies very similar to *Gnypeta carbonaria*, Mannerh.

Head suborbicular, the eyes large and rather prominent, the front and vertex impunctate, the sides with scattered and rather fine punctures each bearing a short black hair;

ground-sculpture fine and coriaceous. Antennæ with the second joint a little shorter than the first and third, the fourth to the sixth as long as broad, gradually increasing in size, the seventh to the tenth transverse, gradually increasing in breadth, the penultimate half as broad again as long, the eleventh elongate, pointed, about as long as the three preceding together. Thorax transverse, wider than the head, shorter than in *G. carbonaria*, but otherwise similarly constructed, finely and rather sparingly punctured; ground-sculpture fine, coriaceous. Scutellum dark, closely punctured. Elytra a little longer and broader than the thorax, scarcely transverse, finely and pretty closely punctured and pubescent. Abdomen nearly impunctate.

♂. Eighth dorsal segment broadly rounded and with a minute notch in the middle of the posterior border, on either side with a rather deep emargination bounded externally by a strong and stout tooth, which does not quite attain the level of the posterior border of the central lobe.

Jamaica. Type in my collection.

111. *Gnypeta basiventris*, sp. n.

(Fauvel, *in litt.*)

Shining, black; the thorax pitchy, the elytra brownish testaceous, the first two (visible) abdominal segments reddish testaceous. Antennæ reddish testaceous, the first three joints lighter. Legs testaceous.

Length 1.75 mm.

Very similar in build, though much smaller than *G. carbonaria*, Mannerh., and differing also in coloration and the more distinctly punctured head.

Head suborbicular, the eyes large, their diameter rather more than the length of the temples; very finely and rather closely punctured at the sides, more obsoletely and sparingly in front. Antennæ with the third joint a little shorter than the second, the fourth to the seventh a little longer than broad, gradually decreasing in length, the eighth as long as broad, the ninth and tenth slightly transverse, the eleventh elongate, as long as the two preceding together. Thorax transverse, wider than the head, finely, obsoletely, but rather closely punctured. Elytra as long as, but broader than the thorax, transverse, exceedingly finely and obsoletely and rather closely punctured. Abdomen very finely and moderately closely punctured and pubescent throughout.

Grenada (*H. H. Smith*). Type in the British Museum.

112. *Gnypeta sanctæ-luciæ*, sp. n.

Black, moderately shining; the posterior border of the elytra narrowly and obscurely testaceous; abdomen with the first two visible segments more or less testaceous; first two joints of the antennæ and legs testaceous.

Length 2.5 mm.

Size and build of *G. fragilis*, Shp., but much less shining, with more closely punctured fore-parts and with the terminal joint of the antennæ concolorous.

Head suborbicular, the eyes large, the vertex with median impression, very finely and rather closely punctured and pubescent. Antennæ elongate, the second and third joints of equal length, the fourth to the eighth longer than broad, gradually decreasing in length, the ninth and tenth about as long as broad, the eleventh elongate, longer than the two preceding together. Thorax transverse, the sides contracted behind, rounded in front; disc with median longitudinal impression broadest behind, narrowed and evanescent anteriorly, very finely and rather closely punctured and pubescent. Elytra as long as, but broader than the thorax, transverse, rather more finely and quite as closely punctured and pubescent as the thorax. Abdomen nearly parallel, the first two segments testaceous, the middle of each with an ill-defined dark spot which in some examples spreads nearly entirely over these two segments, the abdomen appearing almost concolorous; exceedingly finely and closely punctured and pubescent throughout.

St. Lucia. Type in my collection.

113. *Gnypeta basalis*, sp. n.

Black, moderately shining; elytra testaceous, the base, sides, and suture infusate. First two joints of the antennæ and legs testaceous.

Length 2.5 mm.

Size and build of the preceding, from which it differs in the coloration of the elytra, the unicolorous abdomen, rather more slender (but otherwise similarly constructed) antennæ, and the rather finer puncturation of the fore-parts.

St. Lucia. Type in my collection.

114. *Aleuonota* * *carinella*, sp. n.

(Fauvel, *in litt.*)

Elongate, parallel, ferruginous, rather shining; the head

* Fenyès (Gen. Insect. fasc. 173 A, Aleocharinæ, p. 19) places *Aleuonota* amongst the Oxyopodini as having all the tarsi 5-jointed. The species described above, and also *A. gracilentæ*, Er., have a tarsal formula of 4, 5, 5.

sometimes blackish, the elytra more or less extensively infusate. Antennæ and legs testaceous.

Length 2 mm.

In build very similar to *A. egregia*, Rye, but much smaller and narrower and differently coloured.

Head square, the posterior angles briefly rounded, finely, closely, and obsolete punctured, finely pubescent; eyes small, their diameter much less than the length of the temples. Antennæ with the third joint shorter than the second, the fourth to the tenth transverse, the penultimate twice as broad as long. Thorax a little wider than the head, slightly transverse, widest a little behind the anterior angles, the sides feebly rounded and narrowed anteriorly, slightly contracted in a nearly straight line to the obtuse posterior angles, exceedingly finely, obsolete, and closely punctured, much more finely than the head, very finely pubescent. Elytra fully as long as and a little broader than the thorax, square, very finely and closely punctured, finely pubescent. Abdomen parallel, extremely finely and moderately closely punctured and pubescent on the first four segments, more sparingly on the two last.

♂. Seventh dorsal segment with a fine longitudinal keel on either side about midway between the lateral border and the median line, extending from the posterior margin for about three-fourths the length of the segment.

St. Vincent (*H. H. Smith*). Type in the British Museum.

115. *Atheta (Dralica) tentativa*, sp. n.

Parallel, black, shining; the thorax, elytra, posterior half of the seventh, and whole of the eighth abdominal segments, testaceous. First three joints of the antennæ and legs testaceous.

Length 1.2 mm.

In build very similar to *A. amacula*, Steph., but much smaller, differently coloured, and with the seventh and eighth abdominal segments pretty closely punctured.

Head large, transversely subquadrate, the eyes large, their diameter greater than the length of the temples; the posterior angles rounded; puncturation moderately fine and rather close, ground-sculpture distinct and coriaceous; pubescence fine. Antennæ with the third joint shorter than the second, the fourth to the tenth transverse, the penultimate twice as broad as long. Thorax pale reddish testaceous, transverse, wider than the head, without visible puncturation, but with a fine close coriaceous granulation, and finely pubescent.

Elytra more yellow than the thorax, about one-third as long again and a little broader, as long as broad, very finely, closely, and somewhat roughly punctured, finely pubescent. Abdomen parallel, very finely and pretty closely punctured and pubescent throughout.

Jamaica. Type in my collection.

116. *Atheta (Anopleta) antillarum*, sp. n.

(*Phytosus antillarum*, Fauvel, in litt.)

Elongate, parallel, slightly shining, reddish testaceous, the sixth abdominal segment black. Antennæ and legs testaceous.

Length 1.75 mm.

A small but rather coarsely pubescent species, somewhat similar in build to *Phytosus*, but structurally agreeing with the subgenus *Anopleta*.

Head large, orbicular, nearly as broad as the thorax, moderately finely and rather closely punctured, finely but distinctly coriaceous, pretty closely and rather coarsely pubescent; eyes small and not prominent. Antennæ with the third joint distinctly shorter than the second, the fourth square, the fifth to the tenth transverse, the penultimate about twice as broad as long. Thorax in shape very similar to that of *Phytosus balticus*, Kr., but less markedly contracted behind; only slightly transverse, widest just behind the anterior angles, the sides from thence rounded and narrowed anteriorly, slightly sinuate and more strongly contracted to the rounded posterior angles; the disc slightly impressed before the scutellum, finely and not closely punctured, rather coarsely pubescent. Elytra a little longer and broader than the thorax, as long as broad, finely and moderately closely punctured, rather coarsely pubescent. Abdomen parallel, the sixth segment transversely impressed at the base, very finely and not very closely punctured anteriorly, rather more sparingly behind, pubescence scanty, rather long and coarse. Tibiæ ciliate.

Mustique Island (*H. H. Smith*). Would appear to be a maritime species. Type in the British Museum.

117. *Atheta (Microdota) impavida*, sp. n.

(Fauvel, in litt.)

Black, shining; the thorax, elytra, base and apex of the abdomen reddish testaceous. Antennæ reddish brown, the first three joints and the legs testaceous.

Length 1.2 mm.

Build of *A. amicola*, Steph., but much smaller than this species and differently coloured.

Head large, subquadrate, black, shining, finely and pretty closely punctured, finely pubescent. Eyes rather large. Antennæ with the third joint shorter than the second, the fourth to the tenth transverse, gradually increasing in width, the penultimate rather more than twice as broad as long. Thorax pale reddish testaceous, transverse, wider than the head, finely and rather closely punctured, finely pubescent. Elytra one-third longer and a little broader than the thorax, transverse, testaceous, finely and rather more closely punctured than the thorax. Abdomen with the first two visible and the seventh and eighth segments rather obscurely reddish testaceous, finely and rather sparingly punctured, especially behind.

♂. Eighth dorsal segment truncate; sixth vertical segment narrowed and produced.

Grenada (*H. H. Smith*). Type in the British Museum.

118. *Atheta* (s. str.) *insularum*, sp. n.

(*Ocalea insularum*, Fauvel, in litt.)

Pitchy, greasy-lustrous; the elytra brownish testaceous or brown. Abdomen black, more shining than the fore-parts, the whole of the eighth and more or less of the seventh segments bright reddish testaceous. Antennæ with the first three joints testaceous; legs testaceous.

Length 3.75 to 4.2 mm.

An elongate parallel species, rather resembling *A. pallidicornis*, Thoms., in build, but the thorax is rather broader.

Head black or pitchy-black, transverse, very finely and moderately closely punctured, very distinctly but finely coriaceous, and finely pubescent; the eyes large, their diameter greater than the length of the temples. Antennæ with the second joint shorter than the third, the fourth a little longer than broad, the fifth, sixth, and seventh as long as broad, the eighth to the tenth slightly transverse, the eleventh elongate, longer than the two preceding together. Thorax pitchy-brown, nearly twice as broad as long, very finely, obsolete, and not closely punctured, very distinctly but finely coriaceous. Elytra as long as but a little broader than the thorax, transverse, brown, with the shoulders brownish yellow, or more or less entirely brownish testaceous, finely and closely punctured, finely pubescent. Abdomen shining, of the colour above indicated, and sometimes with the posterior margins of the anterior segments

narrowly brownish; the second to the sixth segments very finely and not very closely punctured, the seventh and eighth segments yet more sparingly.

♂. Eighth dorsal segment produced in the middle into a short lobe, the margin of which is broadly and slightly emarginate; lateral margin on either side forming a strong slightly incurved pointed tooth, not extending beyond the level of the central lobe and separated from it by a rather deep rounded emargination.

St. Vincent, Grenada (*H. H. Smith*). Type in the British Museum.

119. *Atheta* (s. str.) *cristofera*, sp. n.

Black, shining; the elytra brownish-testaceous, the postero-external angles more or less infuscate. Antennæ dark, the legs testaceous.

Length 3·3 mm.

In coloration and build very similar to *A. euryptera*, Steph., but the thorax narrower; the colour and structure of the antennæ is very similar, except that the fourth joint is transverse in the species under consideration.

Head very finely and rather sparingly punctured, finely coriaceous. Antennæ entirely dark, the second and third joints of equal length, the fourth to the tenth transverse, gradually increasing in width, the penultimate half as broad again as long. Thorax transverse, narrower than in *A. euryptera* but otherwise similarly built, but much more closely and rather more finely punctured than in that species; ground-sculpture fine and coriaceous. Elytra scarcely longer, but broader than the thorax, transverse, finely and rather closely punctured. Abdomen very finely and rather sparingly punctured, especially posteriorly, finely and sparingly pubescent.

♂. Seventh dorsal segment with a strong median keel occupying the posterior half; eighth with the posterior border furnished with four crenulations or small teeth.

Jamaica. Type in my collection.

120. *Atheta* (s. str.) *albipennis*, sp. n.

(Fauvel, *in litt.*)

Black, shining; elytra pale testaceous, a little infuscate about the scutellum; apex of the abdomen (obscurely), first three joints of the antennæ, and legs testaceous.

Length 1·75 mm.

Of the build of *A. trinotata*, Kr., but smaller and differently coloured.

Head rather large, transverse; the eyes large, their diameter greater than the length of the temples; very finely and pretty closely punctured at the sides, the vertex almost impunctate, very finely pubescent. Antennæ with the second and third joints of equal length, the fourth scarcely, the fifth to the tenth distinctly transverse, the eleventh conical, shorter than the two preceding together. Thorax formed as in *trinotata*, Kr., very finely and pretty closely punctured, very finely pubescent, finely coriaceous. Elytra as long as, but broader than the thorax, distinctly transverse, very finely and rather more closely punctured than the thorax, very finely pubescent. Abdomen parallel, very finely and pretty closely punctured on the first three visible segments, much more sparingly behind.

♂. Eighth dorsal segment with the posterior margin furnished with four crenulations, of which the central pair are the larger; sixth ventral segment narrowed and produced, the apex rounded.

Mustique, Grenada (*H. H. Smith*). Type in the British Museum.

121. *Atheta* (s. str.) *accedens*, sp. n.

(Fauvel, *in litt.*)

Black, shining; elytra brownish testaceous. First three joints of the antennæ, legs, and apex of the abdomen (obscurely) testaceous.

Length 2 mm.

Similar in build to *A. albipennis*, mihi, but larger, the elytra more obscurely coloured and the abdomen much more sparingly punctured, the penultimate joints of the antennæ are more transverse and the puncturation of the thorax and elytra less close.

♂ unknown.

Mustique, Grenada (*H. H. Smith*). Type in the British Museum.

122. *Atheta* (s. str.) *dentella*, sp. n.

(Fauvel, *in litt.*)

Pitchy, shining; the head black, the base of the abdomen obscurely lighter, the elytra brownish testaceous. First three joints of the antennæ and legs testaceous.

Length 1.75 mm.

Very similar in build to *A. liturata*, Steph., but much smaller and otherwise coloured.

Head black, very finely and obsoletely and not very closely punctured. Antennæ with the second and third joints of equal length, the fourth scarcely, the fifth to the tenth transverse, gradually increasing in width, the penultimate about twice as broad as long, the eleventh conical, rather longer than the two preceding together. Thorax transverse, brown, shining, very finely and moderately closely punctured, very finely pubescent. Elytra a little longer and broader than the thorax, transverse, brownish, obscurely lighter at the base, very finely and rather closely punctured and pubescent. Abdomen pitchy-brown, parallel, obscurely lighter at the base, very finely and very sparingly punctured.

♂. Seventh dorsal segment with a tubercle just in front of the posterior border in the middle line; eighth dorsal segment with a pair of parallel keels, one on either side of the middle line.

St. Vincent (*H. H. Smith*). Type in the British Museum.

123. *Atheta* (s. str.) *croceicornis*, sp. n.

(Fauvel, *in litt.*)

Black, very shining; the elytra dark brown, obscurely lighter at the shoulders. Antennæ reddish testaceous, the fifth to the eighth joints more or less infusate. Legs testaceous.

Length 1.75 to 2 mm.

Of the average size, but of more robust build than *A. dentella*, mihi, but at once distinguished by the colour of the antennæ and more sparing puncturation of the thorax and elytra. Approaches *A. coriaria*, Kr., in general facies and shining appearance.

Head very finely, obsoletely, and sparingly punctured. Antennæ with the second and third joints of equal length, the fourth to the tenth transverse, gradually increasing in width, the penultimate twice as broad as long, the eleventh conical, as long as the two preceding together. Thorax formed as in *A. coriaria*, Kr., but narrower, very shining, exceedingly finely, obsoletely, and sparingly punctured. Elytra a little longer and broader than the thorax, transverse, not sinuate internal to the postero-external angle, very finely and rather sparingly punctured and pubescent. Abdomen parallel, very finely and very sparingly punctured in front, almost glabrous posteriorly.

♂ unknown.

St. Vincent, Grenada (*H. H. Smith*). Type in the British Museum.

124. *Atheta* (s. str.) *guadalupensis*, sp. n.

(Fauvel, *in litt.*)

Very shining; the head and the abdomen black, the thorax and elytra dark brown. The first two joints of the antennæ, and more or less of the last, reddish testaceous. Legs testaceous.

Length 2 mm.

Size and build of the preceding, but differs in the colour and structure of the antennæ and the less sparingly punctured head, thorax, and elytra.

Head black, very finely and moderately closely punctured. Antennæ with the second and third joints of equal length, the fourth as long or a little longer than broad, the fifth to the tenth transverse, gradually increasing in breadth, the penultimate only slightly transverse, the eleventh elongate, rather longer than the two preceding together. Thorax transverse, narrower than in *A. coriaria*, Kr., very finely and rather sparingly punctured and pubescent. Elytra as long as but broader than the thorax, transverse, very finely and closely punctured and pubescent. Abdomen parallel, the first three visible segments very finely and rather sparingly punctured and pubescent, the sixth to the eighth nearly glabrous.

♂. Eighth dorsal segment narrowed, the posterior margin thickened; feebly emarginate and quadricrenulate. Seventh dorsal segment with a minute tubercle immediately in front of the posterior margin in the middle.

Grenada, St. Vincent (*H. H. Smith*). Type in the British Museum.

125. *Atheta* (s. str.) *plurispinosa*, sp. n.

Black, parallel, rather shining; the elytra bright yellow, with the postero-external angles more or less infuscate. First three joints of the antennæ and legs testaceous.

Length 1.75 mm.

A small rather robust parallel species, much smaller than *A. nigrifolia*, Gr., and with more strongly transverse thorax, brighter elytra, shorter antennæ, the penultimate joints of which are more strongly transverse.

Head broad, finely and pretty closely punctured, finely

pubescent. Antennæ with the second and third joints of equal length, the fourth to the tenth transverse, gradually increasing in breadth, the penultimate three times as broad as long. Thorax strongly transverse, punctured very similarly to the head. Elytra as long as, but a little broader than the thorax, transverse, very finely and rather closely punctured and finely pubescent. Abdomen parallel, very finely and moderately closely punctured on the first four visible segments, more sparingly behind.

♂. Eighth dorsal segment on either side with a rather long incurved spine and with six short, straight contiguous spines between; the outer spine of this series separated from the lateral curved spine on either side by a short interval.

Jamaica (?). Type in my collection.

126. *Atheta* (s. str.) *combusta*, sp. n.

(Fauvel, *in litt.*)

Black, greasy-shining. Elytra pitchy, the shoulders and more or less of the base reddish testaceous. Abdomen shining, black, the base (obscurely) and the seventh and eighth segments brightly reddish testaceous. Antennæ with the first two joints and the last reddish testaceous. Legs testaceous.

Length 2 mm.

Smaller and less shining than *A. liturata*, Steph., with narrower thorax and different coloration.

Head very finely and pretty closely punctured, very distinctly coriaceous, and but little shining. Antennæ rather stout, the second and third joints of equal length, the fourth a little longer than broad, the fifth to the tenth transverse, gradually increasing in breadth, the penultimate nearly twice as broad as long, the eleventh conical, longer than the two preceding together. Thorax transverse, the disc with a fine median furrow, finely and rather closely punctured, finely pubescent, distinctly coriaceous. Elytra as long as, but broader than the thorax, transverse, finely, closely, and somewhat asperately punctured, finely pubescent. Abdomen finely and moderately closely punctured and pubescent, rather more sparingly behind; the base obscurely, the seventh and eighth segments bright reddish testaceous.

♂. Eighth dorsal segment with the posterior margin furnished with four nearly equidistant teeth, the two central of which are smaller than the lateral ones; sixth ventral segment a little produced and rounded.

St. Vincent (*H. H. Smith*). Type in the British Museum.

127. *Atheta* (s. str.) *subcombusta*, sp. n.

Black, greasy-shining. Elytra pitchy, the shoulders, and more or less of the base reddish testaceous. Abdomen black, the eighth dorsal segment pitchy-testaceous. First two joints of the antennæ and the last reddish testaceous. Legs testaceous.

Length 2 mm.

Size and build of the preceding and closely allied thereto, but differs in the coloration of the abdomen, the shorter terminal joint of the antennæ, and the rather finer and less close puncturation generally, and the ♂ characters.

♂. Eighth dorsal segment truncate in the middle, on either side with a tooth separated by an excision from the median lobe, which does not extend beyond the level of the lateral teeth.

Jamaica. Type in my collection.

128. *Atheta* (s. str.) *fatuosa*, sp. n.

Black, greasy-shining; the elytra dark brown. First two joints of the antennæ and legs reddish testaceous, the femora sometimes darker.

Length 2 mm.

Build of *A. crassicornis*, F., but much smaller.

Head very finely and not very closely punctured, finely but distinctly coriaceous, finely and sparingly pubescent. Antennæ with the second and third joints of equal length, the fourth scarcely longer than broad, the fifth to the tenth transverse, gradually increasing in width, the penultimate scarcely half as broad again as long, the eleventh conical, as long as the two preceding together. Thorax transverse, more than half as broad again as long, with a fine median impressed line, evanescent anteriorly, the sculpture similar to that of the head. Elytra a little longer and broader than the thorax, transverse, scarcely sinuate internal to the postero-external angles, finely and closely punctured, finely pubescent. Abdomen parallel, black, shining, finely and sparingly punctured throughout, sparingly pubescent. Intermediate tibiæ with a fine seta about the middle.

♂. Eighth dorsal segment broadly rounded; sixth ventral segment produced and narrowed, the apex rounded.

Jamaica. Type in my collection.

129. *Atheta* (s. str.) *suboblita*, sp. n.

Black, moderately shining; the thorax and elytra pitch-brown. First two joints of the antennæ and legs testaceous.

Length 1-4 mm.

In build very similar to *A. oblita*, Er., but much smaller, more shining, and with stronger seta on the middle of the intermediate tibiæ.

Head black, moderately shining, extremely finely and very sparingly punctured, finely but distinctly coriaceous. Antennæ with the eighth joint scarcely shorter than the second, the fourth to the tenth transverse, gradually increasing in breadth, the penultimate twice as broad as long, the eleventh a little larger than the two preceding together. Thorax about half as broad again as long, extremely finely and not very closely punctured, finely coriaceous and finely pubescent, the sides each with two weak setæ. Elytra scarcely longer, but broader than the thorax, transverse, not sinuate internal to the postero-external angle, finely and closely punctured, finely pubescent. Abdomen very finely and rather sparingly punctured; the seventh and eighth segments almost smooth, pubescence scanty.

♂. Eighth dorsal segment on either side with a long, sharply-pointed, curved tooth, the margin between furnished with four or five short, sharp teeth; sixth ventral segment narrowed and produced, the apex rounded.

Haiti. Type in my collection.

130. *Atheta (Liogluta) jamaicensis*, sp. n.

Very black, shining; the elytra with purple-metallic reflex. Antennæ with the first joint pitchy. Legs testaceous. Length 2 mm.

Build of *A. hypnorum*, Kies., but much smaller.

Head finely and not very closely punctured; the eyes large, their diameter greater than that of the temples. Antennæ with the third joint scarcely shorter than the second, the fourth as long as broad, the fifth to the tenth transverse, the penultimate about half as broad again as long, the eleventh as long as the two preceding together. Thorax only slightly transverse, scarcely one-third broader than long, the puncturation similar to that of the head. Elytra as long as, but broader than the thorax, transverse, finely, and rather closely punctured and pubescent. Abdomen nearly parallel, the first three visible segments finely and not very closely punctured, yet more sparingly posteriorly.

♂ unknown.

Jamaica. Type in my collection.

131. *Atheta (Dimetrota) flotata*, sp. n.

Shining; the head black, the thorax pitchy, the elytra brownish testaceous. Antennæ rather long and stout, the first two joints pitchy, the penultimate as long as broad. Legs testaceous.

Length 2·8 mm.

Very similar to *A. leucoptera*, Shp., but a little more robust, the colour of the elytra more obscure, the intermediate joints of the antennæ shorter, and the ♂ characters different.

Head black, the eyes rather large, their diameter greater than the length of the temples; finely and pretty closely punctured and finely pubescent. Antennæ rather long and stout, the second and third joints of equal length, the fourth to the seventh longer than broad, gradually decreasing in length, the eighth, ninth, and tenth as long as broad, the eleventh elongate, as long as the two preceding together. Thorax transverse, the disc with trace of median longitudinal groove, and with a small impression before the scutellum; puncturation coarser than that of the head and a little closer. Elytra a little longer and broader than the thorax, transverse, moderately coarsely and pretty closely punctured and finely pubescent. Abdomen scarcely attenuated behind, finely and pretty closely punctured and pubescent on the first three visible segments, more sparingly behind. Intermediate and posterior tibiæ each with a pair of distinct setæ, that near the knee the finer and shorter.

♂. Eighth dorsal segment on either side posteriorly with a short, blunt spine, and two triangular, short, blunt teeth, one on either side of the middle line, which are separated from the lateral spines by a rather deep semicircular excision.

Jamaica. Type in my collection.

132. *Atheta (Acrotona) stagnicola*, sp. n.

(Fauvel, *in litt.*)

Black or pitchy-black, rather shining. Antennæ with the first two joints reddish testaceous, the penultimate scarcely transverse. Legs testaceous.

Length 1·75 mm.

A small, roughly punctured, and coarsely pubescent species, allied to *A. parva*, Sahlb., but more shining, the sides of the thorax more strongly rounded, the puncturation

of the fore-parts coarser and more asperate, and the antennæ differently constructed.

Head black, moderately finely and asperately punctured. Antennæ with the second and third joints of equal length, the fourth as long as broad, the fifth to the tenth transverse, but scarcely differing in breadth amongst themselves, the penultimate scarcely half as broad again as long, the eleventh as long as the two preceding together. Thorax transverse, the sides pretty strongly and evenly rounded, the disc without impression, the puncturation as on the head. Elytra as long as, but wider than the thorax, transverse, moderately finely, closely, and asperately punctured. Abdomen narrowed posteriorly, finely and moderately closely punctured, rather more sparingly behind; the pubescence rather coarse and long, coarser than in *parva*, the sides setiferous.

Grenada (*H. H. Smith*). Type in the British Museum.

133. *Atheta (Acrotona) reducta*, sp. n.

(Fauvel, *in litt.*)

Minute, moderately shining, pitchy; the elytra brownish testaceous. Antennæ with the first joints pitchy-testaceous. Legs testaceous.

Length 1.1 mm.

A minute, obscurely coloured, roughly punctured, and somewhat shining species, allied to the preceding.

Head pitchy-brown, finely, moderately closely, and asperately punctured. Antennæ with the third joint a little shorter than the second, the fourth and fifth as long as broad, the sixth to the tenth transverse, scarcely increasing in width, the penultimate only slightly broader than long, the eleventh as long as the two preceding together. Thorax transverse, the sides rounded, finely, closely, and asperately punctured, finely pubescent. Elytra a little longer and broader than the thorax, slightly transverse, finely, closely, and asperately punctured, finely pubescent. Abdomen narrowed gradually from base to apex, finely and pretty closely punctured, rather more sparingly on the posterior half of the seventh and whole of the eighth segments; pubescence rather long and coarse, the sides and apex setose.

St. Vincent (*H. H. Smith*). Type in the British Museum.

134. *Atheta (Acrotona) cacophila*, sp. n.

(*A. discrepans*, Fauvel, *in litt.*)

Pitchy-black, shining; the elytra brownish yellow, darker

at the scutellum. First two joints of the antennæ and the legs testaceous.

Length 1.75 mm.

Allied to *A. questicula*, Shp., but smaller, rather more finely punctured, and the abdomen with much less coarse pubescence, which is more analogous to that usual in the genus *Orypoda*.

Head black, shining, very finely and pretty closely punctured, finely pubescent. Antennæ with the third joint a little shorter than the second, the fourth to the tenth transverse, the penultimate about half as broad again as long, the eleventh about as long as the two preceding together. Thorax a little transverse, very finely, closely, and asperately punctured, the disc with a distinct median groove extending nearly to the anterior margin. Elytra as long as, and a little broader than the thorax, transverse, finely, closely, and asperately punctured, finely pubescent. Abdomen contracted from the base to the apex, very finely and pretty closely punctured and finely pubescent, the seventh and eighth segments only a little less closely than the preceding. Middle tibiæ with a rather strong setæ about the middle; posterior tibiæ with a weak seta similarly placed.

Grenadines (*H. H. Smith*). Type in the British Museum.

135. *Atheta (Acrotona) flavoterminalata*, sp. n.

Black, moderately shining; the elytra dark brown. Antennæ with the first two joints brownish yellow, the eleventh clear testaceous-yellow. Legs testaceous.

Length 2 mm.

Except for the elytra being shorter, this species is exactly similar in build to *A. parva*, Sahlb., the antennæ also are very similar in build; the puncturation of the fore-parts is, however, stronger in the species under consideration.

Head finely and rather closely punctured, finely pubescent. Antennæ with the second and third joints of equal length, the fourth slightly longer than broad, the sixth to the tenth transverse, gradually increasing in breadth, the penultimate scarcely half as broad again as long, the eleventh as long as the two preceding together. Thorax strongly transverse, more than half as broad again as long, the sides rounded; finely and closely punctured, finely pubescent. Elytra as long as, but scarcely broader than the thorax, transverse, sinuate internal to the postero-external angle, finely, closely, and somewhat asperately punctured, finely pubescent. Abdomen very finely and pretty closely punctured and

pubescent anteriorly, rather more sparingly on the sixth, seventh, and eighth segments. Middle and posterior tibiæ each with a rather fine seta.

♂. Sixth ventral segment narrowed and produced, the apex rounded.

Jamaica. Type in my collection.

136. *Atheta (Acrotona) anomala*, sp. n.

Reddish testaceous, rather shining; the elytra blackish. Abdomen black, the first and last (visible) segments more or less testaceous. Antennæ with the first six or seven joints testaceous. Legs testaceous.

Length 1.75 mm.

This species is exactly of the build of *A. discrepans*, Shp., and indeed only differs from it in the darker elytra, the more obscure colour of the base of the abdomen, the antennæ a little longer and less stout, and the more distinct puncturation of the fore-parts. It must be placed at least provisionally in the *Acrotona* section, with which it agrees in the build of the thorax and the pointed abdomen, whilst examination of the mouth-parts presents nothing to exclude it from the genus *Atheta*.

Head reddish, suborbiculate; the eyes moderate, not prominent; very finely and moderately closely punctured and pubescent. Antennæ with the third joint shorter than the second, the fourth to the tenth transverse, the penultimate three times as broad as long, the eleventh short and stout. Thorax almost twice as broad as long, the sides rounded, the posterior angles obsolete, the base bordered, of a more yellowish colour than the head, very finely and moderately closely punctured, finely pubescent. Elytra about one-third longer and distinctly broader than the thorax, transverse, smoky-black, sometimes with the humeral angles obscurely testaceous; very feebly sinuate internal to the postero-external angle, very finely and moderately closely punctured and pubescent. Abdomen gradually pointed, very finely and moderately closely punctured and finely pubescent, a little more sparingly on the seventh and eighth segments. Tibiæ without distinct setæ.

Haiti. Type in my collection.

137. *Zyras smithi*, sp. n.

(*rufiventris*, Fauvel, in litt.)

Black, shining; the abdomen pointed, bright red. Antennæ elongate, the first six joints black, the rest pitchy. Legs black, the tarsi pitchy.

Length 5 mm.

This species is evidently closely allied to *Z. (Myrmedonia) longipes*, Shp., having a similar antennal structure and general facies; the thorax, however, is not quite so transverse.

Head broad, narrower than the thorax, with a few fine sparse punctures near the eyes and base, the disc impunctate; eyes large and prominent. Antennæ with the second joint shorter than the third, the fourth to the tenth all longer than broad, but gradually decreasing in length so that the tenth is but slightly longer than broad, all narrowed at the base, the eleventh scarcely as long as the two preceding together. Thorax transverse, the sides rounded for the anterior half, rather strongly contracted and sinuate behind to the obtuse posterior angles; disc with a moderately broad, smooth, longitudinal space throughout, and a small deep impression before the scutellum; the rest of the surface, except the sides and base, studded with moderately close granules, the larger of which are situated towards the base. Elytra as long as, but considerably broader than the thorax, transverse, pretty closely covered with pointed tubercles which, however, are not so large as those of the thorax. Abdomen pointed, the margins strongly elevated, practically impunctate and glabrous, the middle of the base of the seventh segment (at least in the ♂) with large and close punctures.

♂. Seventh dorsal segment coarsely punctured in the middle of the base, from which area four fine keels pass backwards towards the posterior margin, each ending in a small tubercle before this is attained, the surface between the keels coriaceous; eighth dorsal segment similarly, but more obsoletely punctured at the base, posteriorly with two transverse rows, each of five or six tubercles; the lateral margin produced into a strong laterally compressed, pointed tooth on either side, the posterior margin with six or seven equal, contiguous, short teeth, the external separated from the lateral margin by a wide emargination on either side.

Grenada (*H. H. Smith*). Type in the British Museum.

138. *Zyras waterhousei*, sp. n.

(Fauvel, *in litt.*)

Shining, black or pitchy-black, exceedingly finely and very sparingly punctured; thorax slightly transverse. Antennæ pitchy-brown, the last joint clear yellow. Femora black, the tibiæ and tarsi yellow.

Length 2.1 mm.

In build very similar to *Z. flavicornis*, Solsky, but much smaller and differently coloured.

Head large, suborbicular, exceedingly finely and very sparingly punctured, the eyes large and prominent. Antennæ with the second and third joints of equal length, the fourth and fifth of equal length, a little longer than broad, sixth and seventh scarcely transverse, eighth to the tenth transverse, gradually increasing in breadth, the eleventh as long as the two preceding together. Thorax slightly transverse, wider than the head, widest at the junction of the anterior and middle thirds, the sides rounded and contracted in front, more strongly narrowed and a little sinuate towards the obtuse posterior angles; very finely and sparingly punctured and with a few scattered hairs. Elytra as long as, but broader than the thorax, transverse, exceedingly finely and very sparingly punctured and with sparingly distributed hairs. Abdomen widest at the eighth segment, from thence gradually and slightly narrowed to the base and apex, practically impunctate and glabrous.

♂. Eighth dorsal segment truncate, sparsely granulate, very obscurely crenulate.

Grenada (*H. H. Smith*). Type in the British Museum.

139. *Zyras clavata*, sp. n.

(Fauvel, *in litt.*)

Robust, short, parallel, black, shining; the thorax strongly transverse, the elytra brownish yellow. Antennæ stout, brown, the first three joints testaceous. Legs testaceous.

Length 2 mm.

In build resembling *Myrmedonia docilis*, Shp.; the thorax, however, is not quite so broad.

Head short and broad, very finely and not very closely punctured, sparingly pubescent; ground-sculpture very fine and coriaceous. Antennæ with the second joint scarcely shorter than the third, the fourth scarcely, the fifth to the tenth strongly transverse, the penultimate joints three times broader than long, the eleventh elongate, nearly as long as the three preceding together. Thorax nearly twice as broad as long, widest at the junction of the first and second fourths, the sides rounded and narrowed in front, contracted more strongly behind in a nearly straight line to the obtuse posterior angles; very finely and

moderately closely punctured and pubescent; ground-sculpture very fine and coriaceous. Elytra a little longer and broader than the thorax, transverse, very finely and pretty closely punctured and pubescent, without visible ground-sculpture. Abdomen, except for a row of very fine punctures along the posterior margins of the segments, impunctate and glabrous.

♂. Eighth dorsal segment a little produced, its extremity broadly rounded.

This is an anomalous species; the first joint of the posterior tarsi is elongate, but does not exceed the following in length. The structure of the mouth-parts and mesosternum indicates, however, its affinity with the genus in which it has been placed.

Grenada (*H. H. Smith*). Type in the British Museum.

140. *Zyras rhopalomera*, sp. n.

(Fauvel, *in litt.*)

Short, robust, parallel, black, the fore-parts moderately, the abdomen strongly shining; elytra yellowish brown. First two joints of the antennæ and legs testaceous.

Length 2 mm.

Very similar to the preceding in build, but less robust, the elytra darker, the puncturation of the fore-parts yet finer and closer, the thorax less strongly transverse, and the antennæ not so stout.

Head broad, finely and moderately closely punctured, finely but distinctly coriaceous, the vertex with a small fovea. Antennæ with the second and third joints of equal length, the fourth to the tenth strongly transverse, the penultimate joints about twice as broad as long, the eleventh longer than the two preceding together. Thorax half as broad again as long, but otherwise formed as in the preceding species, very finely and pretty closely punctured and finely pubescent; ground-sculpture fine, coriaceous. Elytra as long as but broader than the thorax, transverse, very finely and moderately closely punctured, finely pubescent. Abdomen, except for the fine row of punctures on the posterior margins of the segments, impunctate and glabrous.

♂. Eighth dorsal segment broadly and slightly rounded posteriorly; 6th ventral segment a little produced and narrowed, the apex broadly rounded.

Grenada (*H. H. Smith*). Type in the British Museum.

TINOTOMA, gen. nov.

Mandibles rather stout, lightly curved, the right with a strong tooth about the middle of the inner margin, the left bifid at the apex, both at the base with a membrane furnished with four large, stout, triangular teeth. Maxillary palpi 5-jointed, the first joint small, the second moderately elongate, gradually enlarged towards the apex, the third longer and a little stouter than the preceding, the fourth much narrower than the preceding, parallel and about one-fourth its length, the fifth scarcely narrower and about half as long as the fourth, the apex rounded. Inner lobe of the maxilla with moderately long and slender pectinations along the inner margin; outer lobe with the apex finely ciliate. Tongue extending to the level of the apex of the second joint of the labial palpi, rather short, broadly emarginate nearly to the middle. Paraglossæ distinct, finely ciliate. Labial palpi 4-jointed, the first joint rather short, stout, the second much shorter and narrower and twice as long as the preceding, cylindrical, the fourth a little narrower and one-fourth the length of the third, the apex rounded. Labium broadly emarginate in front, antero-external angles prominent. Temples finely bordered below throughout. Mesosternal process narrow, pointed, extending nearly the whole length of the inner margin of the coxæ, which are narrowly separated. Metasternal process short and bluntly pointed, not meeting the mesosternum. Tarsi 4, 5, 5. The anterior pair with the first three joints short and equal, the fourth as long as the three preceding together; middle pair with the first joint short, the second to the fourth gradually increasing in length, the fifth nearly as long as the three preceding together; posterior pair with the first joint a little longer than the second, the second, third, and fourth equal, the fifth as long as the two preceding together. Claws slender, lightly curved. Tibiæ finely ciliate. Elytra not sinuate. The facies of the insect on which this genus is founded is that of a minute *Tinotus*.

141. *Tinotoma rufotestacea*, sp. n.

Moderately shining, testaceous; the head and abdomen rufo-testaceous, the 5th and 6th segments of the abdomen pitchy. Antennæ rather short and stout, testaceous, the last three or four joints infuscate. Legs testaceous.

Length 1.5 mm.

Head suborbicular, the eyes large, not prominent, their

diameter much greater than the length of the temples; very finely and moderately closely punctured, very finely pubescent. Antennæ with the third joint much shorter and more slender than the second, the fourth to the tenth transverse, gradually increasing in breadth, the penultimate nearly three times broader than long. Thorax twice as broad as long, the sides evenly rounded, a little narrower in front than behind, the posterior angles obsolete, the base passing insensibly into the sides; sculpture and pubescence very similar to that of the head. Elytra one-third longer and a little broader than the thorax, transverse, more finely and more closely punctured than the thorax. Abdomen scarcely narrowed behind, very finely and moderately closely punctured on the anterior segments, much more sparingly behind.

♂. Third (first visible) dorsal segment with a slender spine arising from the middle of the posterior margin; eighth broadly rounded.

Grenada (Mount Gay Estate) (*H. H. Smith*). Type in the British Museum.

OXYPODINI.

142. *Ocyusa granella*, sp. n.

(*Schistoglossa granella*, Fauvel, *in litt.*)

Black, moderately shining; the thorax, elytra, and sometimes the base of the abdomen, pitch-black. First two joints of the antennæ and legs testaceous.

Length 1·8 mm.

This species is very similar to *Atheta amicula*, Steph., in general appearance (except that the thorax is less transverse), size, and colour; the tarsi, however, have the structure of *Ocyusa*.

Head black, subquadrate, the eyes rather large, not prominent, their diameter rather more than the length of the temples; vertex with a short longitudinal impressed line, very finely and pretty closely punctured and pubescent and without ground-sculpture. Antennæ with the third joint shorter than the second, the fourth to the tenth transverse, gradually increasing in breadth, the penultimate about three times as broad as long, the eleventh large, conical, longer than the two preceding joints together. Thorax about one-third as broad again as long, widest a little behind the anterior angles, the sides from thence rounded and narrowed in front, behind more strongly narrowed to the rounded posterior angles in a nearly straight line, pitch-brown, very

finely and pretty closely punctured, finely pubescent. Elytra as long as, but broader than the thorax, transverse, very finely and pretty closely punctured, finely pubescent. Abdomen scarcely narrowed behind, exceedingly finely and pretty closely punctured on the first four visible segments, more sparingly on the last two, finely pubescent.

♂. Seventh dorsal segment studded with small granules. Grenada (*H. H. Smith*). Type in the British Museum.

143. *Phlæopora producta*, sp. n.

Subdepressed, shining reddish ferruginous; the elytra darker, the abdomen reddish testaceous. Antennæ brownish testaceous, the first two joints and the legs testaceous.

Length 2·3 mm.

Practically identical in build and shininess with *P. laticula*, Shp., but much smaller, the elytra darker and not so long, and the abdomen uniformly reddish testaceous.

Head transversely subquadrate, dark red, shining, very finely obsoletely and moderately closely punctured. Antennæ with the third joint a little shorter than the second, the fourth to the tenth transverse, gradually increasing in breadth, the penultimate fully twice as broad as long. Thorax as long as broad, the sides rounded in front, slightly narrowed posteriorly in a nearly straight line to the obtuse posterior angles; disc with a small impression before the base, exceedingly finely, not very closely and obsoletely punctured, very finely pubescent. Elytra a little longer and broader than the thorax, as long as broad, shining castaneous-brown, exceedingly finely and rather closely punctured, very finely pubescent. Abdomen finely and moderately closely punctured on the first four visible segments, much more sparingly on the last two.

♂. Second dorsal segment of the abdomen with the posterior margin in the middle obtusely produced and elevated. Haiti. Type in my collection.

144. *Phlæopora occidentalis*, sp. n.

Head black, rather shining; the thorax pitchy-brown, rather dull, the elytra brownish red, darker at the base. Abdomen rather shining, the apex brownish. Antennæ brown, the first joint and the legs testaceous.

Length 2·4 mm.

A slender species of the same colour as, and of similar build to, *P. angustiformis*, Baudi, so that a detailed description will be unnecessary, and the following differences

should serve to separate the species:—The head is much more finely punctured, the antennæ distinctly longer, and the penultimate joints considerably less transverse; the maxillary palpi are entirely testaceous; the thorax and elytra are much more finely and rather more closely punctured; the abdomen is narrower, much less coarsely punctured at the bases of the segments, and much more finely and closely punctured on the rest of the segments.

Haiti. Type in my collection.

ALEOCHARINI.

145. *Aleochara* (s. str.) *bugnioni*, sp. n.

(Fauvel, *in litt.*)

Black, shining; abdomen with the whole of the eighth, the whole or part of the seventh (and sometimes of the posterior portion of the sixth) segments bright reddish testaceous. Antennæ with the first two joints pitchy; legs brown.

Length 3·5 to 6·5 mm.

This species has exactly the build of *A. fuscipes*, F., and was regarded as a variety of that species by Fauvel. It varies much in size, but the puncturation of the elytra in specimens of the two species of corresponding size appears to be rather coarser and not quite so close in *A. bugnioni* as in *A. fuscipes*; moreover, the posterior margin of the eighth dorsal segment is furnished with nine or ten distinct teeth.

Grenada, St. Vincent (*H. H. Smith*). Type in the British Museum.

146. *Aleochara* (s. str.) *nigrocærulea*, sp. n.

Shining, blue-black; the abdomen black. Antennæ rather stout, the first joint pitchy. Legs pitchy, the tarsi reddish. Fore-parts coarsely punctured.

Length 5·75 to 6·5 mm.

Similar in build to *A. curtula*, Goeze, but readily recognized apart from the colour by the much coarser puncturation of the fore-parts. Head broad, coarsely, deeply, and moderately closely punctured. Antennæ formed as in *A. curtula*. Thorax pretty closely and coarsely punctured. Elytra and abdomen punctured as in *curtula*.

♂. Eighth dorsal segment with thirteen or fourteen teeth on the posterior margin.

Jamaica. Type in my collection.

147. *Hoplandria smithi*, sp. n.(Fauvel, *in litt.*)

Shining, pitch-black. Abdomen bright testaceous-red. Antennæ testaceous, the intermediate joints a little infusate. Legs testaceous.

Length 2.75 to 3 mm.

Except for the thorax being rather broader, this species is similar in build to *H. debilis*, Shp.

Head shining, black; the disc rather coarsely and closely punctured, the sides much more sparingly. Antennæ with second and third joints of equal length, the fourth a little longer than broad, the fifth to the tenth transverse, gradually increasing in breadth, the penultimate twice as broad as long. Thorax strongly transverse, the sides evenly rounded, the posterior angles completely rounded, moderately finely and not very closely punctured on the disc, finely and much more sparingly punctured at the sides, transversely impressed before the scutellum. Elytra a little longer and broader than the thorax, transverse, moderately finely and moderately closely punctured. Abdomen narrowed to the apex, very finely and very sparingly punctured, moderately coarsely and closely punctured at the bases of the first three visible segments.

♂ unknown.

Grenada (*H. H. Smith*). Type in the British Museum.

148. *Hoplandria heterodon*, sp. n.(Fauvel, *in litt.*)

Shining, bright reddish testaceous; the elytra reddish yellow, obscurely infusate posteriorly. Antennæ reddish, the first two joints and the legs testaceous.

Length 3 mm.

Head moderately finely and moderately closely punctured. Antennæ with the third joint a little shorter than the second, the fourth a little longer than broad, the fifth to the tenth transverse, gradually increasing in breadth, the penultimate about half as broad again as long. Thorax strongly transverse, moderately finely and pretty closely punctured on the disc, more sparingly towards the sides. Elytra a little longer and broader than the thorax, transverse, moderately finely and moderately closely punctured. Abdomen very finely and very sparingly punctured, the bases of the anterior segments scarcely more distinctly punctured than the rest of the surface.

♂. Elytra each with two tubercles situated at the posterior margin, one at the postero-internal angle, the other a little externally; fourth dorsal segment with a small tubercle at the posterior margin on either side of the middle line; seventh segment with a keel in the middle line for the posterior three-fourths of its length; sixth ventral segment produced and narrowed, its apex rounded.

St. Vincent (*H. H. Smith*). Type in the British Museum.

149. *Hoplandria obliqua*, sp. n.

(Fauvel, *in litt.*)

Shining ferruginous-red, the elytra reddish testaceous, more or less infusate behind. Antennæ with the first two joints and the last testaceous, the rest brown. Legs testaceous.

Length 3 mm.

Head rather finely and rather sparingly punctured, the front impunctate, sparingly pubescent. Antennæ with the second and third joints of equal length, the fourth a little longer than broad, the fifth as long as broad, the sixth to the tenth transverse, gradually increasing in breadth, the penultimate about half as broad again as long, the eleventh as long as the two preceding together. Thorax strongly transverse, moderately finely and moderately closely punctured. Elytra as long as, but broader than the thorax, transverse, moderately finely and moderately closely, distinctly asperately punctured, finely pubescent. Abdomen pointed, practically glabrous and impunctate.

♂. Elytra at the postero-internal angle with a sharp tubercle, and another similar one a little externally; third dorsal segment of the abdomen with the posterior margin produced a little backwards and broadly rounded; fourth on either side with an oblique crest commencing near the base in front and extending obliquely backwards and inwards to the posterior border; seventh with a strong raised median keel; eighth narrowed, the posterior border with a small blunt tooth in the middle. Sixth ventral segment produced, narrowed and rounded.

St. Vincent (*H. H. Smith*). Type in the British Museum.

NOTES AND ADDITIONS.

2 a. *Lispinus sparsepunctatus*, sp. n.

Narrow, depressed, parallel, pitchy-black, greasy-shining, strongly coriaceous; the thorax, elytra, and apex of the

abdomen reddish testaceous. Antennæ ferruginous ; legs reddish testaceous.

Length 2·3 mm.

In size and colour very similar to *L. bicolor*, Shp.), but the head and thorax are broader, the antennæ a little longer with the penultimate joints less transverse, the fore-parts are much more obsoletely and sparingly punctured, and the thorax shorter and more strongly constricted in front of the posterior angles.

Head with a small rounded impression on either side of the front, finely, obsoletely, and very sparingly punctured, strongly coriaceous. Antennæ with the second and third joints of equal length, the fourth and fifth almost moniliform, the sixth to the tenth transverse, gradually increasing in breadth, the penultimate scarcely half as broad again as long. Thorax distinctly transverse, widest about the middle, the sides pretty strongly emarginate before the almost rectangular posterior angles, and gently rounded in front ; disc with fine median raised line throughout, obsoletely impressed on either side ; posterior angles rather broadly and obsoletely impressed ; sculpture strongly coriaceous, with a few fine obsolete scattered punctures. Elytra about half as long again as the thorax and a little narrower, longer than broad, strongly coriaceous, and with a few extremely fine and sparing, scarcely perceptible punctures. Abdomen pitchy-brown, strongly coriaceous, practically impunctate.

Haiti. Type in my collection.

4 a. *Trogophlæus (Boopinus) sericeus*, sp. n.

Black, moderately shining ; the abdomen dull, sericeous. Antennæ dark, the basal joint pitchy. Legs testaceous, the base of the tibiæ more or less pitchy.

Length 3 mm.

More elongate than *T. argutus*, Shp., but with thorax similarly shaped, broader head, and closely pubescent sericeous abdomen.

Head with small fovea on the vertex, the front longitudinally impressed on either side. Very finely and closely, somewhat obsoletely punctured, finely and sparingly pubescent ; the eyes very large, the temples very small. Antennæ elongate, all the joints longer than broad, gradually decreasing in length from the fourth, the tenth only a little longer than broad, the eleventh a little longer than the tenth, the third joint of the maxillary palpi black. Thorax strongly transverse, the sides in front of the middle

rounded and dilated, posteriorly strongly contracted; anterior angles prominent, but blunt; middle of the disc with four impressions, finely and very closely punctured, finely and pretty closely pubescent. Elytra fully one-third longer and a little broader than the thorax, a little longer than broad, moderately finely and quite closely punctured, finely and pretty closely pubescent. Abdomen parallel, very finely and densely punctured and pubescent throughout, sericeous.

Jamaica. Type in my collection.

4 b. *Trogophlæus (Boopinus) scrobiger*, sp. n.

(Fauvel, *in litt.*)

Black, shining; thorax quadrioveolate. Antennæ with the first joint obscure testaceous; legs testaceous.

Length 1.75 mm.

Somewhat similar in build to *T. pusillus*, Gr., but the eyes are larger, the thorax rather more strongly narrowed posteriorly, the elytra a little longer, the puncturation of the fore-parts less close, and the whole insect distinctly more shining.

Head large, almost as wide as the thorax, the eyes large and prominent, the temples very small; the front longitudinally impressed on either side; puncturation moderately fine and pretty close, much closer in front. Antennæ with the third joint shorter than the second, the fourth and fifth scarcely longer than broad, the sixth and seventh as long as broad, the eighth to the tenth slightly transverse. Thorax widest at the anterior third, the sides rounded in front, moderately narrowed posteriorly; disc with four well-marked foveæ, the posterior pair transverse; moderately finely and pretty closely punctured. Elytra fully half as long again as, and a little broader than the thorax, longer than broad, distinctly impressed on either side of the suture anteriorly, puncturation as on the thorax, very scantily pubescent. Abdomen a little enlarged behind, very finely and closely punctured, feebly coriaceous, shining, sparingly and finely pubescent.

Grenada (*H. H. Smith*). Type in the British Museum.

4 c. *Trogophlæus (Tænosoma) funestus*, sp. n.

Black, the head greasy-shining, the thorax and elytra moderately shining, the abdomen shining. Thorax without

impressions on the disc. Antennæ with the first three joints brownish red. Legs testaceous.

Length 2.75 mm.

A narrow species, with the thorax slightly transverse and not strongly dilated anteriorly.

Head black, greasy-lustrous, without vertical impression, finely and densely punctured, finely and sparingly pubescent; the eyes large, the temples very small. Antennæ with the third joint a little shorter than the second, the fourth small, as long as broad, the fifth a little longer than broad, larger than the adjacent joints, the sixth a little longer than broad, the seventh to the tenth transverse, gradually increasing in width, the penultimate slightly transverse. Thorax slightly transverse, widest about the middle, the sides only slightly rounded and narrowed in front, contracted in a nearly straight line behind; the disc with a narrow smooth and shining space throughout the whole length of the middle and without trace of impressions, puncturation of the same size as that of the head, but distinctly less close; pubescence fine and sparing. Elytra a little longer and a trifle broader than the thorax, slightly longer than broad, puncturation distinctly coarser and less close than on the thorax, pubescence grey and fine. Abdomen shining, very finely and pretty closely punctured in front, a little more sparingly on the last three segments; pubescence moderately fine, not sericeous.

Jamaica. Type in my collection.

4 d. *Trogophlæus (Tænosoma) sordidus*, sp. n.

Black, moderately shining; the elytra dark brown. Head densely punctured; thorax with the impression on the disc very obsolete. Antennæ with the first two joints brownish testaceous. Legs testaceous.

Length 1.75 mm.

Closely allied to *T. misellus*, Shp., but the thorax is more transverse and more strongly contracted behind, the sculpture more coriaceous, the puncturation appearing obsolete, the elytra rather more coarsely punctured, the antennæ longer, the penultimate joints less transverse.

Head without impression on the vertex, closely and densely sculptured, appearing to be coriaceous rather than punctured; eyes large, temples short. Antennæ with the third joint distinctly shorter than the second, the fourth scarcely longer than broad, the fifth as long as broad, larger than the fourth and sixth, sixth to the tenth transverse, gradually increasing in breadth, the penultimate about half as broad again as long.

Thorax transverse, widest about the middle, the sides in front gently rounded and narrowed, rather strongly contracted in a nearly straight line behind; disc with four very obsolete impressions; densely coriaceous and with moderately close but obsolete puncturation. Elytra nearly half as long again as, and distinctly broader than the thorax, about as long as broad; rather coarsely and pretty closely punctured, finely and sparingly pubescent. Abdomen black, shining, very finely and moderately closely punctured and pubescent, rather more sparingly on the last two or three segments; finely coriaceous.

Grand Cayman. Type in my collection.

4e. *Trogophlæus (Tanosoma) testaceipennis*, sp. n.

Black, greasy-lustrous, the elytra rufo-testaceous, the base and scutellary region narrowly infusate. Thorax with discal impressions ill-defined. Abdomen black, shining. Antennæ with the first three joints brownish testaceous. Legs testaceous.

Length 2 mm.

This species is of almost identical build with *T. nigrellus*, Shp., but differs in the sculpture and colour.

Head densely coriaceous as in *T. sordidus*, mihi; the eyes large and temples short. Antennæ with the third joint distinctly shorter than the second, the fourth small, scarcely longer than broad, the fifth larger, a little longer than broad, the sixth to the tenth transverse, gradually increasing in breadth, the penultimate only slightly transverse. Thorax rather strongly transverse, the sides gently rounded in front and pretty strongly contracted towards the base; disc with four obsolete impressions; sculpture dense and coriaceous, without distinct puncturation. Elytra a little longer and broader than the thorax, slightly transverse, closely and by no means finely punctured, shining. Abdomen black, shining, very finely and closely punctured in front, more sparingly on the last three segments, pubescence fine, not sericeous, moderately close.

Haiti. Type in my collection.

4f. *Trogophlæus (Tanosoma) lætipennis*, sp. n.

(Fauvel, *in litt.*)

Black, greasy-lustrous, the elytra bright rufo-testaceous. Disc of the thorax bifoveate. Antennæ and legs reddish testaceous, the intermediate joints of the former more or less infusate.

Length 1·5 mm.

Exactly of the build of *T. insignellus*, Shp., but much less shining, the antennæ longer, the elytra not infuscate at the base, the puncturation of the thorax much closer and that of the elytra less coarse.

Head broad, nearly as wide as the thorax, longitudinally impressed in front on either side, the eyes rather large, the temples about half as long as their diameter; finely and very closely punctured. Antennæ with the third joint shorter than the second, the fourth, sixth, seventh, eighth, ninth, and tenth transverse, the fifth about as long as broad, stouter than the adjacent ones. Thorax widest at the anterior third, the sides rounded in front, moderately narrowed behind, the disc longitudinally impressed on either side of the middle posteriorly; rather finely and very closely punctured. Elytra one-third longer and a little broader than the thorax, about as long as broad, moderately coarsely and pretty closely punctured. Abdomen a little widened behind, very finely and moderately closely punctured and pubescent.

Grenada (*H. H. Smith*). Type in the British Museum.

4 g. *Trogophlæus* (*Tænosoma*) *subtilior*, sp. n.

(Fauvel, *in litt.*)

Narrow, elongate, nearly opaque, the head and abdomen black, the thorax and elytra reddish brown, the former obscurely impressed on either side at the base. Antennæ and legs testaceous.

Length 1·5 mm.

Almost identical in build to *T. subtilis*, Er., but much more finely punctured, the abdomen more closely pubescent, and the antennæ shorter, with more transverse penultimate joints.

Grenada (*H. H. Smith*). Type in the British Museum.

5 a. *Thinobius* (s. str.) *opaculus*, sp. n.

Black, opaque, narrow and elongate; the thorax short, strongly transverse, nearly semicircular. Antennæ rather short, the first three joints and the legs testaceous.

Length 1·5 mm.

A slender fragile species, entirely dull, densely coriaceous, and without visible puncturation.

Head suborbicular, the diameter of the eyes equal to the length of the temples. Antennæ with the third joint shorter

than the second, the fourth slightly transverse, the eighth to the tenth as long as broad, scarcely increasing in thickness, the eleventh conical, not as long as the two preceding together. Thorax strongly transverse, nearly semicircular, the posterior angles completely rounded, the sculpture similar to that of the head. Elytra twice the length of the thorax and slightly broader, longer than broad, similarly sculptured to the thorax. Abdomen elongate, parallel till near the apex, where it is slightly narrowed; exceedingly finely and densely coriaceous, very finely and closely pubescent.

Haiti. Type in my collection.

5 b. *Thinobius* (s. str.) *ornatus*, sp. n.

Narrow, elongate, fragile, black, the elytra posteriorly broadly testaceous. Antennæ and legs entirely testaceous. Length 1.75 mm.

A slender fragile species, at once distinguished by the bright testaceous posterior border of the elytra.

Head suborbicular, nearly opaque, densely coriaceous; eyes large, temples small. Antennæ with the third joint distinctly shorter than the second, the fourth to the tenth transverse, gradually increasing in breadth, the penultimate about half as broad again as long, the eleventh as long as the two preceding together. Thorax about one-third broader than long, narrowest behind, the sides gently rounded to the anterior angles; posterior angles obsolete; pitchy, rather more shining than the head, densely and finely coriaceous. Elytra twice as long and a little broader than the thorax, longer than broad, the posterior fourth bright yellow, exceedingly finely and very closely punctured. Abdomen elongate, exceedingly finely and densely punctured and pubescent throughout.

Haiti. Type in my collection.

5 c. *Thinobius* (s. str.) *piceus*, sp. n.

Pitchy-brown, somewhat shining. Elytra half as long again as the thorax. Antennæ long and slender, fusco-testaceous, the base more or less testaceous. Legs testaceous.

Length 1.5 to 1.75 mm.

Rather more slender than *T. tenuis*, Shp., but otherwise almost exactly similar in build. Apart from this it is distinctly more shining, the antennæ are not quite so long, the individual joints being shorter.

Head subtriangular, rather broad, densely and finely sculptured, but without distinct puncturation. Antennæ

with the third joint shorter than the second, the fourth a little longer than broad, the fifth longer than the fourth, the sixth shorter than the fifth, seventh to the tenth differing little between themselves, all distinctly longer than broad. Thorax transverse, widest a little before the middle, the sides gently rounded, but more narrowed behind than in front, densely and finely sculptured, finely pubescent. Elytra half as long again as the thorax, considerably longer than broad, exceedingly finely and densely sculptured, very finely pubescent. Abdomen densely and finely sculptured and pubescent throughout, sericeous.

Jamaica. Type in my collection.

7. *Osorius fauveli* = *Mimogonus fumator*, Fauv.

16 a. *Stilicopsis thoracicus*, sp. n.

Black, greasy-lustrous, the elytra shining rufo-testaceous, each with a black median band extending from the lateral margin nearly to the suture; abdomen black, shining, the apex obscurely testaceous. Antennæ and legs testaceous.

Length 2 mm.

This species is remarkable in the strongly coriaceous, but almost impunctate thorax, which is also narrower than is usual in this group and approaches more to that of *Astenus*. Apart from this, however, the build is similar to that of *Stilicopsis*.

Head large, subquadrate, the temples rounded, the eyes rather small. Puncturation moderately close, superficial and umbilicate, the interspaces distinctly coriaceous. Antennæ short, the third joint as long as the second, the fourth and fifth a little longer than broad, the sixth to the tenth transverse, gradually increasing in breadth. Thorax scarcely longer than broad, widest before the middle, the anterior angles rounded, the sides obliquely contracted in front to the narrow neck, posteriorly less strongly contracted to the rounded posterior angles; the sculpture distinctly coriaceous, with a few obsolete umbilicate punctures sparingly distributed and scarcely noticeable; disc in the middle with trace of median line, which is, however, not shining. Elytra a little longer and distinctly wider than the thorax, almost as wide as the head, longer than broad, shining, moderately finely and moderately closely punctured, finely pubescent. Abdomen narrowed at the base and apex, extremely finely and moderately closely punctured throughout and very finely pubescent.

♂ unknown.

Haiti. Type in my collection.

33 a. *Medon* (*Neomedon*) *insularum*, sp. n.

Greasy-shining brown, the head black. Antennæ and legs testaceous.

Length 4·2 mm.

Build of *N. nigricans*, Shp., but smaller and thorax rather shorter.

Head large, subquadrate, the base slightly emarginate, a little broader than the thorax, the sculpture pretty close, umbilicate, but rather superficial and only moderately large; eyes small. Antennæ with the second and third joints of equal length, the fourth and fifth a little longer than broad, equal between themselves, the sixth as long as broad, the seventh to the tenth transverse, gradually increasing in breadth. Thorax transverse, the middle of the disc posteriorly with a fine impressed line, sculpture close and rather fine, not umbilicate, finely pubescent. Elytra about a third longer and a little broader than the thorax, longer than broad, pretty closely, moderately finely and asperately punctured and finely pubescent. Abdomen very finely and very closely punctured throughout, pubescence very fine and close, almost sericeous.

♂ unknown.

Jamaica. Type in my collection.

36 a. *Lithocharis mendacius*, sp. n.

Black, greasy-lustrous, the thorax pitchy-red, the elytra shining castaneous-red, largely infusate posteriorly. Abdomen brown. Antennæ and legs reddish testaceous.

Length 4·4 mm.

Closely allied to *L. mendax*, Shp., and differing only in the following points:—The antennæ are a little shorter and the penultimate joints more transverse, the eyes are smaller, the head is densely coriaceous, with a few scarcely visible obsolete punctures, the thorax is sculptured similarly to the head, but the fine obsolete punctures are more numerous; the elytra are differently coloured, the abdomen is reddish brown.

♂ unknown.

Jamaica. Type in my collection.

36 b. *Lithocharis obfuscata*, sp. n.

Black, greasy-lustrous; the elytra shining dark brown, the shoulders reddish; abdomen black, the apex brownish testaceous. Antennæ with the first four or five joints pitchy, the rest testaceous. Legs testaceous.

Length 3·2 mm.

Exactly of the build of *L. infuscata*, Er., and differing only in the following respects :—More or less of the base of the antennæ is dark, the head and thorax are much more finely and obsoletely punctured and very distinctly coriaceous ; the elytra are rather more finely punctured ; the abdomen is uniformly black, the posterior margins of the segments not lighter.

♂. Fifth ventral segment with a small obtuse emargination of the posterior border.

Jamaica. Type in my collection.

NOTE ON THE GENUS *MICRANOPS*.

On page 350 of the first part of this paper* the above genus was characterised, and the tongue was described as acuminate ; this is incorrect, and the following should be substituted for the description of the mouth-parts there given :—Tongue broad, divided nearly to the base into three pointed lobes, of which the lateral are a little longer than the central one. Paraglossæ well-marked, strongly ciliate. Labial palpi 3-jointed, the first joint very short, a little broader than long, the second moderate, gradually thickened towards the apex, the third much narrower than the preceding and about half as long, cylindrical, the apex rounded. Inner lobe of the maxilla much wider than the outer, both closely ciliated.

XLII.—*A Revision of the Genera of the Family Liparidæ*. By Colonel C. SWINHOE, M.A., F.L.S., F.Z.S., F.E.S., Member of the Entomological Society of France and of the Bombay Natural History Society.

[Continued from p. 304.]

774. *Orgyia brunnescens*.

Dasychira brunnescens, Moore, Lep. Atk. p. 57 (1879).

Type, Sikkim, in B.M.

775. *Orgyia virescens*.

Cadrusia virescens, Moore, l. c. p. 54, pl. iii. fig. 16.

Type, ♀, Darjiling, in B.M.

* Ann. & Mag. Nat. Hist. (8) xii. (1913).

776. *Orgyia strigata*.

Dasychira strigata, Moore, *l. c.* p. 58; Swinhoe, *Trans. Ent. Soc.* 1903, p. 475 (note); Wileman, *ibid.* 1911, p. 271.

Dasychira niveosparsa, Butler, *Ill. Het.* v. p. 59, pl. xci. fig. 7 (1881).

Type, ♀, Masuri; type, ♀, *niveosparsa*: both in B.M. Khasia Hills; Japan.

777. *Orgyia taiwana*.

Dasychira taiwana, Wileman, *Entom.* liii. p. 311 (1916).

Dasychira multilineata, Swinhoe, *Ann. & Mag. Nat. Hist.* (8) xx. p. 160 (1917).

Type, Formosa, in Coll. Wileman; type, ♂, *multilineata*, Arr-San, Formosa, in Coll. Swinhoe.

778. *Orgyia gwelila*.

Dasychira gwelila, Swinhoe, *Trans. Ent. Soc.* 1903, p. 469.

Type, ♂, Gwelila, B.E. Africa, in B.M.

779. *Orgyia sublunata*.

Dasychira sublunata, Rothschild, *Journal of the F.M.S. Mus.* p. 132 (1920).

W. Sumatra.

780. *Orgyia albibasalis*.

Ilema albibasalis, Holland, *Psyche*, vi. p. 470 (1893).

Type, ♂, Ogove River, in Coll. Holland.

781. *Orgyia gabunica*.

Euproctidion gabunica, Holland, *l. c.* p. 414, pl. x. fig. 19.

Type, ♂, Ogove River, in Coll. Holland.

782. *Orgyia gonophora*.

Ilema gonophora, Holland, *l. c.* p. 470, pl. xvii. fig. 1.

Lælia curvirigata, Karsch, *Ent. Nachr.* xxi. p. 372, pl. iv. fig. 6 (1893).

Type, ♂, Ogove River, in Coll. Holland; Cameroons.

783. *Orgyia albinotata*.

Thamnocera albinotata, Holland, *l. c.* p. 469.

Type, ♂, Ogove River, in Coll. Holland.

784. *Orgyia striata*.

Netohyba striata, Holland, *l. c.* p. 452, pl. xvii. fig. 28.

Dasychira striata, Swinhoe, *Trans. Ent. Soc.* 1903, p. 470 (note).

Type, ♂, Ogove River, in Coll. Holland.

785. *Orgyia brunneicosta*.

Ilema brunneicosta, Holland, *l. c.* p. 471, pl. xvii. fig. 10.

Type, ♂, Ogove River, in Coll. Holland.

786. *Orgyia horrida*.

Dasychira horrida, Swinhoe, *l. c.*

Type, ♂, Old Calabar, in B.M.

787. *Orgyia plagiata*.

Anaxila plagiata, Walker, *iv.* p. 810 (1855).

Type, ♂, without locality, in B.M.

788. *Orgyia varia*.

Dasychira varia, Walker, *iv.* p. 868 (1855); Swinhoe, *Cat. Het. Mus. Oxon.* i. p. 219 (1892) (note).

Dasychira maruta, Moore, *Cat. Lep. E. I. Co.* ii. p. 339 (1859); Butler, *Ill. Het.* v. p. 58, pl. xci. fig. 6 (1881).

Type, ♀ (nec ♂), India, in Mus. Oxon.; type, ♀ *maruta*, Darjiling, in B.M.; Subathu, Dalhousie.

789. *Orgyia pratti*.

Dasychira pratti, Bethune-Baker, *Nov. Zool.* xi. p. 406, pl. iv. fig. 7 (1904).

Type, Mt. Kebea, B. N. Guinea, in Coll. Bethune-Baker.

790. *Orgyia subnigra*.

Dasychira subnigra, Bethune-Baker, *l. c.* p. 404, pl. iv. fig. 41.

Type, Mt. Kebea, in Coll. Bethune-Baker; Mafalu, Ekeikei.

791. *Orgyia albescens*.

Dasychira albescens, Moore, *Lep. Atk.* p. 59 (1879).

Type, Darjiling, in Coll. Staudinger; Darjiling.

792. *Orgyia cinctata*.

Dasychira cinctata, Moore, *l. c.*

Type, Darjiling, in Coll. Staudinger.

793. *Orgyia ampliata*.

Dasychira ampliata, Butler, Ann. & Mag. Nat. Hist. (5) ii. p. 460 (1878).

Type, ♀, Madagascar, in B.M.

794. *Orgyia angulata*.

Dasychira angulata, Hampson, Trans. Ent. Soc. 1895, p. 292.

Type, ♂, Sikkim, in B.M.; Upper Burma, Khasia Hills, Jaintia Hills.

795. *Orgyia postfusca*.

Dasychira postfusca, Swinhoe, Trans. Ent. Soc. 1895, p. 9, pl. i. fig. 12, ♂; Swinhoe, Ann. & Mag. Nat. Hist. (8) xviii. p. 216 (1916), ♀.

Types, ♂ ♀, Khasia Hills, in B.M.; Jaintia Hills.

796. *Orgyia thwaitesi*.

Dasychira thwaitesi, Moore, Lep. Ceylon, ii. p. 98, pl. cxvi. figs. 1 a, b (1883); Cotes, Ind. Mus. Notes, i. p. 29, pl. iii. fig. 1 (1889).

Dasychira pudica, Moore, l. c. iii. p. 538 (1887).

Types, ♂ ♀, Ceylon, in B.M.; Trevandrum, Nilgiris, Java.

797. *Orgyia georgiana*.

Dasychira georgiana, Fawcett, Trans. Zool. Soc. xv. p. 314, pl. xlix. figs. 19-21 (1900).

Natal, Transvaal.

798. *Orgyia cerigoides*.

Janassa cerigoides, Walker, Journ. Linn. Soc. vi. p. 135 (1862).

Dasychira cerigoides, Swinhoe, Cat. Het. Mus. Oxon. i. p. 297, pl. vii. fig. 5 (1892).

Type, ♂, Sarawak, in Mus. Oxon.

799. *Orgyia grandidieri*.

Calliteara grandidieri, Butler, Cist. Ent. iii. p. 14 (1882).

Type, ♂, Madagascar, in B.M.

800. *Orgyia vibicipennis*.

Dasychira vibicipennis, Butler, Ann. & Mag. Nat. Hist. (5) iv. p. 239 (1879).

Types, ♂ ♀, Madagascar, in B.M.

801. *Orgyia gentilis*.

Dasychira gentilis, Butler, *l. c.*

Type, ♀, Madagascar, in B.M.

802. *Orgyia acrisia*.

Deiopeia (?) *acrisia*, Plotz, Stett. ent. Zeit. xli. p. 83 (1880).

Dasychira crausis, Druce, P. Z. S. 1884, p. 228, pl. xvii. fig. 3, ♀.

Type, ♀, *crausis*, Lower Niger, in Coll. Joicey.

803. *Orgyia elegans*.

Calliteara elegans, Butler, Cist. Ent. iii. p. 13 (1882).

Type, ♀, Madagascar, in B.M.

804. *Orgyia dudgeoni*.

Dasychira dudgeoni, Swinhoe, *l. c.* xix. p. 203 (1907).

Types, ♂ ♀, Sikkim, in B.M.; Khasia Hills.

805. *Orgyia cymata*.

Dasychira cymata, Swinhoe, *l. c.* p. 204.

Type, ♂, Sikkim, in B.M.; Darjiling.

806. *Orgyia perdix*.

Dasychira perdix, Moore, Lep. Atk. p. 58, pl. iii. fig. 3 (1859).

Type, Darjiling, in Coll. Rothschild.

807. *Orgyia albodentata*.

Dasychira albodentata, Brøn. Lep. Ost-Sib. p. 102, pl. viii. fig. 13 (1864); Kirby, Cat. Moths, i. p. 483 (1892).

Kiachta, Ussori District.

808. *Orgyia umbra*.

Dasychira umbra, Roths. Journal of the F.M.S. Mus. p. 133 (1920).

W. Sumatra.

809. *Orgyia pastor*.

Calliteara pastor, Butler, Cist. Ent. iii. p. 15 (1882).

Types, ♂ ♀, Madagascar, in B.M.

810. *Orgyia ila*.

Dasychira ila, Swinhoe, Trans. Ent. Soc. 1904, p. 146.

Type, ♂, Obuassi, Ashanti, in B.M.

811. *Orgyia bergmanni*.*Dasychira bergmanni*, Swinhoe, *l. c.* p. 145.

Type, ♂, Obuassi, Ashanti, in B.M.

812. *Orgyia grossa*.*Dasychira grossa*, Pag. Jahrb. Nass. Ver. xli. p. 121 (1868).

Amboina.

813. *Orgyia fidjiensis*.*Dasychira fidjiensis*, Mab. & Vieill. Nov. Lep. p. 5, pl. i. fig. 2 (1891).

Fiji.

814. *Orgyia mendosa*.*Olene mendosa*, Hübner, Zutr. ii. p. 10, figs. 293, 294 (1823); Strand, *l. c.* pl. xxii. d.*Antipha basalis*, Walker, iv. p. 806 (1855).*Nioda fusiformis*, Walker, v. p. 1070 (1855).*Olene fusiformis*, Moore, Lep. Ceylon, ii. p. 97, pl. cxv. fig. 3 (1883).*Rilia lanceolata*, Walker, v. p. 1075.*Olene lanceolata*, Butler, Ill. Het. v. pl. cvi. fig. 6 (1886).*Dasychira sawanta*, Moore, Cat. Lep. E. I. Co. ii. p. 340 (1859).*Dasychira basalis*, Walker, xxxii. p. 362 (1865) (præocc.).*Dasychira divisa*, Walker, xxxii. p. 363, ♂.*Dasychira basigera*, Walker, *l. c.**Rilia distinguenda*, Walker, xxxii. p. 435.*Olene basivitta*, Walker, *l. c.* p. 436, ♀.*Turriga invasa*, Walker, Char. Undescr. Lep. Het. p. 15, ♂ (1869).*Olene mendosa*, Turner, Proc. Linn. Soc. N.S.W. xlv. (4) p. 496 (1920).

From various parts of India, Ceylon, Australia: type, *basalis*, India, in Mus. Oxon.; types of all the others in B.M.

815. *Orgyia tenebrosa*.*Dasychira tenebrosa*, Walker, xxxii. p. 361 (1865); Strand, *l. c.* pl. xxii. c.

Types, ♂ ♀, Darjiling, in B.M.; Japan, W. China, Tibet.

816. *Orgyia chinensis*.*Dasychira chinensis*, Swinhoe, Trans. Ent. Soc. 1903, p. 468 (note).

Types, ♂ ♀, Moupin, in B.M.; Ta-chien-lu, Kwei-chow.

817. *Orgyia catocaloides*.*Mardara catocaloides*, Leech, Trans. Ent. Soc. 1899, p. 126.*Dasychira catocaloides*, Swinhoe, Trans. Ent. Soc. 1903, p. 476; Strand, *l. c.* pl. xxii. c.

Type, ♂, Moupin, W. China, in B.M.; Ta-chien-lu.

818. *Orgyia signifera*.

Dasychira signifera, Walker, Journ. Linn. Soc. vi. p. 165 (1862).

Type, Sarawak, in B.M.

819. *Orgyia butleri*, nom. nov.

Calliteara mærens, Butler, l. c. p. 14 (præocc.).

Types, ♂ ♀, Madagascar, in B.M.

820. *Orgyia aspersa*.

Tearosoma aspersa, Felder, Reise Nov. pl. c. fig. 6 (1868).

Type, without locality, in Coll. Rothschild; Natal.

821. *Orgyia sublutescens*.

Dasychira sublutescens, Holland, Psyche, vi. p. 433 (1893).

Types, ♂ ♀, Ogove River, in Coll. Holland.

822. *Orgyia subflava*.

Anaxila subflava, Walker, iv. p. 918 (1855).

Dasychira subflava, Swinhoe, Trans. Ent. Soc. 1903, p. 475 (note).

Type, ♂, Ashanti, in B.M.

823. *Orgyia difficilis*.

Aroa difficilis, Walker, xxxii. p. 328 (1865).

Type, ♀ (nec ♂), Natal, in B.M.

824. *Orgyia enos*.

Aroa (?) *enos*, Druce, Ann. & Mag. Nat. Hist. (6) xvii. p. 353 (1896).

Type, ♀, Old Calabar, in Coll. Joicey; Sapele, Niger River.

825. *Orgyia viola*.

Calliteara viola, Butler, Ann. & Mag. Nat. Hist. (5) iv. p. 240 (1879).

Type, ♂, Madagascar, in B.M.

826. *Orgyia mascarena*.

Dasychira mascarena, Butler, l. c. (5) ii. p. 294 (1878).

Dasychira cangia, Druce, P. Z. S. 1887, p. 674; Holland, Psyche, vi. p. 567, pl. x. fig. 12 (1893).

Types, ♂ ♀, Madagascar, in B.M.; types, ♂ ♀, *cangia*, Delagoa Bay, in Coll. Joicey.

827. *Orgyia prasina*.

Calliteara prasina, Butler, *l. c.* p. 16.

Type, ♂, Madagascar, in B.M.

828. *Orgyia baruna*.

Somena baruna, Moore, Cat. Lep. E. I. Co. ii. p. 346 (1859).

Dasychira viridis, Druce, Ann. & Mag. Nat. Hist. (7) iii. p. 470 (1889)

Type, ♀, Java, in B.M.; type, *viridis*, Perak, in Coll. Joicey; Penang.

829. *Orgyia gnava*.

Dasychira gnava, Swinhoe, Trans. Ent. Soc. 1903, p. 477.

Pseudonotodonta virescens, Mösch. Abh. Senck. Ges. xxv. p. 77, fig. 6 (1889) (præocc.).

Type, Aburi, Gold Coast, Old Calabar.

830. *Orgyia infirma*.

Somera infirma, Holland, Psyche, vi. p. 479, pl. xvii. fig. 29 (1893).

Type, Ogove River, in Coll. Holland.

831. *Orgyia variegata*.

Dasychira variegata, Holland, *l. c.* p. 568, pl. xviii. fig. 13.

Type, ♂ ♀, Ogove River, in Coll. Holland.

832. *Orgyia remota*.

Dasychira (?) *remota*, Druce, P. Z. S. 1887, p. 695.

Type, ♀, Gambia, in Coll. Joicey; River Niger.

833. *Orgyia complicata*.

Dasychira complicata, Walker, xxxii. p. 365 (1865).

Murdara complicata, Butler, Ill. Het. v. p. 58, pl. xci. figs. 4, 5, c ♀ (1881).

Trisula pustulifera, Walker, *l. c.* p. 576.

Types, ♂, of both in B.M.

834. *Orgyia ampliata*.

Dasychira ampliata, Butler, Ann. & Mag. Nat. Hist. (5) iii. p. 460 (1878).

Type, ♀, Madagascar, in B.M.

835. *Orgyia phæoserica*.

Dasychira phæoserica, Mab. C. R. Soc. Ent. Belg. xxviii. pl. clxxxix. (1884).

Madagascar.

836. *Orgyia apicalis*.

Dasychira apicalis, Walker, Journ. Linn. Soc. vi. p. 130 (1862).

Type, Sarawak, in B.M.

837. *Orgyia lineata*.

Lymantria lineata, Walker, iv. p. 875 (1855); Butler, Ill. Typ. v. p. 57, pl. xci. fig. 3 (1881).

Dasychira lineata, Swinhoe, Trans. Ent. Soc. 1903, p. 477 (note).

Type, ♀ (nec ♂), Sylhet, in B.M.; Buxar, Sumatra.

838. *Orgyia nigrosparsata*.

Dasychira nigrosparsata, Kenrick, Trans. Ent. Soc. 1913, p. 595, pl. xxxiii. fig. 22.

Types, ♂ ♀, Madagascar, in Coll. Kenrick.

839. *Orgyia mabilli*.

Dasychira mabilli, Rochebrune, Bull. Soc. Philom. (2) viii. p. 30 (1884).

Dasychira (?) *mabilli*, Kirby, Cat. Moths, i. p. 484 (1892).

Senegambia.

840. *Orgyia collini*.

Dasychira collini, Mab. l. c. p. 31; Kirby, l. c.

Senegambia.

841. *Orgyia saussurii*.

Dasychira saussurii, Dav. Verh. Leop. Cas. Akad. xiii. p. 69, pl. ii. fig. 13 (1881); Kirby, l. c.

Chinchoxo.

842. *Orgyia herbida*.

Dasychira herbida, Walker, vii. p. 1740 (1856); Kirby, l. c.

Type, South Africa, in B.M.

843. *Orgyia nolana*.

Liparis nolana, Mab. Le Nat. ii. p. 134 (1882).

Dasychira (?) *nolana*, Kirby, l. c.

Madagascar.

844. *Orgyia pallida*.

Dasychira pallida, Butler, Cist. Ent. iii. p. 17 (1882).

Madagascar.

845. *Orgyia pumila*.

Calliteara pumila, Butler, *l. c.* p. 16.

Dasychira pumila, Saalm. Lep. Madag. p. 198, pl. vi. figs. 91, 92 (1884).

Dasychira (?) *pumila*, Kirby, *l. c.* p. 485.

Type, ♂, Madagascar, in B.M.

846. *Orgyia procincta*.

Dasychira procincta, Saalm. Ber. Senck. Ges. 1879-1880, p. 267 (1880);

Saalm. Lep. Madag. p. 198, pl. vi. figs. 91, 92 (1884).

Dasychira (?) *procincta*, Kirby, *l. c.*

Nossi Bé.

847. *Orgyia strigidentata*.

Dasychira strigidentata, Beth.-Baker, Ann. & Mag. Nat. Hist. (8) vii.
p. 548 (1911).

Type, ♀, Omeishan, W. China, in Mus. Oxon.

848. *Orgyia ruficata*.

Dasychira ruficata, Beth.-Baker, *l. c.*

Type, ♂, N'Dalla Tondo, N. Angola, in Coll. Bethune-Baker.

849. *Orgyia obsoletissima*.

Dasychira obsoletissima, Beth.-Baker, *l. c.* p. 549.

Type, ♂, N'Dalla Tondo, in Coll. Bethune-Baker.

850. *Orgyia inconspicua*.

Dasychira inconspicua, Beth.-Baker, *l. c.*

Type, ♂, Guneral, W. Africa, in Coll. Bethune-Baker.

851. *Orgyia perdita*.

Dasychira perdita, Beth.-Baker, *l. c.*

Type, ♂, Malanga, W. Africa, in Coll. Bethune-Baker.

852. *Orgyia exoleta*.

Dasychira exoleta, Beth.-Baker, *l. c.*

Type, ♂, Malanga, W. Africa, in Coll. Bethune-Baker.

853. *Orgyia ladburi*.

Dasychira ladburi, Beth.-Baker, *l. c.* p. 550.

Type, ♀, Bugoma Forest, Uganda Protectorate, in Coll. Bethune-Baker.

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854. *Orgyia styx*.*Dasychira styx*, Beth.-Baker, *l. c.*

Types, ♂ ♀, N'Dalla Tondo, in Coll. Bethune-Baker.

855. *Orgyia castanea*.*Dasychira castanea*, Kenrick, Trans. Ent. Soc. 1913, p. 593, pl. xxxii. fig. 30.

Type, Madagascar, in Coll. Kenrick.

Near *O. strigata*.856. *Orgyia rufotincta*.*Dasychira rufotincta*, Kenrick, *l. c.* fig. 33.

Types, ♂ ♀, Madagascar, in Coll. Kenrick.

Near *O. strigata*, Moore.857. *Orgyia didymata*.*Dasychira didymata*, Kenrick, *l. c.* fig. 24.

Types, ♂ ♀, Madagascar, in Coll. Kenrick.

Near *O. strigata*, Moore.858. *Orgyia brunneata*.*Dasychira brunneata*, Kenrick, *l. c.* p. 594, pl. xxxii. fig. 25.

Type, Madagascar, in Coll. Kenrick.

Near *O. strigata*, Moore.859. *Orgyia aurantiaca*.*Dasychira aurantiaca*, Kenrick, *l. c.* fig. 34.

Type, ♂, Madagascar, in Coll. Kenrick.

Near *O. securis*, Hübner.860. *Orgyia viridipicta*.*Dasychira viridipicta*, Kenrick, *l. c.* fig. 26.

Type, ♂, Madagascar, in Coll. Kenrick.

Near *O. strigata*, Moore.861. *Orgyia ocellata*.*Dasychira ocellata*, Kenrick, *l. c.* fig. 27.

Type, ♂, Madagascar, in Coll. Kenrick.

Near *O. securis*, Hübner.

862. *Orgyia dubia*.*Dasychira dubia*, Kenrick, *l. c.* p. 595, pl. xxxii. fig. 23.Type, ♂, Madagascar, in Coll. Kenrick.
Near *O. angulata*, Hampson.863. *Orgyia miselioides*.*Dasychira miselioides*, Kenrick, *l. c.* fig. 28.Type, ♂, Madagascar, in Coll. Kenrick.
Near *O. securis*, Hübner.864. *Orgyia abbreviata*.*Dasychira abbreviata*, Kenrick, *l. c.* p. 596, pl. xxxii. fig. 36.Type, ♂, Madagascar, in Coll. Kenrick.
Near *O. basistriga*, Walker.865. *Orgyia luteolata*.*Dasychira luteolata*, Kenrick, *l. c.* fig. 31.Type, ♀, Madagascar, in Coll. Kenrick.
Near *O. horsfieldii*, Moore.866. *Orgyia aureotincta*.*Dasychira aureotincta*, Kenrick, *l. c.* fig. 32.Type, ♀, Madagascar, in Coll. Kenrick.
Near *O. horsfieldii*, Moore.867. *Orgyia geoffreyi*.*Dasychira geoffreyi*, Beth-Baker, Ann. & Mag. Nat. Hist. (8) xii. p. 64
(1913).

Types, ♂ ♀, Damba Isl., Uganda, in Mus. Oxon.

868. *Orgyia carpenteri*.*Dasychira carpenteri*, Beth.-Baker, *l. c.*

Type, ♂ ♀, Damba Isl., in Mus. Oxon.

Genus *DASYCHIRINA*, Beth.-Baker, Ann. & Mag. Nat.
Hist. (8) vii. p. 550 (1911).869. *Dasychirina obliquilinea*.*Dasychirina obliquilinea*, Beth.-Baker, *l. c.*

Type, ♂, Malange, W. Africa, in Coll. Bethune-Baker.

870. *Dasychirina unilineata*.

Dasychirina unilineata, Beth.-Baker, *l. c.*

Type, ♂, Lokoja District, in Coll. Bethune-Baker.

871. *Dasychirina crenulata*.

Dasychirina crenulata, Beth.-Baker, *l. c.*

Type, ♂, Lokoja District, in Coll. Bethune-Baker.

Genus HYPOLOCHMA, Felder, Sitz. Akad. Wiss. Wien,
xliii. p. 40 (1861).

872. *Hypolochma sericea*.

Hypolochma sericea, Felder, *l. c.*

Type, Amboina, in Coll. Rothschild.

Genus ABYNOTHA, Swinhoe, Trans. Ent. Soc.
1903, p. 479.

873. *Abynotha preussi*.

Liparis (?) *preussi*, Mab. Vieill. Nov. Lep. i. p. 57, pl. ix. fig. 5 (1892).
Cameroons.

Genus PACHYCIPIA, Butler, Cist. Ent. iii. p. 11 (1882).

874. *Pachycispia picta*.

Pachycispia picta, Butler, *l. c.* p. 12.

Type, ♂, Madagascar, in B.M.

Genus LYMANTRIADES, Beth.-Baker, Ann. & Mag. Nat.
Hist. (8) vii. p. 550 (1911).

875. *Lymantriades obliquilinea*.

Lymantriades obliquilinea, Beth.-Baker, *l. c.* p. 552.

Type, ♂, Gunnal, W. Africa, in Coll. Bethune-Baker.

Genus PARAPIRGA, Beth.-Baker, *l. c.*

876. *Parapirga neurabrunnea*.

Parapirga neurabrunnea, Beth.-Baker, *l. c.*

Type, ♂ ♀, N'Dalla Tondo, 2700', in Coll. Bethune-Baker.

Genus CIFUNA, Walker, v. p. 1172 (1855).

Baryaza, Moore, Lep. Atk. p. 45 (1879).

877. *Cifuna cervina*.

Baryaza cervina, Moore, l. c. pl. iii. fig. 4.

Types, ♂, Darjiling, in B.M.

878. *Cifuna biundulans*.

Cifuna biundulans, Hampson, Journ. Bombay Nat. Hist. Soc. xi. p. 294, (1897).

Types, ♂, Khasia Hills, in B.M.

879. *Cifuna nigroplaga*.

Cifuna nigroplaga, Beth.-Baker, Ann. & Mag. Nat. Hist. (8) xii. p. 64 (1913).

Type, ♀, Damba Isl., Uganda, in Mus. Oxon.

880. *Cifuna locuples*.

Cifuna locuples, Walker, v. 1173 (1855); Wileman, The Philipp. Journ. of Science, xiii. (4) p. 154 (1918); Strand, l. c. pl. xix. d.

Type, ♂, Sylhet, in B.M.; Khasia Hills, Gensan, Chang Yang, Japan.

881. *Cifuna confusa*.

Cifuna confusa, Brem. Lep. Ost-Sib. p. 42; Wileman, l. c. pl. i. fig. 8. Amurland, Corea, Japan.

882. *Cifuna eurydice*.

Cifuna eurydice, Butler, Cist. Ent. iii. p. 118; Strand, l. c. pl. xix. d.
Cifuna ornata, Staud. Berl. ent. Zeit. xxxii. p. 122 (1888).

Japan, Amurland.

883. *Cifuna jankowskii*.

Orgyia jankowskii, Oberth. Etude Ent. x. p. 13, pl. i. fig. 9 (1884).
Cifuna jankowskii, Strand, l. c. pl. xix. d.

Eastern Asia, Sidemi.

Genus POLYMONA, Walker, iii. p. 768 (1855).

Morasa, Walker, iv. p. 859 (1855).

Sarothropyga, Földer, Reise Nov, pl. c. fig. 23, ♂ (1868).

884. *Polymona rufifemur*.*Polymona rufifemur*, Walker, iii. p. 768, ♂.*Morasa lorimeri*, Butler, P. Z. S. 1878, p. 387, ♀.Type, ♂, Africa; type, ♀, *lorimeri*, Natal: both in B.M. Nyassaland, Mashonaland, Dar-es-Salaam.885. *Polymona modesta*.*Morasa modesta*, Walker, iv. p. 859.*Sarothropyga rhodopepla*, Felder, l. c.Type, ♀, Africa, in B.M.; type, *rhodopepla*, Kuysna, in Coll. Rothschild.886. *Polymona obtusa*.*Polymona obtusa*, Walker, xxxii. p. 768 (1865); Kirby, Cat. Moths, i. p. 481 (1892).

Type, Natal, in B.M.

Genus HETERONYGMIA, Holland, Psyche, vi. p. 414 (1893).

887. *Heteronygmia manicata*.*Lymantria manicata*, Auriv. Ent. Tidsk. xiii. p. 193 (1892), ♀.*Heteronygmia rhodapicata*, Holland, l. c. p. 416, pl. x. fig. 15, ♂.Type, ♀, Cameroons, in Upsala Mus.; type, ♂, *rhodapicata*, Ogove River, in Coll. Holland; Ashanti, Sapele, River Niger, Old Calabar.888. *Heteronygmia chismona*.*Heteronygmia chismona*, Swinhoe, Trans. Ent. Soc. 1903, p. 480.

Type, ♂, Aburi, Gold Coast, in B.M.

Genus LOMADONTA, Holland, l. c. p. 417.

889. *Lomadonta erythrina*.*Lomadonta erythrina*, Holland, l. c. pl. x. fig. 1.

Types, ♂ ♀, Ogove River, in Coll. Holland.

890. *Lomadonta johnstoni*.*Lomadonta johnstoni*, Swinhoe, l. c.

Type, ♂, Congo Forest, in B.M.

891. *Lomadonta obscura*.*Lomadonta obscura*, Swinhoe, Trans. Ent. Soc. 1904, p. 146.

Type, ♂, Ashanti, in B.M.

892. *Lomadonta saturata*.*Lomadonta saturata*, Swinhoe, *l. c.* p. 147.

Types, ♂ ♀, Sapele, River Niger, in B.M.

Genus *LÆLAPIA*, Butler, Ann. & Mag. Nat. Hist.
(5) iv. p. 238 (1879).893. *Lælapia notata*.*Lælapia notata*, Butler, *l. c.*

Type, ♀, Madagascar, in B.M.

Genus *ACLONOPHLEBIA*, Butler, P. Z. S. 1898, p. 428.894. *Aclonophlebia flavinotata*.*Aclonophlebia flavinotata*, Butler, *l. c.* pl. xxxii. fig. 8.

Type, ♂, British E. Africa, in B.M.

Genus *NUMENOIDES*, Butler, Ann. & Mag. Nat.
Hist. (5) iv. p. 238 (1879).895. *Numenoides grandis*.*Numenoides grandis*, Butler, *l. c.*

Type, ♀, Madagascar, in B.M.

Genus *MELACHITIS*, Hampson, Trans. Ent. Soc.
1895, p. 291.896. *Melachitis melanochlora*.*Melachitis melanochlora*, Hmps. *l. c.*; Dudgeon, Journ. Bombay Nat.
Hist. Soc. xiii. p. 413, pl. i. fig. 7 (1900).

Type, ♂, Bhutan, in B.M.

Genus *NOTOLOPHUS*, Germar, Prodr. iii. p. 35 (1812);
type, *antiqua*, Linn.*Gynæphora*, Hübner, Verz. bek. Schmett. p. 161 (1818); type, *recens*,
Hüb.*Acyphas*, Walker, iv. p. 797 (1855); type, *fusca*, Walker.*Teia*, Walker, iv. p. 808; type, *ancertooides*, Walker.897. *Notolophus antiqua*.*Bombyx antiqua*, Linn. Syst. Nat. i. p. 503 (1758).*Orygia modesta*, Heyne, Soc. Ent. xiv. p. 98.

- Var. *bukourna*, Strand, Seitz. Macrolep. ii. p. 117.
Ab. confinis, Gr.-Grsh. Hor. Ent. Ross. xxv. p. 463.
 Var. *infernalis*, Rbl. Berge's Schmett.-Busch. p. 114.
Ab. dilutior, Schultz, Ent. Zeit. Stuttg. xxiv. p. 35.
Zimmermani, Graes. Berl. ent. Zeit. 1888, p. 122.
Orgyia antiqua, Strand, *l. c.* p. 117, pl. xix. a.

Russia, Bukovina, Mongolia, Kuku-Nor, Germany, Amurland.

898. *Notolophus gonostigma*.

- Bombyx gonostigma*, Scop. Ent. Carn. p. 199 (1763); Fabr. Lept. Ent. p. 585 (1775).
Orgyia approximatus, Butler, Trans. Ent. Soc. 1881, p. 10.
Orgyia gonostigma, Strand, *l. c.* pl. xix. a.

Type, *approximatus*, Japan, in B.M.; throughout Europe and Northern Asia, England, Belgium, France.

899. *Notolophus aurolimbata*.

- Orgyia aurolineata*, Guen. Ann. Soc. Ent. France, iv. p. 635, pl. xviii. c. fig. 4 (1835); Strand, *l. c.* pl. xix. b, ♂.

E. Pyrenees, Catalonia, Castile.

900. *Notolophus flavolimbata*.

- Oragia flavolimbata*, Staud. Stett. Zg. 1881, p. 404; Strand, in Seitz, Macrolep. ii. pl. xix. b.

Tian-shan, Altai.

901. *Notolophus tristis*.

- Orgyia tristis*, Gr.-Grsh. Rom. Mém. Lép. iv. p. 554.

Pamir.

902. *Notolophus ochrolimbata*.

- Orgyia ochrolimbata*, Staud. Stett. Zg. 1881, p. 405; Strand, in Seitz, Macrolep. pl. xix. b.

S.W. Caucasus.

903. *Notolophus trigotephras*.

- Orgyia trigotephras*, Boisd. Eur. Lep. Ins. Méth. p. 46; Strand, *l. c.* pl. xix. b.

Var. *anceps*, Oberth. Ent. d'Ent. ix. p. 39; Strand, *l. c.* pl. xxii. b.

France, Iberian Frontier, Algeria, Morocco.

904. *Notolophus transiens*.

- Orgyia transiens*, Staud. Stett. Zg. 1887, p. 95.

Orgyia trigotephras, var. *transiens*, Staud. Cat. Lep. Phal. p. 114 (1901); Roths. Nov. Zool. xxiv. p. 355 (1917).

South Mauretania.

905. *Notolophus sicula*.

Orgyia sicula, Staud. Stett. Zg. 1887, p. 95; Strand, in Seitz, Macrolep. ii. pl. xxii. *b*.

Sicily, Andalusia.

906. *Notolophus etrusca*.

Orgyia etrusca, Verity, Bull. Soc. Ent. France, 1905, p. 59.

Tuscany.

907. *Notolophus corsica*.

Orgyia corsica, Boisd. Icon. ii. p. 142; Strand, *l. c.* pl. xix. *a*.

Orgyia ramburi, Mab. Ann. Soc. Ent. France, 1866, p. 557.

Corsica.

908. *Notolophus orientalis*.

Orgyia orientalis, Staud. Cat. Pal. Lep. p. 14.

The Taurus, Syria, Palestine.

909. *Notolophus prisca*.

Orgyia prisca, Staud. Stett. Zg. 1887, p. 95.

Ferghana, Mongolia.

910. *Notolophus ericæ*.

Orgyia ericæ, Germ. Fauna, i. E. p. 8; Strand, *l. c.* pl. xix. *b*.

Ab. *antiquoides*, Hübner, Eur. Schmett. ii. figs. 279, 280 (1818).

Var. *intermedia*, Friv. Magy. Ind. Akad. Erkon. xi. (4) p. 149, pl. v. figs. 1 *a-d*.

Belgium, Germany, Finland, Denmark, Armenia, Mongolia.

911. *Notolophus leechi*.

Notolophus leechi, Kirby, Cat. Moths, i. p. 495 (1892).

Orgyia prisca, Leech (nec Staud.), Entom. xxiii. p. iii (1890) (præocc.).

Type, Chang Yang, in B.M.

912. *Notolophus rupestris*.

Orgyia rupestris, Ramb. Ann. Soc. Ent. France, i. p. 275, pl. viii. figs. 1-5 (1832); Strand, *l. c.* pl. xix. *b*.

Corsica.

913. *Notolophus judæa*.

Orgyia judæa, Staud. Cat. Pal. Lep. p. 114.

Var. *splendida*, Ramb. Faune Andalusie, pl. xv. figs. 2-6 (1842).

Var. *turcica*, Led. Verh. zool.-bot. Ges. Wien, 1852, p. 117.

Form *josephina*, Aust. Le Nat. ii. pp. 212, 220 (1880); Strand, *l. c.*
pl. xix. e.

Form *interrupta*, Gr.-Grsh. Rom. Mem. Lep. iv. p. 555.

Form *seleniaca*, Fisch. Waldheim. Entom. Ross. ii. p. 249.

Form *isolatella*, Strand, *l. c.* p. 119, pl. xix. c.

Ab. *umbripennis*, Strand, *l. c.*

Palestine, Egypt, Mauretania, Spain, Sicily, Asia Minor,
Armenia, Syria, Turkestan, Sarepta, Algeria.

914. *Notolophus transcaspica*.

Orgyia transcaspica, KvnI. Soc. Entom. xxi. p. 50.

Ab. *obliterella*, Strand, *l. c.*

Algeria.

915. *Notolophus thyellina*.

Orgyia thyellina, Butler, Trans. Ent. Soc. 1881, p. 10, ♂; Leech,
P. Z. S. 1888, p. 625, pl. xxxi. figs. 7, 7 a, ♀; Strand, *l. c.* pls. xxii. b,
♂, xix. c, ♀; Wileman, Philipp. Journal of Science, xiii. (4) p. 152,
pl. i. figs. 3, 5 larva (1918).

Types, ♂ ♀, Tokio, Japan, in B.M.; Yokohama, Asama
Yama, Oiwake, Formosa.

916. *Notolophus splendida*.

Orgyia splendida, Ramb. Faune Andalusia, pl. xv. figs. 3-6 (1842).

Notolophus splendida, Roths. *l. c.*

Spain, Algeria, Andalusia.

917. *Notolophus algirica*.

Trichiosoma algiricum, Luc. Expl. Alg. iii. p. 376, pl. iii. fig. 6 (1849).

Notolophus algirica, Roths. *l. c.* p. 352.

Orgyia josephina, Astant, Le Nat. ii. p. 212 (1880).

Algeria, Oran, Mauretania.

918. *Notolophus umbripennis*.

Orgyia dubia, ab. *umbripennis*, Strand, in Seitz, Gross. Erde, ii. p. 119,
pl. x. c (1910).

Notolophus dubia umbripennis, Roths. *l. c.* p. 353.

Batna, Province of Constantine.

919. *Notolophus deserticola*.

Orgyia dubia deserticola, Powell, Etud. Léop. Comp. fasc. xii. pp. 265-
266 (1916).

Notolophus dubia deserticola, Roths. *l. c.*

Kebala.

920. *Notolophus isolatella*.*Orgyia dubia*, forma *isolatella*, Strand, *l. c.* pli xix. c.*Notolophus splendida isolatella*, Roths. *l. c.*

Batna, Mauretania, Blida les Glacières.

921. *Notolophus orana*.*Orgyia dubia orana*, Powell, *l. c.* pp. 264-266.*Notolophus splendida orana*, Roths. *l. c.* p. 354.

Djebel Amour, Sebdon.

922. *Notolophus panlacroixii*.*Orgyia panlacroixii*, Oberth. Etud. Ent. liv. (i.) p. 41, pl. iii. fig. 5 (1876).*Notolophus panlacroixii*, Roths. *l. c.* (note).

Tuelagh, Algeria.

923. *Notolophus anceps*.*Orgyia anceps*, Oberth. *l. c.* liv. (ix.) p. 37, pl. iii. fig. 5 (1884).*Notolophus trigotephras anceps*, Roths. *l. c.*

Tangier.

924. *Notolophus holli*.*Orgyia trigotephras holli*, Oberth. Etud. Lep. Comp. fasc. xii. p. 276 (1916).*Notolophus trigotephras holli*, Roths. *l. c.*

El Biar, Hussein Dey.

925. *Notolophus sebdonensis*.*Orgyia trigotephras sebdonensis*, Oberth. *l. c.**Notolophus trigotephras sebdonensis*, Roths. *l. c.*

Sebdon, Mauretania.

926. *Notolophus tricolor*.*Orgyia tricolor*, Herr.-Schäff. Ausser. Schmett. i. fig. 472 (1856).*Notolophus tricolor*, Kirby, *l. c.* p. 492.

S. Africa.

927. *Notolophus aurantia*.*Orgyia aurantia*, Mab. Ann. Soc. Ent. France, (5) ix. p. 345 (1879).

Madagascar.

928. *Notolophus athlophora*.*Orgyia athlophora*, Turner, Proc. Linn. Soc. N.S.W. xlv. (4) p. 493 (1920).

Types, ♂ ♀, Perth, W. Australia, in Coll. Turner.

929. *Notolophus australis*.

Orgyia australis, Walker, iv. p. 787 (1855), ♀.

Lacida postica, Walker, iv. p. 803.

Orgyia ceylonica, Neitner, Ed. New Phil. Journ. xv. p. 34 (1862).

Orgyia canifascia, Walker, xxii. p. 325 (1865), ♂.

Orgyia ludekingi, Snellen, Tijd. v. Ent. xxii. p. 104, pl. viii. fig. 5, ♂ (1879).

Orgyia australis, Turner, l. c. p. 494.

Type, ♀, Australia; type, ♂, *canifascia*, Australia; type, *postica*, Moulmein: all in B.M. Type, ♂, *ludekingi*, Celebes, in Coll. Snellen; Mackay, Cairns, Townsville, Queensland, Brisbane, Sydney, Ceylon, Formosa, Hongkong, Amboina.

930. *Notolophus ocularis*.

Orgyia ocularis, Moore, Lep. Atk. p. 44 (1879).

Type, ♂, Calcutta, in B.M.

931. *Notolophus tisdala*.

Orgyia tisdala, Swinhoe, Trans. Ent. Soc. 1903, p. 460.

Type, ♂, Arjuno, Java, in B.M.

932. *Notolophus turbata*.

Orgyia turbata, Butler, Trans. Linn. Soc. (2) i. p. 560 (1879).

Type, ♂, Malacca, in B.M.; Province Wellesly, Tenasserim, Heipaw, Burma, Koni, Shan States.

933. *Notolophus furva*.

Ocneria furva, Leech, P. Z. S. 1888, p. 631, pl. xxxi. fig. 10.

Type, Japan, in B.M.; Ichang, Pekin.

934. *Notolophus dimidiata*.

Orgyia dimidiata, Walker, Journ. Linn. Soc. vi. p. 125 (1862);

Swinhoe, Cat. Het. Mus. Oxon. i. p. 198, pl. vi. fig. 6 (1897).

Type, Sarawak, in Mus. Oxon.

935. *Notolophus varia*.

Orgyia varia, Walker, l. c.; Swinhoe, l. c. pl. vi. fig. 13.

Type, Sarawak, in Mus. Oxon.

936. *Notolophus osseata*.

Orgyia osseata, Walker, l. c.; Swinhoe, l. c. pl. vi. fig. 16.

Type, Sarawak, in Mus. Oxon.

937. *Notolophus nucula*.

Orgyia nucula, Swinhoe, Ann. & Mag. Nat. Hist. (6) xiv. p. 435 (1894);
Swinhoe, Trans. Ent. Soc. 1895, p. 7, pl. i. fig. 15.

Type, Khasia Hills, in B.M.

938. *Notolophus senica*.

Orgyia senica, Hmps. Journ. Bombay Nat. Hist. Soc. xiii. p. 234,
pl. B. fig. 23 (1900).

Type, ♂, Chitral, in B.M.

939. *Notolophus viridescens*.

Acyphas viridescens, Walker, iv. p. 798 (1855).

Type, ♂, Ceylon, in B.M.

940. *Notolophus dewarra*.

Orgyia dewarra, Swinhoe, Trans. Ent. Soc. 1903, p. 459.

Type, ♂, Kapaur, N. Guinea, in B.M.

941. *Notolophus nigrocrocea*.

Orgyia nigrocrocea, Walker, Journ. Linn. Soc. vi. p. 124 (1862).

Type, Sarawak, in B.M.

942. *Notolophus nigriplaga*.

Orgyia nigriplaga, Swinhoe, Ann. & Mag. Nat. Hist. (7) xii. p. 194
(1903).

Type, ♂, N. Borneo, in B.M.; Perissim, Lawas, Borneo.

943. *Notolophus albacosta*.

Orgyia albacosta, Beth.-Baker, Ann. & Mag. Nat. Hist. (8) vii. p. 545
(1911).

Type, ♂, Malanga, W. Africa, in Coll. Bethune-Baker.

944. *Notolophus anartooides*.

Teia quartooides, Walker, iv. p. 804.

Teia pusilla, Butler, Ann. & Mag. Nat. Hist. (5) ix. p. 88 (1882).

Orgyia anartooides, Turner, Proc. Linn. Soc. N.S.W. xlv. (4) p. 493
(1920).

Type, ♂, Tasmania; type, ♂, *pusilla*, Melbourne: both
in B.M. Sydney, Blackbutt, N.S. Wales.

945. *Notolophus ruficeps*.

Orgyia ruficeps, Roths. Journ. of the F.M.S. Mus. p. 132 (1920).

W. Sumatra.

946. *Notolophus dubia*.

Bombyx dubia, Tausch. Mém. Soc. Nat. Moscou, i. p. 176, pl. xiii. fig. 3 (1806).

Notolophus dubia, Roths. Nov. Zool. xiv. p. 351 (1917).

Bombyx seleniaca, Waldh. Ent. Ross. ii. p. 240, pl. x. fig. 3 (1823).

Orygia alhagi, Waldh. Bull. Mosc. 1839, (i.) p. 117, pl. iv. fig. 2.

S. Russia, Algeria, Armenia, Transcaspia, Kar Kun, Tian-Shan.

947. *Notolophus punctatella*.

Orygia punctatella, Motsch. Etud. Ent. ix. p. 32 (1860).

Japan.

948. *Notolophus cæca*.

Orygia cæca, Plötz, Stett. ent. Zeit. xli. p. 84 (1880).

Notolophus calca, Kirby, *l. c.* p. 494.

West Africa.

949. *Notolophus quadripunctata*.

Orygia quadripunctata, Wallgrn. Gefv. Vet.-Akad. Förh. xxxii. (i.) p. 99 (1876).

Notolophus quadripunctata, Kirby, *l. c.* p. 495.

Transvaal.

950. *Notolophus retnopepla*.

Orygia retnopepla, Lower, Trans. Roy. Soc. S. Austr. 1905, p. 176; Turner, Proc. Linn. Soc. N.S.W. xlv. (4) p. 499 (1920).

Queensland.

951. *Notolophus nebulosa*.

Orygia nebulosa, Walker, Journ. Linn. Soc. vi. p. 125 (1862); Swinhoe, Ann. & Mag. Nat. Hist. (7) xviii. p. 404 (1906) (note).

Type, ♂, Sarawak, in Mus. Oxon.; Java.

952. *Notolophus malagassica*.

Orygia malagassica, Kenrick, Trans. Ent. Soc. 1913, p. 597, pl. xxxii. fig. 21.

Type, ♂, Madagascar, in Coll. Kenrick.

Genus HYPOGYMNA, Steph. Ill. Brit. Ent. Haust. ii. p. 55 (1828).

953. *Hypogymna morio*.

Bombyx morio, Linn. Syst. Nat. i. (2) p. 828 (1767).

Hypogymna morio, Strand, *l. c.* pl. xix. a.

Ab. natlyi, Aign. Rom. Lép. xiii. p. 69.

Centophera caucasia, Heylerts, C. R. Soc. Ent. Belg. xxxi. p. lxxxviii (1887).

S.E. Germany, Austria, Hungary, N. Balkans, C. Italy, Armenia.

Genus *ENOME*, Walker, iv. p. 883 (1855).

954. *Enome ampla*.

Enome ampla, Walker, *l. c.*

Type, ♂, Ceylon, in B.M.; Calcutta, Bangalore, Malabar, Poona, Bombay, Silchar, Cachar, Sikkim.

955. *Enome incerta*.

Lymantria incerta, Walker, iv. p. 880.

Type, ♂, N. India, in B.M.; Kangra, Jubbulpore, Nilgiris, Bombay.

956. *Enome aryama*.

Lymantria aryama, Moore, Cat. Lep. E. I. Co. ii. p. 345 (1859).

Enome aryama, Swinhoe, Cat. Het. Mus. Oxon. ii. p. 217 (1892).

Type, Kanara, S. India, should be in the B.M., but I have been unable to find it. Hampson makes it a synonym of *incerta*. I separated it in Cat. Het. Mus. Oxon. and should thus leave it because Hampson also puts *detersa* under *incerta*, but *detersa* is a good species confined to South India. I have bred many of them in Bombay and Poona, the females have aborted wings.

957. *Enome detersa*.

Lymantria detersa, Walker, xxxii. 365 (1865).

Lymantria costalis, Walker, *l. c.*

Enome detersa, Swinhoe, P. Z. S. 1885, p. 300, pl. xxi. figs. 3, 4 (female, larva, and pupa); Swinhoe, Trans. Ent. Soc. 1903, p. 482 (note).

Type, ♂, of both, S. India, in B.M.; Mhow, Bombay, Poona, Belgaum, Ahmednagar.

958. *Enome pilospila*.

Enome pilospila, Turner, Proc. Roy. Soc. Queensland, xxvii. p. 21 (1915).

Type, Port Darwin, in Coll. Turner.

959. *Enome antennata*.

Lymantria antennata, Walker, iv. p. 881 (1855).

Lymantria aurora, Turner, Trans. Roy. Soc. S. Australia, xxvi. p. 181 (1902).

Lymantria turneri, Swinhoe, *l. c.* p. 484.

Enome antennata, Turner, Proc. Linn. Soc. N.S.W. xlv. (4) p. 490 (1920).

Type, ♂, Richmond River, in B.M.; type, ♂, *aurora*, Cap York, in Coll. Turner; Cairns, Stannary Hill, Townsville, Brisbane, Queensland.

960. *Enome plumbalis*.

Lymantria plumbalis, Hmps. Trans. Ent. Soc. 1895, p. 292.

Type, ♂, Tinlinyaw, Burma, in B.M.; Thyetmyo.

GENUS *LIPARIS*, Ochs. Schmett. Eur. iii. p. 186 (1810);
type, *monacha*, Linn.

Psilura, Steph. Ill. Brit. Ent. Haust. ii. p. 55 (1828); type, *monacha*, Linn.

Pegella, Walker, xxxv. p. 1922 (1866); type, *curvifera*, Walker.

Nagunda, Moore, Lep. Atk. p. 53 (1879); type, *semicineta*, Walker.

Barhona, Moore, *l. c.* p. 55; type, *carneola*, Moore.

Porthetria, Hübner, Verz. bek. Schmett. p. 160 (1886); type, *dispar*, Linn.

Lymantria, Hübner, *l. c.*; type, *monacha*, Linn.

Leptocneria, Butler, Trans. Ent. Soc. 1886, p. 386; type, *binotata*, Butler.

961. *Liparis monacha*.

Bombyx monacha, Linn. Syst. Nat. i. p. 501 (1758); Strand, pl. xx. *g.*

Psilura monacha, Steph. *l. c.*

Lymantria monacha, Hübner, *l. c.*

Ab. *nigra*, Freyer, Neu Beitr. ii. p. 5, pl. xxviii. figs. 2, 3 (1833).

Ab. *eremita*, Hübner, *l. c.* fig. 246 (1804); Strand, pl. xx. *g.*

Ab. *atra*, Linstow, Entom. Zeit. xxi. pp. 96-103.

Ab. *lutea*, Aurl. Zeitschr. f. W. Ins. Biol. v. p. 159.

Ab. *flavoabdominalis*, Schultz, Ent. Zschr. Stuttgr. xxiv. p. 36.

Ab. *obsoleta*, Schultz, *l. c.*

Castile, Italy, Croatia, Greece, Armenia, Amurland, Japan, Lapland.

962. *Liparis atlantica*.

Liparis atlantica, Ramb. Faun. Ent. Andal. ii. pl. xv. fig. 7 (1842).

Lymantria atlantica, Strand, *l. c.* pl. xx. *g.*

Andalusia, Mauretania.

963. *Liparis sinica*.

Lymantria sinica, Moore, P. Z. S. 1879, p. 403.

Type, ♂, N. China, in B.M.; Formosa, Shanghai.

964. *Liparis eurydice*.

Porthetria eurydice, Butler, Cist. Ent. iii. p. 118 (1885).

Dasychira amata, Staud. Rom. sur Léop. iii. p. 206, pl. xii. fig. 2, ♀ (1887).

Type, ♂, Choyama, Japan, in B.M.; Asama Yama, Amur.

965. *Liparis aboleta*.

Lymantria aboleta, Staud. Iris, viii. p. 295; Strand, *l. c.* pl. xxi. *a.*

Palestine.

966. *Liparis destituta*.

Ocneria destituta, Staud. Iris, iv. p. 256 (1892).

Lymantria destituta, Strand, *l. c.* pl. xxi. *a.*

Armenia.

967. *Liparis grisescens*.

Ocneria grisescens, Staud. Rom. Mon. Lep. iii. p. 289 (1887).

Lymantria grisescens, Strand, *l. c.* pl. xxii. *f.*

Ocneria albescens, Staud. *l. c.* pl. xii. fig. 4.

Askold Isl., Ussuri District.

968. *Liparis lapidicola*.

Lymantria lapidicola, Herr.-Schäff. Schmett. Eur. Syst. vi. p. 52;

Strand, *l. c.* pl. xxiii. *e.*

Form *urbicola*, Staud. Iris, iv. p. 337 (1892); Strand, pl. xxi. *a.*

Form *phænisa*, Rog. Sitz. zool.-bot. Ges. Wien, ii. p. 85 (1891).

Form *libanica*, Staud. Iris, xii. p. 161.

Form *ardinia*, Staud. *l. c.* p. 338.

Asia Minor, Mesopotamia, Smyrna, Beirut, Palestine, Cyprus, Mt. Lebanon.

969. *Liparis kamarovi*.

Lymantria kamarovi, Christ. Hor. Ent. Ross. xvii. p. 109; Strand, *l. c.* pl. xxi. *a.*

Armenia.

970. *Liparis obfuscata*.

Lymantria obfuscata, Walker, xxxii. p. 367 (1865); Strand, *l. c.* p. 130, pl. xxii. *f.*

Type, ♀, N. India, in B.M.; Murree, Kangra, Punjab, Kulu, Sultampur, Cashmir, Skardo.

971. *Liparis atala*, nom. nov.

Liparis binotata, Mab. C. R. Soc. Ent. Belg. xxiii. p. cvii (1889) (præocc.).

Lymantria binotata, Kirby, *l. c.* p. 480.

Madagascar.

972. *Liparis rebuti*.

Liparis rebuti, Pouj. Bull. Soc. Ent. France, (6) ix. p. lxiii (1889).

Lymantria rebuti, Kirby, *l. c.*

Madagascar.

973. *Liparis mus*.

Lymantria mus, Oberth. Etud. Lep. Comp. fasc. vi., Explan. Pis. p. 22, pl. cccxxx. (1916).

El Ontaya.

974. *Liparis oberthüri*.

Lymantria oberthüri, Lucas, Ann. Soc. Ent. France, lxxv. p. 26, pl. iii. figs. 6, 7 (1906).

Mauretania, Tunisia.

975. *Liparis dispar*.

Bombyx dispar, Linn. Syst. Nat. (x.) i. p. 501 (1758).

Lymantria dispar, Strand, l. c. p. 127, pl. xx. d.

Bombyx, form *disparina*, Müll. Faun. Sib. iii. p. 2 (1867).

Liparis, ab. *fasciata*, Rebel, Berge's Schmett.-Buch. p. 118.

Liparis, ab. *bordigulensis*, Mab. Bull. Soc. Ent. France, 1876, p. 9.

Liparis, form *major*, Fuchs, Jahrb. Nass. Ver. Nat. lii. p. 136.

Ocneria, form *erebus*, Th.-Mieg. Le Nat. viii. p. 237 (1881).

Ocneria, form *semiobscura*, Th.-Meig. l. c.

Porthetria, form *umbrosa*, Butler, Trans. Ent. Soc. 1881, p. 10.

Lymantria, ab. *wiaduwastockensis*, Strand, l. c. pl. xx. c.

Lymantria, form *insignata*, Schultz, Ent. Zachr. Stuttg. xxiv. p. 35.

Lymantria, form *angulifera*, Schultz, l. c.

Lymantria, form *unifascia*, Schultz, l. c. p. 36.

Lymantria, form *submarginalis*, Schultz, l. c.

Scandinavia, Finland, Amurland, Corea, Japan, China, France, Germany, England, Vladivostock.

976. *Liparis japonica*.

Liparis dispar, var. *japonica*, Motsch. Etud. d'Ent. 1860, p. 31.

Liparis japonica, Strand, l. c. pl. xx. d.

Porthetria hadina, Butler, Trans. Ent. Soc. 1881, p. 11.

Lymantria japonica, Swinhoe, Trans. Ent. Soc. 1903, p. 483 (note).

Type, *hadina*, Japan, in B.M.; Yokohama, Hakodate.

977. *Liparis fumida*.

Lymantria fumida, Butler, Ann. & Mag. Nat. Hist. (4) xx. p. 402 (1877); Butler, Ill. Typ. Het. ii. pl. xxiv. fig. 4, ♀ (1878).

Types, ♂ ♀, Japan, in B.M.; Nikko, Yokohama.

978. *Liparis rhodina*.

Lymantria rhodina, Walker, xxxii. p. 366 (1865); Swinhoe, Cat. Het. Mus. Oxon. i. p. 222 (1892) (note).

Type, ♂, India, in B.M.; Sikkim, Khasia Hills.

979. *Liparis beatrix*.

Bombyx beatrix, Stoll, Suppl. Cram. pl. xl. fig. 2 (1791).

Lymantria beatrix, Swinhoe, Trans. Ent. Soc. 1903, p. 487 (note).

Java, Malay Peninsula, Japan.

980. *Liparis umbrina*.

Lymantria umbrina, Moore, Lep. Atk. p. 55, pl. iii. fig. 4 (1879).

Type, Darjiling, in B.M.

981. *Liparis mæsta*.

Lymantria mæsta, Swinhoe, Trans. Ent. Soc. 1903, p. 484.

Type, ♂, Kasaoli; type, ♀, Kangra Valley: both in B.M.

982. *Liparis ganaha*.

Lymantria ganaha, Swinhoe, l. c. p. 487.

Type, ♀, Java, in B.M.; Borneo. Allied to *beatrice*.

983. *Liparis mærens*.

Dasychira (?) *mærens*, Felder, Reise Nov. pl. xcix. fig. 4 (1868).

Type, Ceylon, in Coll. Rothschild.

984. *Liparis nephrographa*.

Lymantria nephrographa, Turner, Proc. Roy. Soc. Queensland, xxvii. p. 23 (1915).

Type, Mt. Tambourine, Queensland, in Coll. Turner; Dorigo, N.S. Wales.

985. *Liparis dissoluta*.

Lymantria dissoluta, Swinhoe, Trans. Ent. Soc. 1903, p. 484.

Types, ♂ ♀, Hongkong, in B.M.

986. *Liparis serva*.

Bombyx serva, Fabr. Syst. Ent. (3) i. p. 474 (1793).

Lymantria obsoleta, Walker, iv. p. 880, ♂ (1855).

Lymantria bhascara, Moore, Cat. Lep. E. I. Co. ii. p. 345, ♀ (1859).

Lymantria vinacea, Moore, P. Z. S. 1879, p. 463, ♀.

Lymantria obsoleta, Swinhoe, l. c. p. 485 (note); Strand, l. c. p. 130, pl. xx. f.

Type, ♂, *obsoleta*; type, ♀, *bhascara*: both in B.M. Type, *vinacea*, from Kanara, should be in B.M., but is missing; common in S. Africa. I have a long series from Kanara, Poona, Matheran, Bombay, and Ceylon, bred at Poona: the larva feeds on *Ficus indicus*, pupa found amongst the roots, suspended in net like the pupa of *Pervina nuda*; moths emerged in September and October, but an odd one was taken in every month from July to February.

987. *Liparis ordinata*.

Lymantria ordinata, Walker, xxxii. p. 368 (1865).

Type, Makian, Celebes, in Mus. Oxon.

988. *Liparis albolunata*.

Lymantria albolunata, Moore, P. Z. S. 1879, p. 405; Swinhoe, Trans. Ent. Soc. 1903, p. 485 (note).

Type, ♂, Dharmsala; type, ♀, Simla: both in B.M. Allied to *serva*.

989. *Liparis sobrina*.

Lymantria sobrina, Moore, l. c. p. 402; Swinhoe, l. c. p. 486 (note).

Type, ♂, Dharmsala; type, ♀, India: both in B.M. Simla.

990. *Liparis semicineta*.

Alope semicineta, Walker, iii. p. 620 (1855).

Nagunda semicineta, Butler, Ill. Het. v. p. 54, pl. xc. fig. 7 (1881).

Type, ♀, N. India, in B.M.; Sikkim, Simla, Ranchi, Bengal.

991. *Liparis todara*.

Lymantria todara, Moore, P. Z. S. 1879, p. 402, pl. xxxiii. fig. 6.

Types, ♂ ♀, Nilgiris, in B.M.; Shevaroy Hills, Travancore, Malabar.

992. *Liparis concolor*.

Lymantria concolor, Walker, iv. p. 876, ♀ (1855); Butler, Ill. Het. v. p. 55, pl. xc. figs. 8, 9 (1881).

Lymantria superans, Walker, l. c., ♀.

Lymantria micans, Felder, Reise Nov. pl. xcix. fig. 2, ♀ (1868).

Lymantria carnecolor, Moore, P. Z. S. 1888, p. 399, ♂.

Type, ♀, and type, ♀, *superans*; type, ♂, *carnecolor*, Dharmsala: all in B.M. Simla, Dalhousie, Kangra, Sultaspore, Abbotabad, Manipur, Jarvai Hills, and Khasia Hills, where it is very common.

993. *Liparis similis*.

Lymantria similis, Moore, P. Z. S. 1879, p. 402, ♂.

Lymantria cara, Butler, Ill. Het. v. pl. xc. fig. 13, ♀ (1881).

Type, ♂, Calcutta; type, ♀, Bhutan: both in B.M.

994. *Liparis marginata*.

Lymantria marginata, Walker, iv. p. 877; Butler, l. c. fig. 12; Swinhoe, Trans. Ent. Soc. 1903, p. 487 (note).

Lymantria pusilla, Felder, Reise Nov. pl. xcix. fig. 3 (1868).

Lymantria nigra, Moore, P. Z. S. 1888, p. 399; Strand, l. c. p. 131, pl. xx.f.

Type, ♀, Sylhet; types, ♂ ♀, *nigra*, Kangra: all in B.M. Type, *pusilla*, Bengal, in Coll. Rothschild; Dharmsala, Sikkim.

995. *Liparis postfusca*.

Lymantria postfusca, Swinhoe, Ann. & Mag. Nat. Hist. (7) xvii. p. 547 (1906) (note).

Type, ♂ ♀, Kandy, Ceylon, in B.M.

996. *Liparis fuliginosa*.

Lymantria fuliginosa, Moore, P. Z. S. 1883, p. 17; Swinhoe, Trans. Ent. Soc. 1903, p. 488 (note).

Type, ♂ ♀, Bombay, in B.M.; Ceylon; bred by me in Bombay, Khandalla, Salsette.

997. *Liparis velutina*.

Orgyia (Dasichira) velutina, Mab. Bull. Soc. Zool. France, iii. p. 90 (1878).

Madagascar.

998. *Liparis aurora*.

Lymantria aurora, Butler, Ann. & Mag. Nat. Hist. (4) xx. p. 403 (1877); Butler, Ill. Het. ii. pl. xxiv. fig. 5 (1878); Swinhoe, *l. c.* p. 488 (note); Wileman, The Philipp. Journ. of Science, xiii. (4) p. 156, pl. i. fig. 7 (1918).

Lymantria aurora, var. *fusca*, Leech, P. Z. S. 1888, p. 629, pl. xxxi. fig. 9.

Types, ♂ ♀, Japan; type, *fusca*, Nagahama: all in B.M. Yokohama, Formosa.

999. *Liparis mathura*.

Lymantria mathura, Moore, P. Z. S. 1865, p. 806; Strand, *l. c.* p. 128, pl. xx. e.

Type, ♂, N. India, in B.M.; Kangra, Dehra Doon, Sikkim, Khasia Hills, Loochoo Isls., Chefoo, China, Omeishan.

1000. *Liparis viola*.

Lymantria viola, Swinhoe, P. Z. S. 1889, p. 406.

Types, ♂ ♀, Thanna, Bombay, in B.M.; Wangi, Bombay, Jubbulpur.

1001. *Liparis grandis*.

Lymantria grandis, Walker, iv. p. 874, ♀ (1855); Butler, *l. c.* p. 57, pl. xci. figs. 1, 2, ♂ ♀.

Lymantria maculosa, Walker, iv. p. 881, ♂.

Lymantria metarhoda, Walker, xxxii. p. 365, ♂ (1865).

Type, ♀, Ceylon; type, *maculosa*, labelled N.S.W., *ex errore*: both in B.M. Type, ♀, *metarhoda*, Ceylon, in Mus. Oxon.

1002. *Liparis singapura.*

Lymantria singapura, Swinhoe, Ann. & Mag. Nat. Hist. (7) xvii. p. 547 (1906).

Type, ♂, Singapore, in B.M.

1003. *Liparis subrosea.*

Lymantria subrosea, Swinhoe, Trans. Ent. Soc. 1903, p. 489.

Lymantria rosea, Hmps. Ill. Het. iv. p. 76, pl. clviii. fig. 28 (1893) (præoc.).

Type, ♂, Ceylon, in B.M.

1004. *Liparis lucescens.*

Porthetria lucescens, Butler, Trans. Ent. Soc. 1881, p. 11.

Type, ♂, Hakodate, Japan, in B.M.; Tokio, Oiwake.

1005. *Liparis flavonigra.*

Lymantria flavonigra, Joicey, Noaks, & Talbot, Trans. Ent. Soc. 1915, p. 382, pl. lxi. figs. 12 ♂, 13 ♀.

Types, ♂ ♀, Arfak Mts., Dutch N. Guinea, in Coll. Joicey.

1006. *Liparis maculata.*

Lymantria maculata, Semper, Het. Philipp. p. 462, pl. liv. fig. 1, ♂ (1898).

Type, ♂, Philippines, in Coll. Semper.

1007. *Liparis loacana.*

Lymantria loacana, Semper, l. c. p. 462.

Type, N.W. Luzon, Philippines, in Coll. Semper.

1008. *Liparis nigrostriata.*

Lymantria nigrostriata, Kenrick, Trans. Ent. Soc. 1913, p. 597.

Type, ♂, Madagascar, in B.M.

1009. *Liparis manicata.*

Lymantria manicata, Aurivill. Ent. Tidskr. xiii. p. 193, g (1892).

Type, Cameroons, in Upsala Mus.; Old Calabar, River Niger.

1010. *Liparis xylina.*

Lymantria xylina, Swinhoe, Trans. Ent. Soc. 1903, p. 490.

Type, ♂, Formosa, in B.M.

1011. *Liparis galinara*.

Lymantria galinara, Swinhoe, *l. c.* (note).

Type, ♂ ♀, Singapur, in B.M.; Bali, Jambak, Borneo.

1012. *Liparis lepcha*.

Porthesia lepcha, Moore, Lep. Atk. p. 54, ♂ (1879).

Barhona carneola, Moore, *l. c.* p. 56, ♀.

Types, ♂ ♀, Sikkim, in B.M.

1013. *Liparis marginalis*.

Lymantria marginalis, Walker, Journ. Linn. Soc. vi. p. 131 (1862).

Type, Sarawak, in Mus. Oxon.

1014. *Liparis brunneiplaga*.

Lymantria brunneiplaga, Swinhoe, *l. c.* p. 491 (note).

Types, ♂ ♀, Java, in B.M.; Borneo, Sumatra, Penang.

1015. *Liparis lunata*.

Bombyx lunata, Stoll, Pap. Exot. iv. pl. cccxix. fig. C (1782).

Pegella ichorina, Butler, Ann. & Mag. Nat. Hist. (5) xiii. p. 201 (1884).

Type, *ichorina*, Amboina, in B.M.; N. Guinea, Celebes, Java, Aru.

1016. *Liparis curvifera*.

Pegella curvifera, Walker, xxxv. p. 1922 (1866); ♀, not ♂, as stated by Walker.

Lymantria curvifera, Swinhoe, *l. c.* p. 491 (note).

Lymantria lunata, Semper (nec Stoll), Het. Philipp. p. 461, pl. N. figs. 5, 7, larva and pupa (1898).

Type, ♀ (nec ♂), Philippines, in B.M.; Gilolo, Batjan.

1017. *Liparis asætria*.

Lymantria asætria, Hübner, Samml. Exot. Schmett. ii. figs. 1, 4 (1818).

Dasychira antica, Walker, vii. p. 1739, ♀ (1856).

Lymantria pramesta, Moore, Cat. Lep. E. I. Co. ii. p. 344, pl. ix. a. fig. 3 (1859).

Types, *pramesta* and *antica*, ♂ ♀, Java, in B.M.; Moulmein, Thyetmyo.

1018. *Liparis narinda*.

Lymantria narinda, Moore, *l. c.* p. 342; Swinhoe, *l. c.* p. 492 (note).

Lymantria hilaris, Voll. Tijd. v. Ent. vi. p. 143, pl. x. figs. 2, 3 (1863).

Type, ♂, Java, in B.M.; Sumatra.

1019. *Liparis grisea*.*Lymantria grisea*, Moore, Lep. Atk. p. 55, pl. iii. fig. 5 (1879).

Type, ♀, Darjiling, in B.M.; Khasia Hills, Chin Hills, Burma.

1020. *Liparis silca*.*Lymantria silca*, Swinhoe, Ann. & Mag. Nat. Hist. (7) xii. p. 197 (1903).

Types, ♂ ♀, Fergusson Isl., in B.M.; Milne Bay, Kapaur, N. Guinea.

1021. *Liparis novoguineensis*.*Lymantria novoguineensis*, Beth.-Baker, Nov. Zool. xi. p. 407, pl. vi. fig. 35 (1904).

Type, Ekeikei, N. Guinea, in Coll. Bethune-Baker.

1022. *Liparis ganara*.*Lymantria ganara*, Moore, Cat. Lep. E. I. Co. ii. p. 344 (1859).

Type, ♂, Java, in B.M.; Sumatra, Borneo, Singapore, Burma.

1023. *Liparis bivittata*.*Pegella bivittata*, Moore, Lep. Atk. p. 57 (1879).Type, ♀, Darjiling, in B.M.; Sikkim, Sylhet, all females. The ♂ is unknown, it is sure to be very similar to the male of *ganara*.1024. *Liparis vacillans*.*Lymantria vacillans*, Walker, iv. p. 873 (1855).

Type, ♂, Congo, in B.M.

1025. *Liparis dulcinea*.*Lymantria dulcinea*, Butler, Cist. Ent. ii. p. 12 (1882).

Types, ♂ ♀, Madagascar, in B.M.

1026. *Liparis rosea*.*Lymantria rosea*, Butler, Ann. & Mag. Nat. Hist. (5) iv. p. 239 (1879).

Types, ♂ ♀, Madagascar, in B.M.

1027. *Liparis lugardi*.*Lymantria lugardi*, Swinhoe, Trans. Ent. Soc. 1903, p. 493.

Types, ♂ ♀, N'Gami Country, in B.M.

1028. *Liparis bananæ*.

Lymantria bananæ, Butler, P. Z. S. 1896, p. 848, pl. xlii. fig. 9.

Type, ♂, Nyassaland, in B.M.; Massai.

1029. *Liparis tottea*.

Lymantria tottea, Swinhoe, l. c. p. 494.

Type, ♂, Old Calabar, in B.M.

1030. *Liparis mosera*.

Lymantria mosera, Druce, Ann. & Mag. Nat. Hist. (7) i. p. 208 (1896).

Types, ♂ ♀, Delagoa Bay, in Coll. Joicey; Natal, Durban, Rhodesia.

1031. *Liparis eddela*.

Lymantria eddela, Swinhoe, l. c.

Type, ♂, Ewanbo, Tanganyika, in B.M.

1032. *Liparis carriola*.

Lymantria carriola, Swinhoe, l. c. p. 498.

Type, ♀, Angola, in B.M.

1033. *Liparis gondona*.

Lymantria gondona, Swinhoe, l. c.

Type, ♀, Saraki Valley, Brit. E. Africa, in B.M.

1034. *Liparis reducta*.

Darala reducta, Walker, iv. p. 888 (1855).

Lymantria reducta, Turner, Proc. Linn. Soc. N.S.W. (4) xlv. p. 491 (1920).

Type, ♂, N. Australia, in B.M.; Cunnamulla, Lismore, N.S.W.

1035. *Liparis binotata*.

Lymantria binotata, Butler, Trans. Ent. Soc. 1886, p. 386, pl. ix. fig. 3;
Turner, l. c.

Type, ♂, Peak Downs, in B.M.; Port Darwin.

1036. *Liparis parva*.

Lymantria parva, Walker, xxxii. p. 368 (1865).

Type, Timor, in Mus. Oxon.

1037. *Liparis thomsoni*.

Lymantria thomsoni, Druce, Ann. & Mag. Nat. Hist. (7) i. p. 209 (1898).

Type, ♀, Mungo-na-lobah, W. Africa, in Coll. Joicey.

1038. *Liparis parvula*.

Lymantria parvula, Kenrick, Trans. Ent. Soc. 1913, p. 597, pl. xxxii. fig. 29.

Type, ♀, Madagascar, in Coll. Kenrick.

1039. *Liparis simplex*.

Lymantria simplex, Pag. Jahrb. Nass. Ver. xxxix. p. 132 (1886).

Aru.

The following species of *Liparis* are taken from Kirby's Catalogue. I am not acquainted with them:—

1040. *Liparis brotea*.

Bombyx brotea, Stoll, Pap. Exot. iv. pl. cccxxii. E (1781).

Lymantria brotea, Kirby, Cat. Moths, i. p. 478 (1892).

Coromandel.

1041. *Liparis basinigra*.

Lymantria basinigra, Moore, P. Z. S. 1865, p. 805; Kirby, *l. c.* p. 479.

Bengal.

1042. *Liparis* (?) *rhodalipha*.

Arctia rhodalipha, Felder, Reise Nov. pl. c. fig. 25 (1868).

Lymantria (?) *rhodalipha*, Kirby, *l. c.*

Type, Cape, in Coll. Rothschild.

1043. *Liparis rufopunctata*.

Lymantria rufopunctata, Walker, Trans. Ent. Soc. 1862, p. 265;
Kirby, *l. c.*

Natal.

1044. *Liparis subfusca*.

Liparis subfusca, Boisd. Voy. Delegorgne, ii. p. 598 (1847).

Lymantria subfusca, Kirby, *l. c.*

Amazulu.

1045. *Liparis melanocera*.

Liparis melanocera, Mab. Bull. Soc. Ent. France, iii. p. 89 (1878).

Lymantria melanocera, Kirby, *l. c.*

Madagascar.

1046. *Liparis vitrina*.*Liparis vitrina*, Mab. l. c.*Lymantria vitrina*, Kirby, l. c.

Madagascar.

1047. *Liparis lutea*.*Liparis lutea*, Boisd. l. c. p. 139.*Lymantria* (?) *lutea*, Kirby, l. c.

Amazulu.

1048. *Liparis heptasticta*.*Liparis heptasticta*, Mab. l. c. p. 90.*Lymantria heptasticta*, Kirby, l. c.

Madagascar.

1049. *Liparis rhodophora*.*Liparis rhodophora*, Mab. Soc. Philom. (7) iii. p. 137 (1879).*Lymantria rhodophora*, Kirby, l. c.

Madagascar.

Genus OCNERIA, Hübner, Verz. bek. Schmett. p. 158 (1822).

1050. *Ocneria detrita*.*Bombyx detrita*, Esper, Schmett. Eur. iii. (2) p. 229, pl. xlv. fig. 6 (1785).*Ocneria detrita*, Strand, l. c. p. 131, pl. li. c.

Germany, Austria, Hungary, Bukovina, Bulgaria, Sarepta, Taurus, France.

1051. *Ocneria terebynthi*.*Bombyx terebynthi*, Fryer, Neu Beitr. iii. p. 110, pl. cclxxii. fig. 1 (1837).*Ocneria unicolor*, Staud. Iris, vii. p. 260.*Ocneria terebynthi*, Strand, l. c. pl. xxi. b.

Asia Minor, Balkans, Armenia, Mesopotamia.

1052. *Ocneria terebynthina*.*Ocneria terebynthina*, Staud. l. c. p. 259.

Mesopotamia.

1053. *Ocneria raddei*.*Ocneria raddei*, Christoph. Rom. Mem. Lep. i. p. 10, pl. i. figs. 3, 4 (1885); Strand, l. c. p. 132, pl. xxi. b.

Transcaucasia, Mesopotamia.

1054. *Ocneria flavipalpata*.

Ocneria flavipalpata, Staud. Iris, viii. p. 296; Strand, *l. c.* pl. xxi. *b.*
Valley of the Jordan.

1055. *Ocneria signatoria*.

Ocneria signatoria, Chris. Iris, vi. p. 88; Strand, *l. c.* pl. xxi. *b.*
Ocneria poenitens, Staud. Iris, xii. p. 162.

Transcaucasia, Turkestan, Palestine.

1056. *Ocneria signatoria nisseni*.

Lymantria nisseni, Roths. Nov. Zool. xix. p. 125 (1912).
Lymantria signatoria algerica, Oberthür, Etude Comp. fasc. xi,
April 1916.
Ocneria signatoria nisseni, Roth. Nov. Zool. xxiv. p. 358 (1917).
Algeria.

1057. *Ocneria rubea*.

Bombyx rubea, Fabr. Mant. Ins. ii. p. 117 (1787).
Ocneria rubrior, Fuchs. Jahrb. Ver. Nass. Nat. liii. p. 45.
Ocneria rubea, Strand, *l. c.* pl. xxi. *c.*

Rheingan, Spain, France, Italy, Tyrol, Moravia, Austria,
Hungary, Transsylvania, Dalmatia, N.W. Africa.

1058. *Ocneria* (?) *nora*.

Ocneria nora, Staud. Iris, viii. p. 112.
Taurus.

1059. *Ocneria* (?) *samarita*.

Ocneria samarita, Staud. Iris, viii. p. 204.
Ocneria (?) *samarita*, Strand, *l. c.* pl. xxi. *e.*
Palestine.

1060. *Ocneria* (?) *ledereri*.

Ocneria ledereri, Mill. Icon. ii. p. 451; Strand, *l. c.* pl. xxii. *h.*
Sicily.

1061. *Ocneria* (?) *amabilis*.

Ocneria amabilis, Christ. Rom. Mém. Lép. iii. p. 60.
Ocneria (?) *amabilis*, Strand, *l. c.* pl. xxi. *d.*
Askhabad.

1062. *Ocneria heliaspis*.

Ocneria heliaspis, Meyrick, Trans. Roy. Soc. S. Australia, xiv. p. 192
(1891).
N.S. Wales.

Genus OCNEROGYIA, Staud. Iris, iv. p. 254.

1063. *Ochnerogyia amanda*.*Ochnerogyia amanda*, Staud. l. c.

Mesopotamia.

Genus ALBARRACINA, Staud. Stett. ent. Zeit. xlv.
p. 180 (1883).1064. *Albarracina korbi*.*Bombyx korbi*, Staud. l. c. p. 179.*Albarracina korbi*, Staud. l. c. p. 180; Strand, l. c. pl. xxi. d.

Albarracin, East Central Spain.

1065. *Albarracina syriaca*.*Albarracina syriaca*, Standfus, Iris, ii. p. 266; Strand, l. c. pl. xxii. h.Var. *deundulata*, Strand, l. c. p. 133.

Jaffa in Syria, Tunis.

1066. *Albarracina baui*.*Albarracina baui*, Standfus, l. c.

Palestine, Syria.

1067. *Albarracina* (?) *vandalicia*.*Bombyx vandalicia*, Mill. Ann. Soc. Linn. Lyon, (2) xii. p. 437, pl. vi.
figs. 6, 7 (1866).*Albarracina* (?) *vandalicia*, Kirby, Cat. Moths, i. p. 838 (1892).

Spain.

1068. *Albarracina warrionis*.*Bombyx warrionis*, Oberth. Etude Ent. vi. p. 75, pl. ii. fig. 6 (1881).

Algeria, in Coll. Oberthür.

Genus OREINOBIA, Wallgrn. K. Vet.-Akad. Handl.
(2) v. (i.) p. 34 (1865).1069. *Oreinobia scurrilis*.*Psilura scurrilis*, Wallgrn. Wien. ent. Mon. iv. p. 163 (1860).*Oreinobia scurrilis*, Wallgrn. Vet.-Akad. Handl. (2) v. (i.) p. 34.*Oreinobia scurrilis*, Kirby, l. c. p. 480.

S. Africa.

Genus PALASEA, Wallgrn. l. c. p. 35.

1070. *Palasea albimacula*.*Palasea albimacula*, Wallgrn. l. c.; Kirby, l. c.

Caffraria.

Genus *IMAU*S, Moore, Lep. Atk. p. 54 (1879).

1071. *Imaus mundus*.

Lymantria munda, Walker, iv. p. 875 (1855).

Imaus mundus, Moore, *l. c.*

Lymantria gomara, Moore, Cat. Lep. E. I. Co. ii. p. 344 (1859).

Type, ♀, Sylhet, in B.M. ; Sikkim, Java.

1072. *Imaus dasychiroides*.

Imaus dasychiroides, Roths. Journal of the F.M.S. Mus. p. 133 (1920).

Type, W. Sumatra, in Coll. Rothschild.

1073. *Imaus malgassica*.

Imaus malgassica, Kenrick, Trans. Ent. Soc. 1913, p. 599, pl. xxxii. fig. 35.

Type, ♂, Madagascar, in Coll. Kenrick.

1074. *Imaus nepcha*.

Imaus nepcha, Joicey & Talbot, Ann. & Mag. Nat. Hist. (8) xx. p. 57, pl. i. fig. 12 (1917).

Type, ♂, Dutch N. Guinea, in Coll. Joicey.

1075. *Imaus basistriga*.

Imaus basistriga, Joicey & Talbot, *l. c.* p. 58, pl. i. fig. 13.

Type, ♂, Dutch N. Guinea, in Coll. Joicey.

Genus *DURA*, Moore, Lep. Atk. p. 56 (1879).

Dasychiroides, Beth.-Baker, Nov. Zool. 1904, p. 406.

1076. *Dura alba*.

Dura alba, Moore, *l. c.*

Type, ♂, Darjiling, in Coll. Staudinger; type, ♀, Darjiling, in B.M. ; Sikkim, Khasia Hills, Tonkin, Philippines.

1077. *Dura amplipennis*.

Lymantria amplipennis, Walker, xxxii. p. 367 (1865).

Type, N. Guinea, in Mus. Oxon.

1078. *Dura albicans*.

Dasychira albicans, Walker, vii. p. 1730 (1856).

Type, ♀, Celebes, in B.M. ; Borneo, Singapore.

1079. *Dura obsoleta*.

Dasychiroides obsoleta, Beth.-Baker, Nov. Zool. xi. p. 406, pl. vi. fig. 43, ♂ (1904); Joicey & Talbot, Ann. & Mag. Nat. Hist. (8) xx. p. 58, pl. i. fig. 4, ♀.

Type, ♂, N. Guinea, in Coll. Bethune-Baker; type, ♀, N. Guinea, in Coll. Joicey.

1080. *Dura marginepunctata*.

Inaus marginepunctata, Beth.-Baker, Nov. Zool. 1904, p. 410.

Dura marginepunctata, Turner, Proc. Linn. Soc. N.S.W. xlv. (4) p. 489 (1920).

Type, N. Guinea, in Coll. Bethune-Baker; Cairns, N. Queensland, Atherton.

1081. *Dura ochrias*.

Inaus ochrias, Turner, Proc. Roy. Soc. S. Australia, xxx. p. 126 (1906).

Dura ochrias, Turner, Proc. Linn. Soc. N.S.W. xlv. (4) p. 489 (1920).

Type, ♀, Thursday Isl., in Coll. Lyell; Cairns.

1082. *Dura pratti*.

Dasychiroides pratti, Beth.-Baker, l. c. p. 406, pl. vi. fig. 7.

Dura pratti, Turner, l. c.

Type, N. Guinea, in Coll. Bethune-Baker; Kuranda, near Cairns.

1083. *Dura prionodesma*.

Dura prionodesma, Turner, l. c.

Type, ♂, Port Darwin, N. Australia, in Coll. Lyell.

1084. *Dura inhonorata*.

Lymantria inhonorata, Hopff. Stett. ent. Zeit. xxxv. p. 44 (1874).

Dura (?) *inhonorata*, Kirby, Cat. Moths, i. p. 481 (1892).

Celebes.

Genus PYRAMOCERA, Butler, Journ. Linn. Soc. xv.
p. 85 (1880).

1085. *Pyramocera fuliginea*.

Pyramocera fuliginea, Butler, l. c. (fig.).

Types, ♂ ♀, Madagascar, in B.M.

1086. *Pyramocera barica*.

Liparis barica, Mab. Bull. Soc. Zool. France, iii. p. 90 (1878).

Pyramocera barica, Kirby, l. c.

Madagascar.

1087. *Pyramocera tephra*.

Orgyia tephra, Herr.-Schäff. Ausserer. Schmett. i. p. 337 (1855).

Pyramocera (?) *tephra*, Kirby, *l. c.* p. 923.

Cape.

1088. *Pyramocera fumosa*.

Lymantria fumosa, Saalm. Lep. Madag. i. p. 188, pl. vi. figs. 79, 79 a (1884).

Pyramocera fumosa, Kirby, *l. c.*

Nossi Bé.

1089. *Pyramocera uxor*.

Lymantria uxor, Saalm. *l. c.* p. 190 (1884).

Pyramocera uxor, Kirby, *l. c.*

Nossi Bé.

SPECIES WRONGLY REFERRED TO THE FAMILY.

1090. *Aroa exoleta*, Swinhoe, Cat. Het. Mus. Oxon. i. p. 197, pl. vi. fig. 18.

1091. *Euproctis pelodes*, Lower, Proc. Roy. Soc. Queensland, 1892, p. 77 (Notodontidæ).

1092. *Teara erebodes*, Lower, Trans. Roy. Soc. S. Australia, xvi. p. 14 (1892) = *Ochrogaster contraria*, Walker (1855) (Notodontidæ).

1093. *Teara coralliphora*, Lower, Proc. Linn. Soc. N.S.W. 1900, p. 32 (Notodontidæ).

GENERA IN KIRBY'S CATALOGUE WRONGLY INCLUDED
IN THE LIPARIDÆ.

1094. *Comana*, Walker, xxxii. p. 495.

1095. *Xanthodura*, Butler, Ann. & Mag. Nat. Hist. (5) v. p. 384.

1096. *Ænosandra*, Newman, Trans. Ent. Soc. 1856, p. 286 (Notodontidæ).

1097. *Marcipa*, Walker, iv. p. 807.

1098. *Epipyrops*, Westwood, Proc. & Trans. Ent. Soc. 1876, pp. xxiv, 522.

1099. *Sarsina*, Walker, iv. p. 800.

1100. *Geodena*, Walker, vii. p. 1691 (Aganaidæ).
1101. *Soloë*, Walker, ii. p. 557 (Aganaidæ).
1102. *Isine*, Walker, ii. p. 543 (Lithosiidæ).
1103. *Lerna*, Walker, xxxiii. p. 805 (Lithosiidæ).
1104. *Cypra*, Boisd. Voy. de l'Astrolabe, p. 201 (Boarmiidæ).
1105. *Deroca*, Walker, iv. p. 822 (Drepanidæ).
1106. *Trichetra*, Westwood, Mod. Class. Ins. Gen. Syn. p. 92
(Eupterotidæ).
1107. *Marane*, Walker, xxxii. p. 397 (Eupterotidæ).
1108. *Apina*, Walker, iii. p. 756 (Noctuidæ).
1109. *Phiala*, Wallengr. Wien. ent. Mon. iv. p. 165
(Eupterotidæ).
1110. *Raphipeza*, Butler, Ann. & Mag. Nat. Hist. (5) v.
p. 386 (Lasiocampidæ).
1111. *Chrysopsyche*, Butler, l. c. p. 387 (Lasiocampidæ).
1112. *Trisula*, Moore, Cat. Lep. E. I. Co. ii. p. 420 (Noctuidæ).
1113. *Trisuloides*, Butler, Ann. & Mag. Nat. Hist. (5) vii.
p. 36 (Noctuidæ).
1114. *Rhanidophora*, Wallgrn. Œfv. Vers. Vet.-Akad. Förh.
xv. p. 213 (Noctuidæ).
1115. *Amsacta*, Walker, iv. p. 804 (Arctiidæ).
1116. *Teara*, Walker, iv. p. 816 (Eupterotidæ).
1117. *Ochrogaster*, Felder, Reise Nov. pl. xciv. fig. 5
(Eupterotidæ).
1118. *Sitina*, Walker, iv. p. 854 (Lasiocampidæ).
1119. *Callia*, Walker, iv. p. 854 (Lasiocampidæ).
1120. *Amana*, Walker, iii. p. 661 (Uraniidæ).
1121. *Vunga*, Walker, xxxii. p. 453 (Boarmiidæ).
1122. *Beralade*, Walker, iv. p. 852 (Lasiocampidæ).
1123. *Cebysa*, Walker, ii. p. 486 (Tineidæ).
1124. *Castula*, Walker, ii. p. 561 (Lithosiidæ).

1125. *Cluaca*, Walker, xxxi. p. 268 (Lithosiidæ).
 1126. *Lecriolepis*, Butler, Ann. & Mag. Nat. Hist. (5) v.
 p. 385 (Lasiocampidæ).
 1127. *Laganda*, Walker, xxxii. p. 389 (Bombycidæ).
 1128. *Ticilia*, Walker, xxxii. p. 394 (Drepanidæ).
 1129. *Cosmethis*, Hübner, Verz. Schmett. p. 179 (Boarmiidæ).
 1130. *Cozistra*, Walker, xxxii. p. 342 (1865) (Boarmiidæ).

XLIII.—*Some Bees from British Guiana.*

By T. D. A. COCKERELL, University of Colorado.

THE bees of the Guianas were collected long ago, and many of the commoner or more conspicuous species described by the earlier authors. Thus it happens that a small collection from this region will usually contain a number of the species of Linnaeus, Fabricius, Olivier, Lepeletier, F. Smith, &c., and one readily gets the idea that the fauna is well-known. In later years, however, collections have been few, and such authors as Vachal, Friese, Schrottky, Ducke, and others have apparently had little material from this part of South America. The collection now reported on represents those species, received by the Imperial Bureau from British Guiana, which could not be readily identified at the British Museum. I am greatly indebted to Dr. G. A. K. Marshall for the opportunity to study them, and permission to retain some duplicates, which will eventually go to the U.S. National Museum. It will be seen that there are many novelties, but they do not represent fundamentally new types, but rather representative or local species of groups well-known from other parts of South America.

Ptiloglossa ducalis lucernarum, subsp. n.

♀.—Length about 17.5 mm.

Black, with the labrum dark red (clypeus entirely black), mandibles dark red in middle except above, first abdominal segment ferruginous, with the apical margin broadly bluish green, second segment steel-blue, greenish toward the base, third similarly coloured, fourth blue-green apically and red at extreme (covered) base; flagellum, except basal joint, dusky ferruginous beneath, the oblique apical truncation

red; vertex with black hair, cheeks with long white hair, a fringe of white hair around clypeus above and laterally, a tuft of bright red hair at apex of clypeus medially, hair of front mainly black; thorax with short brownish-black hair above, beneath with pale hair (but much black on mesopleura), at sides posteriorly with red hair; tegulae black. Wings dusky, suffused with reddish; femora with light hair, tibiae and tarsi with dark hair on outer side and red on inner. Abdomen with pale reddish hair on red part of first segment, and black on metallic; segments 2 to 4 with linear but distinct apical yellowish bands; apex with copious sooty hair; venter with pale red hair basally and dark apically; a patch of long yellowish-white hair on each side ventrally beyond the middle; apical plate broad and black.

At lights, Hills Estate, R. Massaruni, 15 Dec., 1917 (G. E. Bodkin).

As to the occurrence of *Ptiloglossa* at light, see Schrottky (under *Megacilissa*), Smithsonian Misc. Coll. xlviii. (1907) p. 259. The ocelli are very large, as with other nocturnal Hymenoptera. The type of *Ptiloglossa ducalis*, Smith, is at Oxford, and is labelled "Chili?" Smith said the locality was unknown. Friese formerly thought it identical with the Mexican *P. eximia* (Smith), but Schrottky in 1914 showed that this was not the case, and stated that he had *ducalis* from La Rioja, Argentina. The present insect is certainly very near to *ducalis*, differing by the largely red first abdominal segment and other minor details. Smith's figure of the venation is incorrect, as his description shows. The Brazilian *P. obscura* (Schrottky) has the base of the abdomen dark red, and is evidently closely allied. Other related forms are the Brazilian *P. pretiosa* (Friese) and the Mexican *P. thoracica* (Fox), described under *Megacilissa*. It seems quite probable that all these forms are local races of one, *P. ducalis*. On the other hand, *P. ducalis*, var. *buchwaldi*, Friese, is a large red insect resembling *Xenoglossa fulva* in appearance, and must, I think, stand as a distinct species, *P. buchwaldi*.

Megalopta idalia, Smith.

1 ♀, Issororo, N.W.D., June 1916 (Bodkin).

As at present understood, this species is widely distributed, and it may be capable of subdivision when more material is available*.

* Schrottky thinks that what I described as *idalia* in Proc. Acad. Nat. Sci. Phila., 1900, p. 356, is really *ochrius* (Vachal). My insect was a ♀; Vachal described only the ♂. Ducke holds that *ochrius* is a variety of *idalia*.

Megalopta sodalis, Vachal.

4 ♀, Issororo, N.W.D., June 1915 and 1916 (*Bodkin*); attracted to light, Morawhanna, N.W.D. (*Bodkin*); N.W. District, May 1917 (*A. A. Abraham*).

These bees, like the *Ptiloglossa*, have large ocelli and are nocturnal or vespertine. Described from Brazil.

Megalopta tacarunensis, sp. n.

♂.—Length about 12.5 mm., anterior wing about 10.

Head and thorax brassy green, with strong coppery tints on face (especially supraclypeal area), mesothorax, and scutellum; lower margin of clypeus and labrum dull yellowish; face very narrow, broadened on front by emargination of orbits; ocelli large as usual, lateral one's distance from occipital margin about the length of an ocellus; mandibles pale basally, darkened apically; tongue long and linear; antennæ long, pale ferruginous, the flagellum blackened above and nodose beyond the middle; clypeus very sparsely and not strongly punctured; mesothorax shining, with fine punctures and widely scattered larger ones; scutellum convex, not at all bigibbous; post-scutellum considerably smaller than scutellum; base of metathorax with a rather narrow shining channel, obtusely angulate in middle, its margins and ends with indistinct traces of plicæ; tubercles and tegulæ ferruginous. Wings slightly dusky, not clouded in the marginal cell; stigma and outer nervures yellowish ferruginous, toward the base the nervures are darker; second submarginal cell small; first recurrent nervure meeting second intercubitus. Legs ferruginous, with concolorous hair. Abdomen with first two segments light ferruginous; apex of second, and the remaining segments, much darker; third ventral segment with a complete and deep median sulcus.

Cattle Trail Survey, Takaruni R. (sec. 2), June 1919 (*A. A. Abraham*).

Near to *M. athautis* (Vachal), from Peru, but the abdomen is differently coloured. Also allied to *M. tabascana*, Ckll., from Mexico, but differing in the area of metathorax and coloration of abdomen. Possibly all three are races or subspecies of one species. It has been the history of the South American birds and mammals that many species have been described as distinct, from widely separated places. More recent, far more intensive and exhaustive studies have shown that the number of separable forms is very much greater than had been supposed, but that whole series of these are

to be regarded as local races of widespread species. How far this will be paralleled among the bees remains to be seen. The butterflies and ants certainly show analogous phenomena.

Nevertheless, when we have defined a series of subspecies and arranged them under aggregate species, the biological problem has not been solved. Experimental work has shown that objectively identical differences may be due either to heredity or environment. Among the bees, it is probable that the "little species" are in most cases the genuine units of life, having different habits and occupying different stations. It will, of course, be long before these matters have been adequately elucidated by field-observations in tropical countries, but every scrap of biological information is of value.

Augochlora (Odontochlora) essequibensis, sp. n.

♀.—Length about 11.5 mm.

Robust, black and green; head large, with broad rounded cheeks and broad vertex, mainly black, but a bright green band along anterior orbits, and upper part of cheeks greenish; mandibles strongly bidentate, dark red in middle, with no green spot at base; clypeus broad, polished, with rather numerous large punctures, its lower middle depressed, and at each extreme side a distinct tubercle; supraclypeal area very convex, dullish; front very densely and minutely rugoso-punctate; flagellum ferruginous beneath, except at base; mesothorax very densely and finely rugoso-punctate, median depressed line distinct; mesothorax black, with green margins, and a pair of green bands converging anteriorly; scutellum sculptured like mesothorax, black in middle, green at sides, the median groove distinct; area of metathorax with about 55 delicate longitudinal striæ, irregularly connected about the middle by a transverse line; posterior truncation not defined above; postscutellum brilliant green, and metathorax mainly green; mesopleura black, faintly greenish, granular; tegulae castaneous. Wings dusky, stigma dark reddish, nervures dark; first recurrent nerve meeting second intercubitus. Legs black, anterior tibiae red in front, at least at base; hind spur simple; mesothorax with black hair, postscutellum, metathorax, and base of abdomen with white, inner side of tarsi with dark rufous hair. Abdomen almost impunctate, the first segment with very delicate punctures at sides; abdomen broad, black, suffused with green at sides, with delicate pruinose pubescence, shining silvery in some lights; apex with black hair; first ventral segment with a long stout spine. As in

related species, this varies to a form with rather less massive head, and head and thorax mainly Prussian green, the thorax bright green with only a blackish shade down middle of mesothorax, and the sides of the face bright green, especially close to the antennæ.

3 ♀, Suddie, Essequibo, March 1918 (*G. E. Bodkin*).

Very close to *A. nigrocyanea*, Ckll., from Mexico, but lateral ocelli not nearly as far apart as distance of either from eye, and the details of colour and sculpture differing in several particulars. In Brazil there is a very similar species, *A. francisca*, Schrottky, which lacks the tooth on the first ventral segment. This closely resembles *A. thetis*, Schrottky, from Paraguay, which has the tooth and is a true *Odontochlora*.

Augochlora (Oxystoglossa) bodkini, sp. n.

♀.—Length about 9 mm., anterior wing slightly over 6.

Head and thorax green; abdomen black, with strong green tints at sides of first three segments and a subapical green band on third; head and thorax above with hair mixed dark and light; head broad, eyes strongly emarginate and converging below; supraclypeal area dull and granular; clypeus shining, strongly but not densely punctured, its apex black, squarely truncate, strongly depressed in middle; labrum black; mandibles bidentate, obtuse, bright chestnut-red in middle; cheeks broad, shining, with sharp posterior margin; flagellum ferruginous beneath, except at base; angles of pronotum prominent, but greater than a right angle; mesothorax entirely yellowish green, very finely and densely punctured; scutellum similarly sculptured, depressed in middle; area of metathorax covered with very fine but distinct radiating striæ which reach the margin, those near the middle strongly curved; pleura dull bluish green, shining just above the middle legs; tegulæ ferruginous. Wings dusky, quite dark; stigma reddish brown, dull, nervures fuscous; first recurrent meeting second intercubitus. Legs black, with anterior and middle knees, basal third of anterior tibiæ in front, and tarsi at apex, ferruginous; hind spur simple (microscopically denticulate); scopa of hind legs pale. Abdomen with the punctures so minute as to be hardly visible under a lens; segments with fine pubescence, appearing silvery in certain lights; apex with black hair; no ventral tooth.

Botanic Garden, April 23, 1915 (*G. E. Bodkin*).

Related to *A. francisca*, Schrottky, from Brazil, but distinguished by the largely red mandibles, red tegulæ, &c.

Although this is placed in a different subgenus from the last, they are probably more nearly allied than *A. bodkini* is to the type of *Oxystoglossa*.

Auglochloa maroniana, Cockerell.

1 ♀, Issororo, N.W.D., Dec. 1918 (*Bodkin*).

Previously known only by the unique type, from French Guiana. The abdomen does not show the strong coppery tints of the type, but this variation is like that found in related species.

Augochloa (Oxystoglossa) erubescens, sp. n.

♀.—Length about 7 mm., anterior wing about 5·3.

Head, thorax, and abdomen green, strongly suffused with copper-red; the face (except the broad black lower margin of clypeus) entirely red, the clypeus and supraclypeal area crimson; mesothorax and scutellum red, but mesopleura yellowish green, reddish along its posterior border. Abdomen above brilliant red, with almost lilacine tints, becoming green at sides. Legs black, with the anterior tibiae and tarsi, middle tibiae in front, hind knees, and middle and hind tarsi obscurely, ferruginous; flagellum dusky reddish beneath; mandibles broadly red in middle; tegulae piceous with pallid margins. Wings dusky, stigma rather dilute reddish brown, nervures fuscous.

Head broad, orbits strongly converging below; cheeks broad, posterior orbits reddened; supraclypeal area closely punctured, but shining; clypeus closely punctured, depressed in apical middle; front dull and greenish; mesothorax shining but not polished, the microscope shows many very small punctures and scattered much larger ones; area of metathorax large, with fine radiating striae all over, these wrinkled about the middle; posterior truncation not abrupt; first recurrent nervure meeting second intercubital; hind spur simple (microscopically denticulate). Abdomen with pale pruinose pubescence; first two segments not vibrissate, but with extremely short fringes of branched hairs.

Issororo, June 1915 (*Bodkin*).

A distinct species, for which I find no very close relative, but it may be compared with the much more brilliantly coloured *A. ignifera*, Crawford, from Dominica.

Augochloa (Augochloropsis) barticana, sp. n.

♀.—Length about 6·5 mm., anterior wing 5 or a little over. Brilliant yellowish green, with golden tints on metathorax

and abdomen; pubescence thin and pale; head broad; clypeus prominent, convex, sparsely but distinctly punctured, its lower margin black and red just above the black; labrum black, strongly bituberculate; mandibles green at base, then black, but the apical half dark red; front very broad, densely punctured, glistening; flagellum obscurely reddish beneath; ocelli in a curve; mesothorax and scutellum brilliantly shining, finely and closely punctured, but the punctures well separated; sides of pronotum expanded anteriorly, but not angulate; postscutellum with long dull white hair; area of mesothorax in the form of a lunule, hind margin shining, not sharp, surface of area with short oblique striæ not reaching base or margin; posterior truncation smooth and highly polished; tegulæ ferruginous, with a yellowish-green spot anteriorly, and pallid margins. Wings strongly suffused with reddish; stigma ferruginous, nervures fuscous; first recurrent nervure meeting second intercubitus. Legs brilliant green, with red knees; tarsi dark reddish, with much pale reddish hair; hind spurs with five long spines. Abdomen broad, convex, shining, thinly pale hairy, the second segment with a thin white apical fringe, the first with the same at sides only; venter with pale hair.

Bartica District, 14 Sept., 1918 (*Bodkin*).

This species is so weakly vibrissate on the abdomen that it might be referred to the subgenus *Pseudaugochloropsis*, falling in Vachal's tables near the Mexican *A. tonsilis* (Vachal). In Schrottky's table of Brazilian species it falls in the vicinity of the much larger *A. hecuba*, Schrott., *A. circe*, Schrott., *A. brasiliانا*, Ckll., and *A. monochroa*, Ckll. The two latter are very well vibrissate. The most distinctive feature is the sculpture of the metathorax. The type of *Augochlora* seems not to have been fixed; I will herewith designate *A. pura*, Say*.

Augochlora (Augochloropsis) semilata, sp. n.

♀.—Length about 7 mm., anterior wing 5.

Brilliant emerald-green, including the legs except the dark reddish tarsi; head very broad; clypeus prominent, with large punctures, its lower margin broadly black; labrum black, with fine transverse lines and a pair of apical

* I wished to designate *A. pandora*, Smith, the first species in Smith's series described from the female, but in *Canad. Entom.* 1897, p. 4, I restricted *Augochlora*, s. str., to a different series, and included in it two of the species in Smith's original list—*pura*, Say, and *labrosa*, Say. I choose of these the better known. This will make *Oxystylosa* a synonym of *Augochlora*.

tubercles; mandibles green at base, then black, then red; flagellum obscure reddish beneath; front glistening, cheeks hairy; mesothorax shining, rather bluish green, with close but distinctly separated punctures; hair of thorax light, but some dark hairs on scutellum; area of metathorax very short, with distinct short plicæ which are not appreciably oblique, the apical margin shining and obtuse; mesopleura rough; tegulæ ferruginous, with a green spot. Legs with pale yellowish hair, dense on hind tibiæ and tarsi; hind spurs with five long spines. Wings dusky hyaline, the apical field darker and somewhat reddish; stigma very pale reddish, not very large, nervures fuscous; first recurrent nervure reaching base of third discoidal cell. Abdomen brilliant, with thin hair, long at sides, the apex black; second segment briefly and thinly vibrissate with orange hairs, first obscurely vibrissate at sides.

Greenwich Park, 29 December, 1912 (*Bodkin*).

Closely allied to the last, but easily distinguished by the area of metathorax. In both, the pronotum is without distinct anterior angles. There is much resemblance to *A. læta*, Smith, from Ega, but the colour of the legs is different.

Centris minuta, Mocsary.

1 ♀, Rupununi District, 1919 (*Rev. Fr. Robinson*).

Mocsary described the male, but I have a female from Mr. Schrottky. The species has been recorded from Venezuela.

Chalepogenus testaceus (Smith).

1 ♂, Issororo, N.W.D., Dec. 1918 (*Bodkin*).

Smith described the female as *Tetrapedia testacea*. Friese saw the male from Bogota. The present specimen has the scutellum and axillæ pale honey-colour, contrasting with the dark red mesothorax (on which are two yellow stripes), the sides of face and some distance up front cream-colour, the middle basitarsi blackened on inner side. Possibly a distinct race is indicated, but it is necessary to see the other sex.

Chalepogenus flavus (*Exomalopsis flavus*, Smith) is closely allied.

Chalepogenus hypoleucus, sp. n.

♀.—Length about 8.5 mm., anterior wing 8 mm.

Robust, black, the small joints of tarsi obscurely brownish; scape dark reddish, with a light red spot at base; flagellum

dull ferruginous beneath; lateral inferior margins of clypeus (between eye and apical truncation) yellow; sides of labrum yellow; mandibles mainly red, but yellowish basally above; head broad; clypeus convex, with large punctures, absent from apical middle; sides of front broadly and deeply channelled; eyes dark; cheeks above smooth and polished, with a sharp posterior margin, below with erect pure white hair; mesothorax and scutellum dull, the latter with sparse weak punctures, anterior half of mesothorax with very short reddish-black tomentum; mesopleura polished, sharply keeled in front, its anterior portion with sparse strong punctures, its posterior part flattened and weakly punctured; tegulæ black, marked with dark red. Wings reddish subhyaline (not fuliginous), stigma and outer nervures ferruginous, first and second intercubiti extremely pale; first recurrent nervure joining second submarginal cell not far from end; thorax with white hair beneath, but legs with mainly black hair; anterior tibiæ on outer side polished and with large sparse punctures, but middle tibiæ finely and closely punctured, covered with short very dark reddish hair; anterior basitarsi with very dark reddish hair, and on outer side a curved keel-like line of erect hairs; middle basitarsi with black hair; hind tibiæ and tarsi with long black hair, except that there is creamy-white hair on anterior margin and posteriorly at apex of tibiæ, and copiously in front of basitarsi, except at apex. Abdomen broad, shining, pure black, with long glistening white hair beneath, except subapically, where it is dark chocolate. Hind spur simple.

1 ♀, Issororo, N.W.D., June 1915 (*Bodkin*).

It was compared with the series in the British Museum and found to be different from all, but it is closely allied to *Chalepogenus amplipennis* (*Tetrapedia amplipennis*, Smith), from Brazil, differing in the face-markings and paler wings and the hair on the legs. According to Ducke, the Mexican *Chalepogenus lugubris* (*Tetrapedia lugubris*, Cresson) is identical with *amplipennis*, and, if this is correct, it has priority. Friese's "group *clypeata*" must now be divided: *clypeata* and *pyramidalis* being true *Tetrapedia*; while *amplipennis*, Sm., *bunchosia*, Fr., *glaberrima*, Fr., and *nigripes*, Fr., all go in *Chalepogenus*.

Chalepogenus leucostoma, sp. n.

♂.—Length about 6.5 mm., anterior wing 6.

Black, with the labrum, mandibles except apex, area between clypeus and eyes, and extending narrowly up orbits to level of antennæ, all white; clypeus also with

a creamy-white bar on each side, between eye and apical truncation; last joint of tarsi red; spurs creamy-white, hind spur simple; antennæ dusky red, the flagellum darker above; head broad, eyes dark; clypeus and supra-clypeal area with extremely large dense punctures; posterior orbits with a variable pale mark; mesothorax shining, finely punctured; mesopleura polished, without distinct punctures; tegulæ piceous. Wings dilute reddish brown, stigma ferruginous, nervures fuscous; first recurrent nervure joining second submarginal cell near its end; cheeks and lower part of pleura with white hair. Legs with black hair, that on hind tibiæ and basitarsi entirely black. Abdomen shining black, the base of second segment may be obscurely reddish, and the venter is reddish; apical segment ferruginous, produced to a dark spine-like point. The whole anterior margin of clypeus may be pale, and the labrum may have a dark basal spot.

2 ♂, Issororo, N.W.D., Dec. 1918 (*Bodkin*).

In Friese's table it runs to *C. mæsta* (Cress.), but it is quite distinct. It appears to be closely allied to *Tetrapedia melanopus*, Schrottky, from Paraguay, but it is doubtless distinct. Schrottky's description is short, and he does not mention the hind spur. He describes the face-markings as yellow.

Trigona capitata, Smith.

Three workers; Berbice River, 12. vi. 1913 (*Edyar Beckett*).

In these specimens the axillæ and lateral margins of mesothorax are yellow (reddened by cyanide). The same is true of specimens from Pará, received by the U.S. National Museum from Dr. Friese. In specimens from S. Paulo, Brazil (*Schrottky*), the axillæ are pale or black, and the lateral stripes of mesothorax are very short and weak, extending forward only as far as the tegulæ. Smith, in his original description, refers to the lateral stripes, but leaves us to infer that the axillæ were black. The dark variety of *T. capitata* has been named *virgili*, Friese.

The U.S. National Museum has *T. capitata* from Alhajuclø, Panama, 28 May (*Busk*), and Esparta, Costa Rica, 18 Sept. (*F. Knab*).

Trigona jaty, Smith.

Three workers; Canister Falls, Nov. 1919 (*A. A. Abraham*).

These specimens have the abdomen darker than usual, and possibly constitute a separable race.

Trigona williana, Friese.

Five workers; Rockstone, R. Essequibo (*Bodkin*).

Four were taken 23 March, 1913, one at flowers. One is dated 5. viii. 1913.

Megachile stomatura, Cockerell.

One of each sex. Courantyne Coast, Berbice, Aug. 1915, constructing nest in disused borings in timber (*G. E. Bodkin*).

Described (1917) from a single male collected by Busck in Trinidad. The female runs exactly to *M. brethesi*, Schrott., from Paraguay, in Schrottky's (1913) table of species of the Brazilian region. *M. brethesi* is considerably larger and certainly different. The female of *stomatura* may be described as follows: length about or slightly over 9 mm.; head broad, eyes dark purplish brown; mandibles broad, quadridentate; clypeus densely punctured, but with a smooth shining area in middle, lower margin strongly crenulate; flagellum hardly at all reddened; hair of front, sides of face, and cheeks white; mesothorax and scutellum closely punctured; tufts of white hair above tegulae (at hind corners of mesothorax) very conspicuous; tegulae piceous. Wings dilute fuliginous, much darker in marginal cell and beyond. Legs black, hind basitarsi only moderately broadened, with pale orange hair on inner side; spurs creamy-white. Abdomen broad, cordiform, with narrow bands on hind margins of segments; ventral scopa white, black on last segment.

Megachile bodkini, sp. n.

♀.—Length about 8.5 mm., anterior wing 7.6 mm.

Robust, black, with white scopa, black on last segment. This is very near to *M. stomatura*, and, like it, goes exactly to *M. brethesi* in Schrottky's table. It is certainly distinct, differing from *stomatura* thus: third tooth of mandibles (counting from outer side) pointed instead of broadly truncate; margin of clypeus not evenly crenulate, but feebly undulate in middle, and minutely crenulate at sides; clypeus dull and extremely densely punctured, with a slender shining median line; supraclypeal area more closely punctured; hair on sides of face denser, on front and disc of clypeus largely black, but reddish and very thin on apical part of clypeus; tufts at hind corners of mesothorax, and hair on prothorax above, distinctly yellowish;

tegulae bright ferruginous, black at extreme base. Wings blackish (reddish in *stomatura*); all the knees, spines at end of anterior and middle tibiae, hind tibiae (except a blackish stain posteriorly), and base of hind basitarsi, dull red; surface of abdomen a little smoother.

1 ♀, Issororo, N.W.D., xii. 1918 (*G. E. Bodkin*).

Marked, "very near *simillima*, Sm.; not in B.M." It will be known from *simillima* by the scopa, the extremely dark marginal cell and beyond, etc.

Megachile botanicorum, sp. n.

♀.—Length about 11 mm., anterior wing not quite 7 mm.

Black, with mandibles broadly bright chestnut-red apically, flagellum red above and below (black at extreme tip), tegulae pale orange-ferruginous, anterior and middle femora red above, anterior tibiae red in front, spurs and small joints of tarsi red; head broad; mandibles very broad, quadridentate; clypeus extremely densely punctured, shining above in middle, but without any distinct smooth line; lower margin of clypeus finely crenulate; sides of face with thin greyish-white hair; a curved band of pale fulvous hair on upper part of head, passing between the ocelli; thorax with light fulvous hair (bright in region before wings) above and at sides, but white beneath, the disc of mesothorax almost without hair; mesothorax and scutellum well punctured, moderately shining. Wings flavo-hyaline, nervures light ferruginous, stigma poorly developed; hind basitarsi moderately broad, with black hair on outer side and bright red on inner; black hair also on outer side of hind femora. Abdomen broad, shining, hind margin of first segment reddened; segments 3 to 5 with broad pale yellow hair-bands, second with traces of a similar band, abraded in the specimen studied; when the abdomen is seen from above, there is conspicuous black hair at sides; last dorsal segment with fine dense appressed white hair; ventral scopa mainly white, but on penultimate segment and the sides of the two before black; it is white on the last segment.

1 ♀, Botanic Gardens, 23 April, 1915 (*Bodkin*).

In Schrottky's table runs exactly to *M. paraguayensis*, Schrott., but is larger, with flagellum red above and below. It is also very like *M. curvipes*, Sm., of which only the male is known. Schrottky found *paraguayensis* ♀ and *curvipes* ♂ in Paraguay, and I suspect that they may be sexes of one species. In that case, it may well be that *botanicorum* represents a race or subspecies of the same. It is, however, equally close to *M. leucocentra*, Schrottky (? = *fossoris*, Smith),

and Friese believes that *M. fossoris* is the true female of *M. curvipes*.

Megachile pulchriventris, sp. n.

♀.—Length about 8 mm., anterior wing 6·7 mm.

Short and broad, black, including the legs, mandibles, and antennæ, but tegulæ bright ferruginous, blackened in front; mandibles quadridentate; clypeus closely punctured laterally, but the convex disc highly polished and sparsely punctured, the lower margin very broadly angularly emarginate; cheeks narrow, sharply keeled behind, with long white hair below; sides of face with spreading fulvous hair, but a patch of black hair immediately laterad of each antenna; front with appressed pale fulvous hair; mesothorax minutely punctured, covered with appressed fulvous hair, conspicuous when viewed from certain angles; scutellum abbreviated, truncate posteriorly, anteriorly with fulvous hair; base of metathorax depressed in middle; mesopleura shining, distinctly and rather coarsely punctured. Wings dusky, deep fuliginous in the marginal cell and apically; first recurrent nervure joining second submarginal cell at a distance from base greater than half length of first intercubitus; hair on outer side of anterior and middle tarsi shining silvery, on middle tarsi with a patch of purplish brown; hind spurs brown; hind basitarsi broad and almost as long as the tibiæ, with red hair on inner side. Abdomen very broad, the segments with fringes of fulvous hair, most conspicuous on segments 4 and 5, but these are not entirely covered with such hair; apical segment with appressed fulvous tomentum; ventral scopa shining golden, not at all black at apex, but toward the base is a very large triangular area of woolly-looking white hair, very different from the rest of the scopa; the thorax beneath and bases of legs are also densely clothed with this woolly white hair.

2 ♀, Issororo, N.W.D., xii, 1918 (*G. E. Bodkin*).

Marked "Not in B.M." An elegant little species, running in Schrottky's table to *M. beroni*, Schrott., which it does not resemble, and going nowhere in Friese's table. It is actually close to *M. xanthura*, Spinola, differing by the abdominal segments 4 and 5 not entirely yellow-haired, the yellow scopa, and the dark marginal cell and apex of wing. In the colour of the wings it resembles *M. bertonii*, Schrott., in the pubescence of thorax and character of the ventral scopa it is like *M. aurantipennis*, Ckll., from Guatemala.

Megachile hamatipes, sp. n.

♂.—Length about 11 mm., anterior wing 9 mm.

Black, robust, with short parallel-sided abdomen; head large; eyes dark brown; face and front densely covered with long silky golden hair; mandibles dark, with a broad flat dull and delicately pruinose-pubescent base, beyond which is a tuft of fulvous hair; cheeks broad, with white hair; antennæ black, the flagellum obscurely reddish beneath; vertex with erect black hair; mesothorax dullish, closely and finely punctured, with erect black hair on disc, but the thorax anteriorly is covered with pale yellowish hair, there is a conspicuous band in the scutello-mesothoracic suture, and a large yellowish tuft at each posterior corner of mesothorax; scutellum shining anteriorly, covered with erect black hair; thorax posteriorly with yellowish hair; sternal region with white hair; tegulæ black. Wings dilute fuliginous, upper half of marginal cell distinctly darker; first recurrent nervure joining second submarginal cell at a distance from base equal to not quite half length of intercubitus. Legs mainly black, anterior coxæ with long spines; anterior femora pale reddish, with a curved brown line on inner face, apex and nearly apical half of outer side black, lower margin beyond middle sharply and prominently keeled, outer surface (especially basally) with long cream-coloured hair; anterior tibiæ red on inner side and black on outer, except apex, which is yellow; anterior tarsi dilated, pale yellow, the broadest part at apex of basitarsus, which does not extend nearly to end of second joint; tarsal fringe long, fulvous at base, otherwise white, broadly black apically; beneath, the small joints are red, and the black spot does not show through above; middle tibiæ thick, red passing into pale yellow apically, with a stout pale apical hook-like spine; their tarsi dark red, the basitarsi black behind, and outer face of tarsi largely pale yellow; hind femora not especially swollen, their tibiæ black, with pale reddish spurs, their tarsi pale yellow on outer side. Abdomen with deep sulci at bases of second and third segments; all the segments with fringes of fulvous hair, the first very slender except at sides; disc of second segment with erect fulvous hair, passing into black laterally; discs of third and fourth with erect black hair, of fifth with deep red hair; sixth segment densely covered with pale yellow tomentum, its apical keel prominent, broadly and deeply emarginate, the lateral portions not dentate or crevulate; no ventral spines or teeth.

1 ♂, Bel Air, Lamaha, E. Coast, 1. vi. 1913 (*Bodkin*).
 "Not in B.M."

In Schrottky's key it runs exactly to *M. chamacoco*, Schrott., which it resembles in the hook-like spine on middle tibia, but otherwise it is very distinct. In Vachal's table it falls in the vicinity of *M. rectipalma*, Vach., but is not very similar. In Friese's table it falls nearest *M. lobitarsis*, Šm., a quite different species. There is a general resemblance to *M. aricensis*, Friese, which has a very large hook-like process at end of middle tibia; but the head and thorax of *aricensis* are covered with fulvous hair dorsally, and there are many other differences.

Megachile melanopoda, sp. n.

♂.—Length about 8.5 mm., anterior wing 6 mm.

Black, the abdomen rather narrow but parallel-sided; mandibles black with a red subapical mark; antennæ black; tegulæ rather dark red. Wings dusky, the marginal cell and apical field dark fuliginous, shining purple; nervures black; femora and tibiæ bright red, tarsi black. Head broad, orbits converging below; face and front densely covered with pale golden hair; cheeks with white hair; vertex with sparse long black hair; antennæ simple at end, not enlarged or flattened; mesothorax and scutellum shining, with strong rather close punctures, and beset with long black hair; a slender band of light hair in scutello-mesothoracic suture; a small patch of light hair above each wing-base; prothorax, pleura, and metathorax with white hair; first recurrent nervure joining second submarginal cell very near its base; anterior coxæ broad and lens-like, shining, not spined; anterior tarsi simple. Abdomen shining, with conspicuous white hair-bands or patches at sides of segments, but lacking in middle; there is, however, light hair in the basal sulci; disc of fifth segment with erect black hair, and a very small amount (hardly visible) of pale; sixth segment not conspicuously hairy, the weak keel entire, a little depressed in middle; venter black, with three very conspicuous pure white hair-bands.

1 ♂, Issororo, N.W.D., 15 June, 1915 (*Bodkin*).

In Schrottky's table it runs exactly to *M. giraffa*, Schrott., differing by the black apex and venter of abdomen, and the simple apex of antennæ. Also related to *M. orba*, Schrott. The nearest relatives, however, are *M. exaltata*, Smith (*incongrua*, Smith), and *M. lamnula*, Vachal, both Brazilian. The fringe of the anterior basitarsus is white, not black as in *lamnula*, nor are the fifth and sixth abdominal segments

evidently pale-haired as in Vachal's species. In Friese's table our species runs exactly to *exaltata*, but that has ferruginous nervures, and the dorsal hair of thorax is not black. Nevertheless, the affinity is close. The venation shows that this cannot be the male of *M. bodkini*.

Megachile mutatiiceps, sp. n.

♀.—Length 11 mm., anterior wing 7·4.

In Schrottky's table runs exactly to *M. brethesi*, differing by the dark tegulæ, &c. It is extremely close to *M. stomatura*, Kll., agreeing in most of its characters, but larger, with the clypeus conspicuously different, as follows:—

M. mutatiiceps: clypeus shorter, densely rugoso-punctate all over, with no smooth median space; lower margin very broadly but shallowly excavated, the excavated part undulate instead of crenulate; disc of clypeus with much long erect black hair, sides with creamy-white hair (like that of sides of face), directed downward.

M. stomatura: clypeus longer, with a smooth and polished median line; lower margin not excavated, but strongly crenulate; disc without the long erect black hair, and lateral pale hairs directed antero-mesad.

The basal area of metathorax is entirely dull in *mutatiiceps*, distinctly shining in both sexes of *stomatura*.

The ventral scopa of *mutatiiceps* is creamy-white, black on last segment except basally.

1 ♀, Courantyne Coast, Berbice, Aug. 1915, constructing nest in disused borings in timber (*Bodkin*).

This is a most interesting bee, clearly distinct from *M. stomatura* by the very different clypeus, yet found nesting in the same manner, at the same time and place.

Thus, so far as the evidence shows, we appear to have a new species arising by mutation, without any change in the mode of life or locality.

While on South American *Megachile*, it may be worth while to add a note on the two species, *M. squalens* and *M. susurrans*, described by Haliday from Sao Paulo as early as 1836. *M. squalens* is placed by Friese as one of the indeterminate species, but the type is in the British Museum, and there is a specimen at Oxford. *M. susurrans* is also in both these collections, 9 in the former, 4 in the latter. Haliday described only the ♀ of *susurrans*, but at Oxford I noted the male, with red tegulæ and tarsi much modified. Schrottky, in dealing with the Brazilian species (1913) was

unable to recognise *susurrans* from Haliday's description. With regard to *M. squalens*, I have a note that the ventral scopa is pale orange in a specimen in British Museum from Rio Grande do Sul (*R. von Ihering*). Schrottky cannot definitely decide what *squalens* is, but indicates *M. apicipennis*, Schrott., and *M. pleuralis*, Vachal, as possible synonyms. New descriptions of both Haliday's species should be made by someone who has access to the specimens.

Cælixys rostrata, Friese.

1 ♀, Courantyne Coast, Berbice, Aug. 1915, inhabiting disused borings in timber (*Bodkin*). "Not in B.M."

A remarkable species, on account of the snout-like clypeus. The specimen is a little smaller than Friese's type, and the antennæ are nearly pure black, but the identification seems certain. It is doubtless parasitic on *Megachile stomatura*.

Cælixys issororensis, sp. n.

♀ (type).—Length about 10·5 mm.

Robust, black, with the bidentate mandibles dark red, the teeth black, tegulæ bright chestnut-red. Legs dusky red; first abdominal segment laterally with large well-defined highly polished areas which are dark red; first three ventral segments very obscurely reddish; face with white hair, faintly ochreous-tinted around antennæ; clypeus normal; antennæ entirely black; eyes dark brown, with short hair; cheeks narrow, densely hairy, with a depression but no naked area below; mesothorax and scutellum with very large punctures, the former with a line of pale ochreous hair in front and behind, and a spot behind each tegula; scutellum with an elevated median keel, ending in a short tubercle; axillary spines moderately long, little curved; postscutellum with dense yellowish-white hair; extreme base of metathorax with a series of little pits or spaces separated by very short plicæ; mesopleura very coarsely rugoso-punctate, with a strong band of white hair anteriorly and posteriorly. Wings fuliginous, darkest in upper part of marginal cell and beyond; nervures black; anterior coxæ with short angular projections; spurs dark red. Abdomen highly polished, rather weakly punctured, with six narrow white hair-bands; sixth dorsal segment finely punctured all over, keeled except basally, narrow and beak-like apically, slightly turned up at end; fifth ventral angulate apically; sixth narrow, not notched, sharply pointed, thinly fringed with black hair, not extending far beyond last dorsal.

♂.—Similar in most respects; mandibles redder; hair of face all pale yellowish; cheeks with a bare space below. Legs bright chestnut-red; anterior coxæ with well-developed but blunt spines; venter of abdomen red; fifth abdominal segment without lateral spines, sixth with six, the lateral and lower apical ones very slender and sharp, the upper apical shorter and thicker.

1 ♀, 2 ♂, Issororo (*Bodkin*), the ♀ 18th Dec., the males June, 1915.

The female is marked "near *ignava*, Sm., not in B.M." The males, "no name B.M." In Friese's table (1921) of Brazilian species this runs (♀) to *C. leopoldensis*, Fr., but the last ventral is much less produced, and the legs are much darker. It also resembles the Brazilian *C. nigrofimbriata*, Ckll., but is easily distinguished by the end of the abdomen. In Holmberg's table (1903) it falls with *C. remissa*, Holmberg., from the Argentine. It goes in Holmberg's group *Melanobasis*, and in the subgroup (1917) with densely punctured scutellum, which includes seven of Holmberg's Argentine species. Unfortunately I possess none of these seven species, but I believe the present insect is distinct from all.

XLIV.—*A new Ascarid from an Otter.*

By H. A. BAYLIS, M.A., D.Sc.

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AMONG helminthological material recently collected by Mr. A. Loveridge in Tanganyika Territory there occurred two sets of specimens of a very curious *Ascarid* which seems to represent a new genus, having, however, close affinities with *Contracæcum*. One set of material, including both sexes, came from an otter (*Lutra* sp., probably *L. maculicollis*). The other contained only three females, and was taken from the stomach of a mongoose (*Atilax paludinosus*, a species which inhabits swamps). The following description is based on the former specimens, which are taken as types. The females from the mongoose are slightly larger than the type-females. In both cases the locality was Kilosa.

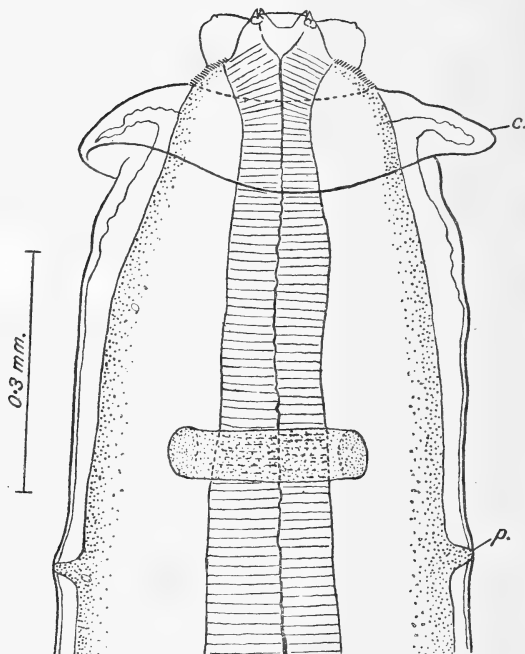
*Cloeoascaris** *spinicollis*, gen. et sp. n.

In the type-material the largest male measured is about 40.5 mm. long and the largest female 38.7 mm. The greatest

* κλοιός, a collar.

thickness is 0.7–0.8 mm. in the males, 0.9–1.1 mm. in the females. [The largest specimen in the material from *Atilax* is 43.8 mm. long and about 1.2 mm. thick.] In the male the body is slender towards the posterior end, while in the female the posterior portion of the body, which contains the genital organs, is somewhat thickened. The transverse cuticular striations in the middle region of the body are at intervals of $6\ \mu$ or a little more. The diameter of the head is

Fig. 1.

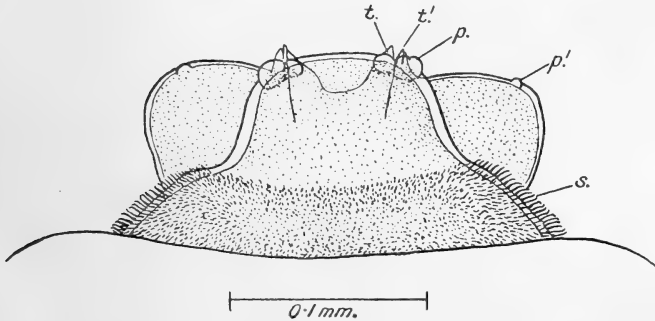


Cleoascaris spinirollis. Anterior end of female; dorsal view.
c., cuticular collar; p., cervical papilla.

0.13–0.15 mm. in the male, 0.16–0.17 mm. in the female. There are three small rounded lips (figs. 1 and 2), each bearing externally two prominent papillæ. The papillæ of the dorsal lip are double, as are also the more ventral papillæ of the ventro-lateral lips. The more lateral papilla of each ventro-lateral lip is simple, very small, and situated on the anterior surface. On its inner surface each lip is armed with a pair of sharp conical teeth (fig. 2, *t.*, *t'*), separated

from each other by a deep "saddle" and projecting anteriorly. These teeth, when seen in profile, are bifid. There are no interlabia. At a little distance behind the bases of the lips the neck is surrounded by a more or less prominent fold of cuticle, or "collar." In most specimens this collar is turned forward, so as to form a funnel surrounding the head, but occasionally it is turned back, as represented in fig. 1, allowing the head to be more distinctly seen. This structure gives the head of the animal very much the appearance of that of a *Physaloptera*. The region of the neck between the bases of the lips and the origin of the collar is closely beset with minute spines (fig. 2, *s.*). This character is somewhat reminiscent of the close transverse folds of cuticle seen in the region immediately behind the head in many species of

Fig. 2.



Cleoascaris spinicollis. Head of female; dorsal view.

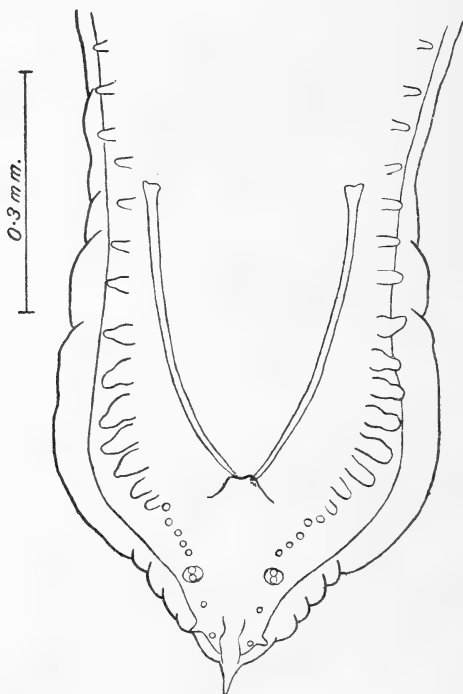
p., papilla of dorsal lip; *p.*', papilla of ventro-lateral lip; *s.*, spines;
t., tooth of dorsal lip; *t.*', tooth of ventro-lateral lip.

Contracæcum, and may possibly be an elaboration of that feature.

The œsophagus (excluding the ventriculus, and measured from the extremity of the lips) is 2.8–3.75 mm. long [4 mm. in a specimen from *Ati'ax*]. The structure of the alimentary canal is similar to that in *Contracæcum*. There is a small rounded ventriculus, an œsophageal appendix measuring 1.0–1.2 mm. in length, and an intestinal cæcum which runs forward to within 1.25–1.55 mm. of the anterior extremity. The nerve-ring is situated at 0.44–0.55 mm., and a pair of conspicuous cervical papillæ (fig. 1, *p.*) at 0.52–0.7 mm. from the anterior end. The excretory pore is situated very far forward, between the bases of the ventro-lateral lips.

The caudal end of the male (fig. 3) is curled ventrally. The tail measures 0.22-0.25 mm. in length. The cuticle at the sides of the body near the tail is somewhat inflated and is longitudinally ribbed between the rather coarse transverse striations. There are two short equal spicules, measuring 0.55 mm. in length and very slender, their thickness not exceeding 0.017 mm. except at the roots. There are nine pairs of postanal papillæ, of which one pair, near the extremity of the tail, is laterally placed, the rest subventrally.

Fig. 3.



Cleoascaris spinicollis. Caudal end of male; ventral view.

All these papillæ are small, except those of the fourth pair from the posterior end, which have double terminations. The preanal papillæ are very numerous, as many as seventy-seven having been counted on one side of the body. Posteriorly they are large, especially those of the third to the eighth pairs of the series, which have long peduncles, somewhat swollen at their bases. Further forward the papillæ gradually become smaller, the most anterior being quite minute.

The tail of the female is conical and measures about

0.4 mm. in length. There is a pair of caudal papillæ at 0.1 mm. from the tip. The vulva is situated at 16 mm. from the anterior end in a specimen 38.7 mm. long, thus dividing the body, roughly, in the proportion of 2 : 3. The vagina is long, narrow, and muscular, running posteriorly, with an irregular course, from the vulva. The long unpaired portion of the uterus and its two relatively short branches continue in a posterior direction, the latter parallel to each other. The ovarian tubes turn forward, still parallel, at a short distance behind their junction with the uterine branches (*i. e.*, at a point 3-6 mm. from the posterior end of the worm). They continue anteriorly to a point somewhat in front of the vulva, where they bend posteriorly again. The ovaries, just behind the vulva, form a close series of transverse loops ventrally to the intestine, and terminate at about 4 mm. behind the vulva. The eggs are oval, with thin shells, granulated externally and measuring about 0.075×0.047 mm. Their contents are unsegmented at the time of laying.

The following brief diagnosis will serve, for the present, for both the genus and the species :—

ANISAKINÆ: resembling *Contracæcum* in the structure of the alimentary canal, but differing from it in having no inter-labia. Each lip with a pair of large conical teeth on its inner surface. A collar-like fold of cuticle surrounding the neck, and between this and the bases of the lips an area covered with small spines. Spicules equal, short, and slender. Vulva in anterior half of body. Parasitic in the alimentary canal of semiaquatic carnivorous land-mammals.

Type-material in the British Museum (Natural History).

XLV.—*A new Species of Membracidae (Centrotinæ) from Uganda.* By W. E. CHINA, B.A.

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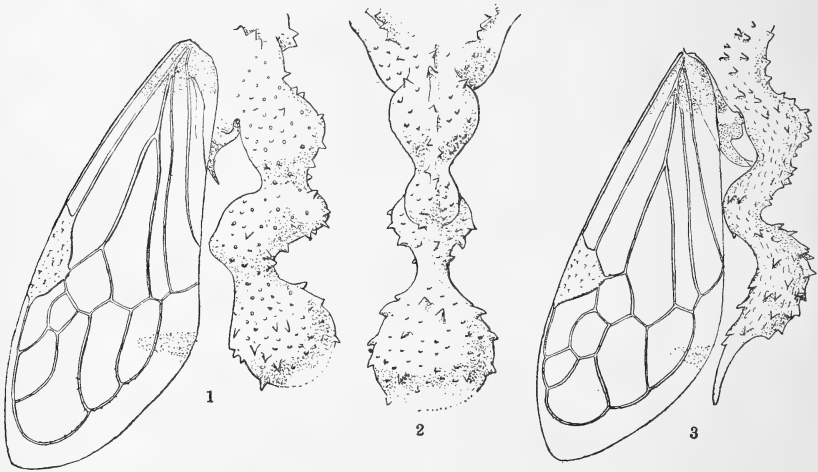
Genus HAMMA.

Buckton, Trans. Linn. Soc. Lond., Zool. (2) vol. ix. p. 330, pl. xxi. fig. 3 (1906); Distant, Ann. & Mag. Nat. Hist. (8) vol. xvii. p. 157, fig. (1916).

Hamma mabirensis, sp. n.

Head shiny black, strongly punctate, ocelli about as far from one another as from the eyes. Pronotum shiny black, strongly punctate, with the metopidium somewhat tuberculate, the humeral angles more or less prominent and dentate

(but not horned), and a long, sinuate, inflated posterior process reaching to the apex of the abdomen; this process divided into three lobes by two constrictions, the posterior lobe being somewhat larger than the others, the central lobe more or less divided into a dorsal and a ventral lobe; the whole process shiny black, strongly punctate, with numerous spine-like tubercles, and provided dorsally with an obscure, rounded, impunctate, medial carina. The apex of the process is damaged in the type-specimen, but apparently does not end in a long spine as in *H. pattersoni*, Dist., and *H. nodosum*, Buckt. Scutellum recurved, widely excised at the apex, with the apical angles acute. Tegmen large, extending



Tegmen and lateral view of pronotal process of: 1. *H. mabirensis*, sp. n.; 3. *H. pattersoni*, Dist. 2. Dorsal view of pronotal process of *H. mabirensis*.

well beyond the pronotal process, hyaline, with the base dark brown, coriaceous, and punctate, and a small fuscous area on the anal angle extending into the third apical cell; veins yellowish punctate; on the mid-costal margin a large pale yellowish, raised, punctate stigma. Abdomen piceous, with the posterior margins of the segments pale. Posterior legs shiny black, except the posterior half of the tibiæ and the tarsi, which are pale yellow; other legs missing.

Another specimen has the tegmen, including the stigma, almost entirely dark fuscous with the exception of the apical third and two small patches, one near the base of the costal

margin, the other near the anal angle, which are hyaline. There being no other character by which this specimen can be distinguished from the type, it may be considered as a colour-variety.

Total length to tip of tegmen 4.5 mm., length of pronotal process 3 mm., length of tegmen 4 mm.

Two ♀ ♀ from Mabira, Uganda (*R. A. Dummer*).

This species is quite distinct from the two previously described.

Buckton's description of *H. nodosum* (Cameroons) is so bad that one must rely on his figure. This apparently differs from Distant's *H. pattersoni* (Gold Coast) only in the dark fuscous colour of the wings. It is therefore quite probable that Distant's species is merely a variety of *nodosum*, Buckt. The present species differs from *H. pattersoni* not only in the shape and puncturation of the pronotal process, but in the venation of the tegmen. In the former the first apical cell extends to the base of the second subapical cell, whereas in the latter it extends only halfway down the second subapical cell. The presence of a costal stigma seems to be characteristic of the genus.

Mr. Dummer writes that this is a very rare Homopteron which was secured by sweeping herbage for insects in the forest-paths of the Mabira, near Mulangi, 4000 feet, about 15 miles from the Ripon Falls to Nile commencement. He remarks on its similarity to some of the biting-ants of the district.

January 1923.

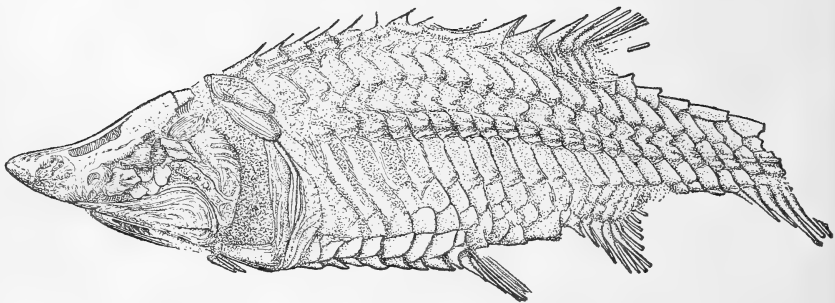
XLVI.—*An undescribed Fish from the Coal Measures of Lancashire.* By E. LEONARD GILL.

THE small fish here figured and described is one of the specimens (No. L 8585) in the remarkable collection of arthropod and other fossils gathered by the late Mr. W. A. Parker from clay-ironstone nodules in the Middle Coal Measures at Sparth, near Rochdale. With the rest of the Parker Collection it is preserved in the Manchester Museum, and I am indebted to the Keeper of the Museum, Dr. W. M. Tattersall*, for the opportunity of examining it.

Its remains occur in a nodule which has split almost

* Since appointed to the Chair of Zoology at Cardiff.

along the median vertical plane of the fish, but the line of splitting runs slightly across this plane, so that the end of the snout is seen on one side only and the fragment of the tail on the other. As far as the body is concerned the two sides of the nodule are almost identical, so that for purposes of figuring I have thought it sufficient to represent the left side, which includes the snout, and to incorporate in the drawing the few additional details, chiefly of the tail-shaft and caudal fin, which appear only on the right. Unlike that of the body, the state of preservation of the head is very different on the two sides. On the left side—shown in the figure—the head has been considerably crushed in laterally. On the right its form is retained as a cavity in the nodule, and within this cavity are seen natural but



Phanerorhynchus armatus, $\times 3$. Middle Coal Measures, Sparth, nr. Rochdale, Lancs. Manchester Museum, L 8585. Coll. W. A. Parker.

rough and granular casts of the bones of the palate. The total length of the specimen is 3.7 cm. ; the complete fish would be about 4 cm. long.

The specimen had not been critically studied, but palæontologists who had previously examined it were disposed to think it would turn out to be a "super-Palæoniscid," possibly allied to the Permian genus *Acentrophorus*, or, at any rate, a fish of a higher type than any hitherto known from the Carboniferous*. The prominent snout had not then been exposed and the general aspect of the fish was therefore quite different ; and it was presumably the size of the scales, the strong dorsal and ventral ridge-scales and fulcra, and an appearance as of fin-supports equal in number to the dermal rays that suggested a relationship to the

* A. Smith Woodward, Proc. Geol. Soc. 1915, p. lxxiii.

Semionotids. Further study of the specimen, however, has shown that such a view is untenable. The fish certainly exhibits a number of remarkable characters, but in essentials of structure it does not appear to have advanced beyond the stage of the contemporary Palæoniscids.

Both sides of the specimen seem, for the most part, to present natural moulds of the outer surface, and for that reason impressions taken from them are more intelligible than the fossil itself. The accompanying figure has been drawn chiefly from such impressions.

In general shape the fish is acutely fusiform, the snout being produced and pointed, the head rapidly deepening posteriorly, the back rising in a considerable arch behind the head, and the body narrowing behind the dorsal and anal fins to a comparatively slender tail-shaft. The line of the belly from the shoulder-girdle to the anal fin is nearly straight. The head is proportionately very large; the measurement from the point of the snout to the position that would be occupied by the back of the opercular plates is one-third of the total length to the base of the caudal fin; and the head was also very broad.

I have asked Prof. D. M. S. Watson, who has made a special study of the cranial structure of the Palæoniscidæ, to report on the head of this specimen, and I will here only remark on a few outstanding points that appear in the figure. The snout is produced in a roughly conical form in advance of the mouth to a distance equal to half the length of the mouth-opening; the mouth-opening itself is very long and straight as in the Palæoniscids, and the bones forming it appear also to be strictly of the Palæoniscid pattern. The maxilla, a narrow splint anteriorly, expands behind dorsally into a large rounded plate with concentric striæ; its extreme anterior point is slightly marked off from the rest and is possibly a premaxilla. The lower jaw is incompletely shown, but it is evidently narrow and practically straight. Part of its length is well preserved, and bears sharply-marked longitudinal striæ. It also shows a perfect cast of a short length of the mandibular sensory canal, with three of its lateral tubules running out obliquely to the surface of the jaw. The upper outline of the head from the snout backwards is first markedly concave, then gently convex. A conspicuous suture crossing the top of the head far back probably separates the frontal and parietal; the small bone behind it may be the whole of the parietal, and probably much of the skull-roof in front of it is formed by the frontals. The supratemporal is missing, unless it is to be recognised

in the angular displaced bone lying on the upper part of the preoperculum. A group of small plates immediately above the maxilla presumably represent some of the circumorbitals. Overlying them anteriorly is a prominent, roughly triangular bone, which possibly also belongs to the circumorbital series in the position of a lachrymal. A large curved plate lying in the region of the orbit may be the displaced pterotic ("squamosal"); its true outline is largely concealed. Near the front of the snout is a conspicuous lateral pit, presumably for the nasal sac; its outer wall was either unossified or has broken away. Most of the opercular apparatus is missing on this side. Behind and above the back of the maxilla is a large bone, which I take to be the preoperculum; from a small ventral end it widens greatly upwards and is curved forwards. A strap-shaped anterior border with obscure tubercles is marked off from the hinder and upper portion, which is slightly tumid and transversely ridged. The only other elements of the opercular apparatus which appear are two of the smaller branchiostegal rays lying below the infraclavicle.

The shoulder-girdle is almost completely displayed on the left side. The uppermost element, the post-temporal, is proportionately larger even than in most Palæoniscids. Its hinder border is probably not quite complete. The bone is ornamented with concentric ridges parallel to the margins, the ridges nearest the median line being tuberculated. The supraclavicle (supracleithrum) is a similar bone to the post-temporal, and of about the same size. As seen in the specimen it is apparently displaced upwards and forwards; in life the shoulder-girdle would have the same wide arch as the back of the head, but in this nodule it has been flattened laterally like the body behind it, and the component bones have had to adjust themselves to the unnatural position. The cleithrum ("clavicle") is of unusual size. Its most conspicuous portion is a strong ridge running downwards and backwards from the supraclavicle, then bending slightly forwards and expanding into three adjacent ridges which may have reached nearly to the ventral margin. It is probably this ridged portion of the cleithrum which appeared at the surface behind the opercular plates. Both in front of it and behind it there are considerable expansions of the bone. The anterior of these expansions is deep-seated, and may have formed a sort of basin as in the sturgeon. The posterior expansion may in part represent one or more post-clavicular scales, but it is likely that most of it was overlaid

by the regular scales of the body. Passing forward at right-angles to the ventral end of the cleithrum is a large "infra-clavicle" (true clavicle); it is cone-shaped, tapering slightly to a rounded anterior end, and by the flattening of the pectoral arch it has been pushed down a little below the natural ventral margin of the fish. The right side of the nodule shows a cast of the inner face of the cleithrum, with the hollow for the scapulo-coracoid cartilages close to the junction with the infraclavicle.

The squamation of the body is well-preserved only in a few regions; for the most part the true surface of the scales has been lost, and the impressions are granular and not too easy to decipher. The scales are rhomboidal, large, and in some regions exceptionally deep. Strongly developed ridge-scales occur along the mid-dorsal and mid-ventral borders; the ventral ridge-scales are paired as far back as to the pelvic fin, but the dorsal row is single, with each scale (to the dorsal fin at any rate, and probably to the tail) produced backwards into a long, very acuminate spine. About twenty-four transverse rows of scales are shown, and in the abdominal region there appear to be six scales in each row below the dorsal ridge-scales. Of these six the upper three cover two-thirds of the total depth of the body, and each of them bears a tubercle at or near its posterior ventral angle. There are thus three longitudinal lines of tubercles on the flanks of this fish. The upper and lower lines die out on the tail-shaft, but the middle line of tubercles, which throughout is much the most strongly developed, apparently extends to the caudal fin. These prominent middle tubercles are borne by the scales of the lateral line, which shows as a raised tube-like ridge on the last few scales, but is marked more anteriorly by deep notches. The scales next below the lateral line are, in the abdominal region, the deepest of all. Below them again, in each transverse row (but not behind the anal fin), come two scales of more ordinary form, and then the ventral ridge-scales. Between the pelvic and anal fins the paired ridge-scales are replaced by enlarged median scales, much like the anal scales commonly seen in the *Semionotidæ*.

Nothing is seen of the pectoral fin, but some portion of each of the others is preserved, though none is at all nearly complete. The dorsal fin is placed above the region where the body passes into the tail-shaft. In advance of it the dorsal ridge-scales are greatly enlarged and produced into very strong spines. By a rapid transition these pass into

remarkably powerful fin-fulcra, below and behind which are seen parts of two or three dermal rays, unjointed in the length that is preserved. The fin was apparently based on a saddle-like lobe of the back; the rays must have been few, and must have sprung mainly from the posterior margin of the saddle, where the line of the back falls abruptly to the tail-shaft. The saddle is apparently covered by narrow scales in relation with the fulcra; they may even be the bases of the fulcra themselves. The anal fin, as a whole, is placed a little further back than the dorsal, and is based on a similar lobe of the body, similarly covered by narrow scales, which in this case seem to be a modified continuation of the two rows of more ordinary scales covering the lower flank in front of them. As with the dorsal fin, the front margin of the anal is protected by strong acutely-pointed fulcra. Of these, the first, immediately behind the anus, is short, and is followed by three more which show a graded increase in length; after which are seen the first two of the true fulcra based on the first dermal ray. Parts of six rays are preserved, and there is only room for one or two more. So far as they are seen, they are unjointed. Of the caudal fin nothing remains beyond a few of the fulcra bordering its ventral edge; but these are of quite extraordinary size and length, and suggest a well-developed fin. The specimen gives no hint as to the form and squamation of the caudal body-lobe. The only one of the paired fins of which anything is seen is the left pelvic, and of this only three or four fulcra of graded length are preserved, though there are rather ill-defined impressions of three dermal rays behind them. The pelvic fin was evidently narrow-based and probably rather long.

Of the general systematic position of this fish there can be little doubt. The patterns of the maxilla and of the lower jaw, together with the presence of well-developed infra-clavicles, associate it at once with the Palæoniscidæ. But it possesses characters which altogether exclude it from any known genus of the family. A rostrum slightly overhanging the front of the mouth is a common Palæoniscid character, but in no known member of the family is it developed into a long and massive snout such as is carried by this fish. The squamation also is entirely uncharacteristic of the family. The scales in the Palæoniscidæ are typically small; *Eurylepis* has deep scales on the flanks, and some other genera (e. g., *Canobius*, *Holurus*, and *Atherstonia*) have enlarged ridge-scales, but the combination of these characters with

longitudinal rows of large tubercles and a line of dorsal spines is unknown in any described genus, nor is there any parallel in the family for the remarkable development of the fulcra into which the ridge-scales are transformed as they approach the median fins. A new genus must therefore be established for this strongly differentiated form, and in allusion to the prominent snout I propose for it the name *Phanerorhynchus*. The species represented by this specimen I propose to name *Phanerorhynchus armatus*.

Note on the preceding Paper. By D. M. S. WATSON.

At Mr. Gill's suggestion I have made an independent examination of the head of the unique specimen of *Phanerorhynchus*. The matrix which lay within the head, attached to the right side, showed impressions of certain bones of the palate; these had been so much broken by the original splitting of the nodule that it was quite impossible to gain any useful information from them: I therefore removed the whole mass, leaving exposed a beautiful impression of the whole right surface of the head. In the main this merely confirms Mr. Gill's account, but does bring out certain features more clearly.

The sutures between the parietals, frontals, and supratemporals are not clearly visible. Together these bones form a strongly arched roof to the skull, presenting a long free border to the operculum; this lateral border is thickened and rounded. The supratemporal appears to be perforated by a foramen for an otic branch of the 9th or 10th nerve. Behind the parietals lies a single pair of bones representing the tabular postparietal row. Behind these lies what is apparently a single very large scale, the first of the dorsal series.

The rostrum shows no trace of subdivision into separate elements. As Mr. Gill has described it, it forms a long massive projection, continuing the head forward in advance of the mouth. The olfactory pit lies entirely on its side, showing that the bone actually exposed is a cartilage-bone in the ethmoidal region. The whole appearance of this rostrum with its olfactory pit is precisely that of the cartilaginous rostrum of *Acipenser*. The structure here differs very markedly from that in an ordinary Palæoniscid.

On the side of the head is a large, nearly square antorbital, which articulates with the frontal above, the maxilla below, and apparently with a bone of the orbital margin behind.

Its anterior border has an articulation with the rostrum ventrally, and dorsally is cut out into two shallow notches which must have formed the posterior margin of an incompletely divided nostril.

Parts of four circumorbitals are shown, three of which are unfortunately not in their natural positions. The most dorsal and largest of these bones projects outward from the frontal, so as to carry the orbit away from the middle line. It is quite certain that the orbit was small.

The maxilla and the preoperculum are as Mr. Gill has described them, and there is in addition a small triangular bone lying between the latter element and the supratemporal, which appears to be homologous with the accessory preoperculum described by Traquair in *Cheirolepis*.

The bones of the operculum are well exposed on the right side; they are a large opercular ornamented with sparse longitudinal ridges, a small subopercular, and a long series of branchiostegals, the uppermost not much smaller than the subopercular. It is impossible to see if large lateral gulars and a median gular are present or not.

That Mr. Gill is correct in referring this remarkable fish to the Palæoniscidæ is obvious, but, as he has brought out, it represents a very aberrant type. The whole build of the fish, its squamation, the character of the tail-shaft, and especially the short-based pelvic fin and the small number and large size of the unjointed dermal rays in the fins are totally unlike those of any other Palæoniscid, and suggest most strongly a higher fish and especially a Semionotid.

The skull and shoulder-girdle, however, are conclusive evidence of Palæoniscid affinities, and I believe that we must see in *Phanerorhynchus* another case of the precocious acquirement of characters in a short-lived side-line, which, more slowly reached by a conservative stock, lead on to the establishment of a new order. In other words, this fish, although itself not ancestral to any later form, shows that the Palæoniscids had latent in them the potentiality of giving rise to the Lepidosteoid Ganoids, and hence to all higher bony fish.

It is obvious that *Phanerorhynchus* differs from all other fish so greatly as to deserve at least family distinction; but as to remove it from the family Palæoniscidæ would obscure its close relations to those fish, and as that family as at present constituted includes forms presenting a very great range in structure, I do not propose to establish a new group for its reception.

XLVII.—A Revision of the Old World *Cyrtacanthacrini* (*Orthoptera*, *Acrididæ*).—II. Genera *Phyxacra* to Willemsea†. By B. P. UVAROV, F. E. S., Assistant Entomologist, Imperial Bureau of Entomology.

[The figures referred to in this paper will be found in Part I.]

I. Genus *PHYXACRA*, Karny.

1907. *Phyxacra*, Karny, Sitz. Akad. Wiss. Wien, Bd. cxvi. Abt. 1, p. 309.

Karny included in this genus, besides the genotype, *Coptacra variolosa* of Krauss, also *Ph. cœrulans*, Karny. Later on (1914) Rehn described the third species, *Ph. nigrispinis*, which, however, judging by the description, is not a *Phyxacra*, but an *Acridoderes*. On the other hand, *Locusta renkensis*, Karny, of which I have studied the type, is undoubtedly congeneric with *variolosa* and *cœrulans*, while *variolosa* itself, as well as *Cyrtacanthacris scrobiculatus*, Karsch, are conspecific with *Caloptenus strenuus*, Walk. Thus, the number of the known species of *Phyxacra* is three: *strenua*, *cœrulans*, and *renkensis*; as all of them are as yet very insufficiently known and represented by very few specimens, nothing definite can be said as to their exact relationship, and the following key is necessarily very incomplete:—

Key to the Species.

- | | |
|--|------------------------------|
| 1 (2). Fastigium of the vertex not punctured. Pronotum narrowed anteriorly, but without any constriction; its posterior fourth reddish brown, with blackish dots and streaks; hind angle straight, not rounded. Anal field of elytra with an indefinite reddish design. (Sudan.) | 1. <i>renkensis</i> (Karny). |
| 2 (1). Fastigium of the vertex coarsely punctured, at least towards its front margin. | |
| 3 (4). Pronotum without a constriction in the prozona; its front margin not touching the eyes. Wings hyaline. (Senegal, Gold Coast.) | 2. <i>strenua</i> (Walk.). |
| 4 (3). Pronotum thick, distinctly constricted in the prozona; its front margin touching the eyes. Wings bluish at the base. (Northern Uganda.) | 3. <i>cœrulans</i> , Karny. |

† Part I., Ann. & Mag. Nat. Hist. (9) xi. p. 130 (1923).

1. *Phyxacra renkensis* (Karny).

**1907. *L[ocusta] renkensis*, Karny, Sitz. Akad. Wiss. Wien, Bd. cxvi. Abt. I, p. 306, no. 58.

1910. *C[yrtacanthacris] renkensis*, Kirby, Cat. iii. p. 454. no. 69.

It is very strange that Karny did not recognise that this species belongs also to the genus *Phyxacra* described by himself in the same paper, seeing that the venation of the elytra and the shape of the head and sternum show the closest relationship to *variolosa* and *cærulans*. As the type is the only specimen known and in very bad condition, having obviously been kept some time in alcohol and having lost both its hind legs, nothing can be said as to the variability of species.

Geographical distribution. The type is from Renk, Sudan.

2. *Phyxacra strenua* (Walk.). (Figs. 4 C, 4 D, 5 a.)

**1870. *Caloptenus strenuus*, Walk. Cat. iv. p. 699. no. 49.

**1877. *Coptacra variolosa*, Krauss, Sitz. Akad. Wiss. Wien, Bd. lxxvi. p. 33. no. 1.

1893. *Cyrtacanthacris scrobiculatus*, Karsch, Berl. Ent. Ztschr. xxxviii. p. 89. no. 49.

1910. *C[yrtacanthacris] scrobiculatus*, Kirby, Cat. iii. p. 453. no. 67.

1910. *P[hyxacra] variolosa*, Kirby, *l. c.* p. 469. no. 1.

1910. *A[cridoderes] strenuus*, Kirby, *l. c.* p. 470. no. 1.

The type of *variolosa* differs from that of *strenua* in its slightly larger size and in its paler coloration, but I do not hesitate to regard them as being conspecific. One female in the British Museum from Liberia perfectly agrees in all morphological characters with the type of *variolosa*, but is of a darker colour, with distinct oblique brownish fasciæ on the elytra. It is very likely that *Acridium cribrifrons*, Walk. (Cat. v., Suppl. p. 60), represents a male of this species, as its type is from the same locality and collector as that of *strenua*, but the type of *cribrifrons* is lost and nothing definite can be said from the description.

Geographical distribution. The type of *strenua* is from Gambia, that of *variolosa* from Senegal. In the British Museum there are specimens from Liberia and Yapi, N. Territories, Gold Coast; Karsch described his *scrobiculatus* from Bismarckburg, Togo, so that the species seems to be confined to West Africa.

3. *Phyxacra cærulans*, Karny.

**1907. *P[hyxacra] cærulans*, Karny, Sitz. Akad. Wiss. Wien, Bd. cxvi. Abt. I, p. 308. no. 61.

1910. *P[hyxacra] cæruleus* (sic!), Kirby, Cat. iii. p. 469. no. 2.

This is a more robust species than *strenua*, differing from

the latter also in the shape of the pronotum and in the coloration of the hind wings, but it is not known whether these characters are constant.

Geographical distribution. Besides the type, which is from Gondokoro, N. Uganda, only one specimen (a male) is known to me; it belongs to Prof. R. Ebner, of Vienna, and was taken by him at Talodi, Anglo-Egyptian Sudan.

II. GENUS *ACRIDODERES*, Bol.

1889. *Acridoderes*, Bolivar, Journ. Scien. Mat. Phys. e Natur. Acad. Lisboa, i. p. 163.

As I have the genotype of *Acridoderes* before me, I am in a position to define the differences between this genus and *Phyxacra* (see the key to genera, Part I., p. 138) and also to determine what other species should be referred to it. Amongst the species described under *Acridoderes* four belong to other genera, as follows: *A. punctatus*, Kirby, and *tectiferus*, Karsch, to *Rhytidacris*, Uv. (p. 483); *A. amethystinus*, Bol., to *Pachynotacris*, Uv. (p. 480); and *A. lavigatus*, Bol., to *Anacridoderes*, Uv. (p. 477); while *A. prasinus*, Karsch, unknown to me save by description, probably belongs to an undescribed genus. *Caloptenus strenuus*, Walk., included in the genus *Acridoderes* by Kirby, belongs to *Phyxacra* (see p. 474). Thus, only the genotype remains in the genus, but I do not hesitate to refer to it two more species originally described under other generic names, viz., *Cyrtacanthacris validiceps*, Karsch, and *Phyxacra nigrispinis*, Rehn. As I have seen only one of the three known species, the following key is based on the original descriptions and should be considered as preliminary:—

Key to the Species.

- 1 (4). Elytra extending beyond the hind knees in both sexes.
- 2 (3). Larger. Transverse sulci of the pronotum fine. Elytra extending well beyond the hind knees, even in the female. General coloration darker, with numerous blackish dots on the head and pronotum; hind femora with two blackish fasciæ on the upper side; hind tibiæ with the extreme base shining black, then with a narrow, indefinite, pale ring, elsewhere brownish violaceous above and pale beneath; tibial spines yellowish with the tips and the whole of the hind surface black. (Angola; Mashonaland.) 1. *crassus*, Bol.
- 3 (2). Smaller. Transverse sulci of the pronotum deep. Elytra in the female only slightly

extending beyond the hind knees. General coloration paler, without blackish markings; hind tibiae with the basal part blackish, the spines entirely black. (Ruwenzori.)

- 4 (1). Elytra in the female just reaching the hind knees, in the male a little longer. Coloration reddish grey, without black dots. Hind wings bluish at the base. Hind tibiae pale on the inner side, bluish on the upper side, with pale black-tipped spines. (Central Africa.)
2. *nigrispinis* (Rehn).
3. *validiceps* [(Karsch).

1. *Acridoderes crassus*, Bol. (Figs. 1A, 2a, 4A, 4B.)

**1889. *Acridoderes crassus*, Bolivar, Journ. Acad. Scien. Lisboa, i. p. 163. no. 155.

1910. *A[cridoderes] crassus*, Kirby, Cat. iii. p. 470. no. 2.

Geographical distribution. The types are from Kakonda (Caconda) and Kwango in Angola; I have seen three specimens perfectly identical with the types from Salisbury, Mashonaland (B.M. and O.M.).

2. *Acridoderes nigrispinis* (Rehn).

1914. *Phyxacra nigrispinis*, Rehn, Wiss. Ergebn. Deutsch. Z.-Afr. Exped. Bd. v. Lief. 1, p. 115.

The description of this species leaves no doubt that it belongs not to *Phyxacra* but to *Acridoderes*. It seems to be fairly distinct from *A. crassus*, though the colour-characters given by Rehn are not quite reliable owing to the preservation of the unique type in spirit.

Geographical distribution. Described from the foot of Mt. Ruwenzori.

3. *Acridoderes validiceps* (Karsch).

1896. *Cyrtacanthacris validiceps*, Karsch, Stett. Ent. Ztg. lvii. p. 296. no. 59.

The original description enables me to conclude that the species belongs to *Acridoderes* and is sufficiently distinct from the two others known. It is omitted from Kirby's Catalogue altogether.

Geographical distribution. Kabebe, Central Africa (*Karsch*, l. c.).

III. GENUS ANACRIDODERES, nov.

Though I have not been able to study the type of *Acridoderes levigatus*, Bol., I have not the slightest doubt that I am correct in referring three insects from the Transvaal to

that species, and I do not find it possible to retain them in the genus *Acridoderes*, as the shape of fastigium and of the pronotum, as well as the reticulation of the elytra, which is somewhat abnormal for a member of the group *Acridoderi*, are all characters of generic value, and so striking that a detailed description of the genus may be omitted.

1. *Anacidoderes lævigatus* (Bol.). (Fig. 5 b.)

1911. *Acridoderes lævigatus*, Bolivar, Ann. Soc. Ent. Belg. lv. p. 303. no. 9.

Owing to a slip, the species is called *An. crassus* in the explanation of the fig. 5 (Part I., p. 139).

Geographical distribution. Katanga, Belgian Congo (Bol., l. c.); Pretoria and Johannesburg, Transvaal (B.M., 3 ♀ ♀).

IV. GENUS CONGOA, Bol.

1911. *Congoa*, Bolivar, Ann. Soc. Ent. Belg. lv. p. 303.

The genus undoubtedly belongs to the group of *Acridoderi*, as the shape of the head and elytra (which are, though abbreviated, distinctly obliquely truncate apically) shows, and it is quite distinct from any other genus of the group. Only one species is known.

1. *Congoa katangæ*, Bol.

**1911. *Congoa katangæ*, Bolivar, l. c. p. 304. no. 10.

The type, which is the only specimen known, is charcoal-black all over (except on the sides of the abdomen, which are somewhat brownish), and there is no reason to think, as Bolivar does, that this coloration, unusual in Orthoptera though it is, is not natural and due to the bad preservation of the specimen.

Geographical distribution. Katanga, Congo (Mus. du Congo Belge).

V. GENUS PACHYACRIS, nov.

This new genus forms a kind of link between the true *Acridoderi* (i. e., the genera *Acridoderes*, *Anacidoderes*, *Phyxacra*, and *Congoa*) and the *Valanga* group of genera, as it agrees with the latter group in the shape of the fastigium, frontal ridge, and apex of elytra, while the reticulation of the apical half of the elytra is very characteristic for *Acridoderi* and *Coptacrae*.

Two species are known in this genus, both from the Oriental region.

Key to the Species.

- 1 (2). Fastigium of the vertex distinctly impressed, less sloping. Frontal ridge not at all dilated above the ocellum. Head and pronotum above with a pale median fascia prolonged into the anal field of elytra. Elytra almost unicolorous brownish, with very small and indistinct, scattered, darker spots. Wings infumate throughout, with the base pale violaceous. (Ceylon.) 1. *violascens* (Walk.).
- 2 (1). Fastigium of the vertex almost flat, distinctly sloping. Frontal ridge above the ocellum slightly dilated. Coloration brownish, with more numerous darker spots on the elytra, forming more or less distinct narrow oblique fasciæ in the apical part. Wings infumate throughout, with the base rosy. (India, China.) 2. *vinosa* (Walk.).

1. *Pachyacris violascens* (Walk.).

- **1870. *Acridium violascens*, Walker, Cat. iii. p. 587. no. 38.
 1910. *C[yrtaanthacris] violascens*, Kirby, Cat. iii. p. 452. no. 53.
 1914. *Orthacanthacris violascens*, Kirby, Fauna Br. Ind., Acr. p. 229. no. 276.

The coloration, as described in the key, seems to be fairly constant in the series before me. In one specimen from Mysore, S. India, there are, however, fairly well-pronounced dark spots on the elytra, forming irregular oblique fasciæ, like those in *vinosa*; at the same time the upper median fascia on the head and pronotum is well developed, and the shape of the frontal ridge and fastigium is quite typical for *violascens*. In case these characters prove to be present in all specimens from the Indian mainland, they must be separated as a distinct geographical form.

Geographical distribution. This species seems to be very common in Ceylon, whence came Walker's types; there is only one specimen known to me from the mainland (Mysore), which may represent a distinct subspecies (see above). I have seen also one specimen from the Madrid Museum, labelled "Usambara," which is doubtless incorrect.

2. *Pachyacris vinosa* (Walk.). (Fig. 6 a.)

- **1870. *Acridium vinosum*, Walk. Cat. iii. p. 588. no. 40.
 **1900. *Cyrtaanthacris wingatei*, Kirby, Ann. & Mag. Nat. Hist. (7) vi. p. 381.
 1910. *C[yrtaanthacris] vinosa*, Kirby, Cat. iii. p. 452. no. 54.
 1910. *C[yrtaanthacris] wingatei*, Kirby, l. c. no. 55.

The type of *C. wingatei* is much smaller and much darker

than the typical Indian *vinosa*, but another specimen † from the same locality as *wingatei* is much nearer to *vinosa* in its dimensions and coloration, which prevent me from regarding *wingatei* as a northern subspecies of *vinosa*. Specimens from Burma are also somewhat smaller than those from India, but of the same coloration.

Geographical distribution. The type of *vinosa* is from North Bengal. Other specimens in the British Museum are from Mohaupar and Pakur, Bengal; Maymyo, Burma; Aijal, Lushai Hills, Assam; Yang-tse-kiang, China.

VI. GENUS *PACHYNOTACRIS*, NOV.

Face rugulose. Frontal ridge in profile straight, distinctly reclinate, prominent, and somewhat dilated between the antennæ, flat, punctured, impressed below the ocellum, lowered and disappearing before the clypeus. Antennæ reaching beyond the base of the hind femora. Fastigium of the vertex strongly sloping, forming a broad curve with the frontal ridge, slightly impressed, not marginate. Distance between the eyes slightly broader than the frontal ridge between the antennæ and distinctly narrower than the horizontal diameter of an eye. Eyes strongly prominent sideways; their height less than twice the horizontal diameter, which is subequal to the height of the subocular sulcus. Pronotum with the prozona perfectly rounded and swollen on the lateral lobes; the metazona almost flat; median keel fine, linear, interrupted by feeble transverse sulci; the whole surface rugulose; hind angle about 90° , rounded. Prosternal spine straight, feebly narrowed apically, almost cylindrical. Elytra slightly longer than the abdomen, broad, subcoriaceous, coarsely and irregularly reticulated; the apex rounded. Hind femora short, basally dilated, with all keels distinctly serrate. Hind tibiæ thick, armed with eight outer and nine inner stout spines. Male cerci straight, compressed, narrowly triangular. Male subgenital plate conical, somewhat recurved. Valvæ of the female ovipositor elongated, without basal teeth.

Genotype: *Acridoderes amethystinus*, Bol.

This is a very peculiar genus, easily separated from any other by the above characters. Only one species is known.

† Recorded by Kirby (*l. c.*) as *Cyrt. succincta*, L. (!).

1. *Pachynotacris amethystina* (Bol.).

**1908. *Acridoderes amethystinus*, I. Bolivar, Mem. Soc. Ent. Belg. xvi. p. 114. no. 120.

Bolivar's type, which I have studied, is badly discoloured. One of two specimens in the British Museum, a female, perfectly identical with Bolivar's species in all the morphological characters, is very vividly coloured, being black and sulphur-yellow; the elytra are black basally, gradually merging into dark violet towards the apex, with a sharply defined sulphurous stripe in the anal field; wings vinous, but not amethyst as in the type, which is undoubtedly discoloured; hind femora black all over except both upper areas and the genicular lobes, which are yellow; hind tibiae black all over, including the spines.

Geographical distribution. Stanley Falls (Belgian M.; Bolivar's type); Entebbe, Uganda, 1 ♂, 1 ♀ (B.M.).

VII. Genus BRYOPHYMA, nov.

Frontal ridge in profile distinctly convex, forming a wide curve with the fastigium. Fastigium of the vertex strongly sloping, somewhat convex, its margins not at all or scarcely raised, distant behind. Distance between the eyes distinctly broader than the base of the frontal ridge; the height of an eye in ♀ distinctly less, in the ♂ not more, than the height of the subocular sulcus. Pronotum distinctly compressed laterally, very feebly constricted in the prozona, coarsely punctured and rugulose; its front margin rounded, slightly prominent in the middle; hind angle about 90°; median keel in prozona tectiform, deeply cut by transverse sulci, in prozona sharp, lowered before the hind margin. Elytra transparent throughout, with not dense reticulation; their apex bent backwards, moderately narrowed, obliquely truncate. Wings faintly coloured. Hind femora distinctly widened basally; supero-external area granulated; the upper keel of the externo-median area denticulate. Hind tibiae with 8-9 outer and 10-11 inner spines. Male cerci elongato-triangular, compressed, with the apex incurved. Male subgenital plate short, conical.

Genotype: *Cyrtacanthacris debilis*, Karsch.

Two known species may be included in this genus, namely, *debilis*, Karsch, and *sigillata*, Bol., and I regard them as but geographical races of the same species.

1. *Bryophyma debilis* (Karsch). (Fig. 3a.)

Though the material at my disposal is rather scanty,

I believe I am right in splitting the species into three geographical races, one of which is new.

Key to Subspecies.

- 1 (2). Pronotum unicolorous. Hind tibiæ on the upper side violaceous. Median keel of pronotum feebly raised throughout, in profile scarcely convex. Size smaller. (East Africa.) 1 *a. debilis* (Karsch).
- 2 (1). Pronotum not unicolorous; its median keel distinctly raised, in profile strongly convex.
- 3 (4). Pronotum more compressed laterally, sanguineous above, with the lateral lobes green. Transverse fasciæ of hind femora sanguineous or violaceous. Hind tibiæ reddish. Elytra without any trace of fasciæ. (Uganda.) 1 *b. picta*, subsp. n.
- 4 (3). Pronotum thicker, with round black or violaceous-black dots on the upper surface. Transverse fasciæ of hind femora black. Hind tibia greyish green. Elytra with very faint and irregular oblique fasciæ. (Inner Congo; Mashonaland.) 1 *c. sigillata* (Bol.).

1 *a. Bryophyma debilis debilis* (Karsch).

1896. *Cyrtacanthacris debilis*, Karsch, Stett. Ent. Ztg. lvii. p. 300. no. 63.

I have only a single specimen (S.M.) before me which agrees perfectly well with the original description; as it is from Punda Melia, near Nairobi, Brit. E. Africa, and the original type was from Zanzibar, I take it for the typical subspecies, distributed over the country eastwards from the lakes. Unfortunately, the specimen is discoloured by preservation in spirit.

1 *b. Bryophyma debilis picta*, subsp. n.

The specimens from Western Uganda are very distinctly coloured and should be regarded as an independent subspecies. Dimensions of the type (♂) are as follows: body 39; pronotum 9; elytra 36; hind femur 20 mm.

Geographical distribution. Described from 4 ♂♂ and 3 ♀♀ from the following localities: Entebbe, Uganda, 2 ♂♂, 1 ♀ (one male being the holotype); Kampala, Uganda, 1 ♂; Tororo, Uganda, 1 ♂, 1 ♀ (all in B.M.); Uganda occident., prov. Toro, environs de Fort Portal (M.M.).

I c. *Bryophyma debilis sigillata* (Bol.).

**1908. *Acridium sigillatum*, I. Bolivar, Mem. Soc. Ent. Belg. xvi. p. 111. no. 111.

Specimens from Mashonaland are somewhat more slender and smaller than the type from the Congo, the typical black dots on the pronotum being also not always well developed, so that they may be regarded as transitional to *B. debilis picta*, but still they are more like those of *sigillata*.

Geographical distribution. Luluabourg (M.M.; type of *A. sigillatum*, Bol.); Salisbury, Mashonaland (B.M.; O.M.); S. Rhodesia (C.M.).

VIII. Genus RHYTIDACRIS, nov.

Frontal ridge in profile feebly convex, distinctly inclined, forming a very wide curve with the fastigium. The latter very strongly sloping, distinctly impressed, hexagonal, but not separated from the frontal ridge, its margins raised, convergent behind. Distance between the eyes narrower, or scarcely broader than the base of the frontal ridge, which is narrowed below the ocellum. The height of an eye in both sexes more than the height of the subocular sulcus. Pronotum compressed laterally, somewhat narrowed but scarcely constricted in the prozona, very coarsely punctured or callously rugose; its front margin rounded or slightly prominent; hind angle not less than 90° , more or less rounded; median keel more or less raised, convex in profile. Elytra in the basal half subcoriaceous, with the reticulation moderately dense; strongly narrowed towards the apex, which is lancet-shaped and bent backwards. Wings slightly infumated apically, colourless elsewhere. Hind femora basally strongly dilated and thickened; the supero-external area granulated; supero-median and supero-external keels strongly denticulate. Hind tib.æ with 7–8 outer and 9–10 inner spines.

The shape of the frontal ridge which is somewhat dilated between the antennæ, the structure of the hind femora, and the peculiar ocellar fasciæ on the elytra indicate a relationship to the group *Acridodermi*, and particularly to the genus *Phyxacra*, from which *Rhytidacris* differs, however, in many important characters, as is evident from the key to genera. In fact, it is a connecting-link between the *Acridodermi* and the *Anacridium* group of genera.

One species, besides the genotype, is known.

Key to Species.

- 1 (2). Fastigium of the vertex longer than broad (even in the female), acutely angulate or very narrowly truncate behind. Pronotum distinctly compressed laterally, with very coarse impressions and callous rugosities, especially noticeable in the metazona, where they are longitudinal; its median keel strongly arched. (W. & C. Africa.) 1. *tectifera* (Karsch).
- 2 (1). Fastigium of the vertex not longer than broad (even in the male), truncate behind. Pronotum thick, coarsely punctured, with rugosities in the prozona only; its median keel low. (S.E. Africa.) 2. *punctata* (Kirby).

1. *Rhytidacris tectifera* (Karsch). (Fig. 6 b.)

1896. *Cyrtacanthacris tectifera*, Karsch, Stett. Ent. Ztg. lvii. p. 299. no. 62, fig. 24.

Geographical distribution. Yapi, N. Territories, Gold Coast; Old Calabar (B.M.); Kamerun (M.M.); Kassongo to Stanley Falls (M.M.); Popocabacca (Bl. M.); Kondove to Karonga, Nyasaland (B.M.); Zomba (B.M.).

The specimen from Cameroons is very dark brown on the upper side, while the lateral lobes of the pronotum and mesopleuræ are pale, but it does not differ in structural characters from other specimens, and I take it to be just a colour aberration.

2. *Rhytidacris punctata* (Kirby).

**1902. *Acridoderes punctatus*, Kirby, Trans. Ent. Soc. London, p. 239. no. 108c.

Kirby says that his type is a female, but it is obvious even from his description of the genitalia that it is a male, as the study of the type shows.

Geographical distribution. Rustenburg, Transvaal (Kirby's type; B.M.); Bultfontein, Pretoria distr. (B.M.); Durban (B.M.); Zoutpansberg, Transvaal (M.M.).

IX. GENUS *SCHISTOCERCA*, Stål.

This is an essentially New World genus, or rather group of genera, which is represented in the Central and South America by a large number of species, requiring a thorough revision, as their systematics and synonymy are in a chaotic state. As this paper, however, is restricted to the Old World representatives of the group, we have to deal with a single species only, which is also the type of the genus.

1. *Schistocerca gregaria* (Forsk.).

1775. *Gryllus gregarius*, Forskål, Descr. animalium, quae in itinere orientali observavit, p. 81.
 1804. *Acridium peregrinum*, Olivier, Voyage dans l'empire Othoman, etc. iv. p. 388, footnote.
 1910. ||*Schistocerca tatarica*, Kirby, Syn. Cat. Orth. iii. p. 459. no. 46 (nec Linné!).

The correct synonymy of this species was established by H. Krauss in 1907 (Denkschr. mat.-nat. Kl. K. Akad. Wiss. Wien, lxxi. p. 12 of separate copy), but Kirby overlooked Krauss's paper, as well as that of Forskål, and thus missed the name given to the insect in question by the latter author, which has priority over that of Olivier. Moreover, Kirby added to the confusion by ascribing the name *Gryllus tataricus* of Linné to this insect, which clearly contradicts the original description of the Linnean species, as is shown in my notes on the latter (see below).

All further synonyms are given by Kirby correctly, including *Acridium subsellatum*, Walker, the type of which is a perfectly typical example of the species, though reputed to come from South America.

The interrelations of this species and the South American *S. paranensis*, Burm., have been studied by me on a fairly large series of specimens, and the conclusion reached is that they may be separated by a good number of morphological characters, though I am not yet in the position to say definitely whether those characters are of specific value, or whether the two insects should be regarded as but subspecies of one species.

S. gregaria is fairly constant in its specific characters, but I managed to find amongst the collections studied by me a number of specimens which are all strikingly aberrant from the typical form in the less constricted pronotum, with the median keel more raised and the surface more rugose, as well as in the dull greyish coloration, with distinct dark and pale fasciæ on the pronotum. This form agrees perfectly well with the description of *Acridium flaviventre*, Burm., and I believe it to represent the solitary phase of the species, and I call it, accordingly, *S. gregaria*, ph. *flaviventris* †.

Geographical distribution. *S. gregaria* occurs over practically the whole of Africa (with the possible exception of the belt of equatorial forests), and also in S.W. Asia, reaching as far north as Transcaspia and as far east as Kashmir (B.M.), as

† For a detailed account of the matter, as well as of the geographical distribution, variability, and bionomics of *S. gregaria*, see my paper in Bull. Entom. Res. xiv. pt. 1, 1923 (in press).

well as on some of the Atlantic Islands—Cape Verde, Grand Canary, Ascension (B.M.). The existing records of its occurrence also in South America are considered by me to be erroneous and based on a confusion with *S. paranensis*.

X. GENUS RHADINACRIS, NOV.

Small and slender. Antennæ fairly thick, somewhat compressed, extending in both sexes well beyond the hind margin of the pronotum. Frontal ridge strongly reclinate, in profile straight, forming a very distinct, though rounded, angle with the fastigium. The fastigium slightly sloping, distinctly longer than broad, somewhat impressed. Eyes large, strongly prominent; their length equal to the sub-ocular height, or even exceeding it, and more than a half of the horizontal diameter; the distance between the eyes less than their horizontal diameter, and subequal to the width of the frontal ridge between the antennæ. Pronotum compressed laterally, and distinctly constricted in the prozona; its surface rugulose; the median keel low, but fairly thick, smooth, and very deeply cut by the transverse sulci. Prosternal spine thick, somewhat inflated apically, straight, or very slightly inclined backwards. Elytra very narrow, with sparse reticulation. Wings narrow, hyaline. Hind femora narrow, but rather thick, with all keels remotely and obtusely serrate. Hind tibiæ with 8 outer and 10–11 inner spines. Male cerci compressed, broad, triangular.

This is certainly a very aberrant genus, but its relation to *Schistocerca*, suggested by the specific name, owing to the shape of the male cerci, is not very close if other characters are taken into consideration. The genus is monotypic.

1. *Rhadinacris schistocercoides* (Brancs.). (Fig. 5 c.)

1893. *Acridium schistocercoides*, Brancsik, Jahresh. Ver. Trencs. Com. xv.–xvi. p. 122, pl. xii. fig. 2 a–c.

*1907. *Acridium schistocercoides*, Finot, *l. c.* p. 310.

*1916. *Cyrtacanthacris schistocercoides*, J. Carl, Rev. Suisse Zool. vol. xxiv. no. 6, p. 490.

The general coloration of this species is somewhat variable, as is mentioned by Finot and, especially, by J. Carl (*l. c.*).

Geographical distribution. Madagascar.

XI. GENUS ANACRIDIDIUM, NOV.

Frontal ridge in profile vertical, or practically so, slightly dilated above the ocellum, but narrowed again at the

fastigium; its surface impressed below the ocellum, flat above it; margins callous. Fastigium of vertex slightly sloping, somewhat impressed along the middle; its margins raised, convergent behind, or nearly so. Eyes large, strongly prominent, about twice as high as long; their height subequal to the subocular distance; distance between eyes distinctly less than the length of an eye. Pronotum laterally compressed and more or less constricted in the prozona; its surface rugulosely punctured, and bearing small scattered callous tubercles; median keel fairly thick, tectiform, convex in profile, deeply cut by transverse sulci. Prosternal spine cylindrical or slightly compressed laterally, straight, or feebly bent forwards, with the apex rounded. Elytra long and fairly narrow, with the apex attenuate and bent backwards (fig. 6c). Wings with the whole basal part, or with but a submedian fascia, infumate. Male cerci cylindrical and narrow, almost filiform, at least as long as the anal plate, curved. Male subgenital plate trilobate apically.

Though the genotype (*A. ægyptium*) somewhat differs from the two other known species in the shape of the pronotum, which in it is less constricted in the prozona and more angulate behind, there is no reason to split the genus, which is quite a natural one.

Key to the Species.

- | | |
|--|---------------------------|
| 1 (2). Pronotum distinctly angulated behind. Prosternal spine perfectly straight and vertical, not compressed laterally, with the apex obtuse. Male cerci shorter, neither reaching the apices of the lateral lobes of subgenital plate nor touching each other apically. (Mediterranean countries.) | 1. <i>ægyptium</i> (L.). |
| 2 (1). Pronotum distinctly rounded behind. Prosternal spine slightly inclined backwards, compressed laterally, with the apex subacuminate. Male cerci longer, reaching to the apices of the side-lobes of subgenital plate, and touching each other apically, or even with the apices crossed. | 2. <i>mæstum</i> (Serv.). |
| 3 (4). The fascia of the hind wings, however broad, never touching the hind margin; base of the wings hyaline, or rosy, or violaceous. (Africa, south of Sahara.) | 2 a. subsp. <i>mæstum</i> |
| a (b). General coloration darker. The wing-fascia very broad, shining black, with the outer margin sharply defined; a longitudinal series of black spots between the anal and axillar vein, and several more black confluent spots near the apex. (South and equatorial Africa.) | [(Serv.)] |

- b* (a). General coloration paler. The wing-fascia narrow and short, more or less obsolete, imperfectly margined; the spots in the post-anal area and in the apical part less numerous, smaller, and paler. (Cape Verde Islands, Sudan, Abyssinia, Aden, Sokotra.) [rhodon (Walk.).
- 4 (3). The fascia of the hind wings is along the hind margin, not extending forward beyond the middle of the wing; base of the wing yellow. (S. India, Ceylon.) 2 *b*. subsp. *melanorhodon* (F.).
3. *flavescens* (F.).

1. *Anacridium ægyptium* (L.). (Figs. 2 *b*, 3 *b*.)

1764. *Gryllus Locusta ægyptius*, Linnaeus, Mus. Ludov. Ulr. p. 131.

1910. [*Cyrtacanthacris*] *ægyptia*, Kirby, Cat. p. 444. no. 6.

**1870. *Acridium indecisum*, Walker, Cat. iii. p. 585. no. 32.

1870. *Acridium albidiferum*, Walker, Cat. iv. p. 627.

Though the type of *A. albidiferum* does not exist, the description of this species and the locality (Sinai) leave no doubt that it is conspecific with *ægyptium*. As for *A. indecisum*, the type (a female, not male, as Walker indicated in the description) and another male specimen, named by Walker as *A. tataricum* (= *ægyptium*; see Cat. Derm. Salt. B.M. iii. p. 577. no. 1, *g.*), are quite indistinguishable from the typical *ægyptium*, except by the slightly more acute hind angle of the pronotum, which may be due to the previous preservation of the specimens in alcohol, and their supposed origin from South Africa seems to me very doubtful. I think, therefore, it is better to regard *indecisum* as a pure synonym of *ægyptium*, unless fresh and more reliable records as to the occurrence of this species in South Africa become available; in that case, and if the more angulated pronotum proves to be a distinctive feature of South African specimens, they will have to be regarded as a subspecies to which Walker's name should be applied.

As the species has been described and figured many times, there is no need to give a description. As regards the variability of its characters, I should like to mention that I have seen some specimens from Palestine in which the base of the wings is pale violaceous, as may be seen sometimes in *A. mæsta* and its subsp. *melanorhodon* (see below).

Geographical distribution. It is an essentially Mediterranean species, which ranges, as a permanent member of the fauna, not farther northwards than Bordeaux, the Alps, and the Crimea, while the most southern locality is Nubia (Karuy, Sitz. Akad. Wien, Bd. cxvi. Abt. 1, p. 307). In the west it is known from Madeira, while it ranges as far eastwards as Russian Turkestan and Baluchistan (Quetta; B.M.).

2 a. *Anacridium mæstum mæstum* (Serv.).

1839. *Acridium mæstum*, Serville, Ins. Orth. p. 654. no. 14.
 1910. [*Orthacanthacris*] *mæsta*, Kirby, Cat. p. 444. no. 1.
 **1907. [*Orthacanthacris*] *wernerella*, Karny, Sitz. Akad. Wiss. Wien, cxvi. Abt. 1, p. 305. no. 57.
 1918. *Orthacanthacris eximia*, Sjöstedt, Arkiv Zool. xii. no. 1, p. 2, fig. 2.

The characters given by Karny for separating his *wernerella* from *mæstum* are not of specific value, as may be easily seen in a sufficiently long series of specimens.

The base of the hind wings is sometimes rosy or violaceous.

Geographical distribution. This subspecies is distributed all over South Africa, ranging northwards up to North Uganda (Gondokoro) and Northern Nigeria (Zungeru, B.M.); it has, however, never been recorded from the forest-regions of Central and West Africa, and it seems that it does not penetrate there.

2 b. *Anacridium mæstum melanorhodon* (Walk.). (Fig. 6 c.)

- **1870. *Acridium melanorhodon*, Walker, Cat. iii. p. 585. no. 28.
 **1907. [*O. wernerella*], var. *sphalera*, Karny, Sitz. Akad. Wiss. Wien, cxvi. Abt. 1, p. 305.
 1907. *Acridium æthiopicum*, Finot, l. c. pp. 269, 346.

The characters separating this form from the typical *mæstum* are of such a kind that I cannot give them specific value, and the data concerning their distribution lead to the conclusion that they are but geographical races of the same species.

Geographical distribution. The race *melanorhodon*, originally described by Walker from St. Jago, Cape Verde Islands (not S. America, as incorrectly recorded by Walker), represents a northern form of *mæstum*. I have seen examples from St. Vincent, Cape Verde Islands; Khartum; Massowah; Aden and Sokotra; Karny described his *sphalera* from Renk, Sudan, and Finot's *æthiopica* was described from Abyssinia.

3. *Anacridium flavescens* (F.).

1793. [*Gryllus*] *flavescens*, Fabricius, Entom. Syst. ii. p. 52. no. 24.
 1910. [*Orthacanthacris*] *flavescens*, Kirby, Cat. p. 445. no. 10.
 **1870. *Acridium pardalinum*, Walker, Cat. iii. p. 587.

The identity of *pardalinum*, Walk., with *flavescens*, F., has been recorded already by Kirby in the 'The Fauna of British India' (Acrid. p. 225, 1914), and is beyond any doubt.

Geographical distribution. The only known localities where this species occurs are Tranquebar (Fabr. l. c.), Trichinopoly

(Finot, *l. c.*), Marudaimalai and Coimbatore (Bolivar, Rev. K. Acad. Cien. Madrid, xvi. nos. 6, 7, 8, 9, p. 401, 1918) in South India, and Ceylon (B.M.).

XII. GENUS *ORTHACANTHACRIS*, Karsch.

1896. *Orthacanthacris*, Karsch, Stett. Ent. Ztg. lvii. p. 303.

This very peculiar genus has never been diagnosed properly, as its author simply mentioned in a note to the description of his *Cyrtacanthacris humilicrus* the principal differences between the latter and *ægyptia*, and expressed a suggestion that it belongs probably to a distinct genus which may be called *Orthacanthacris*. As, however, the genus is easily recognisable by the genotype, the name must be regarded as valid. The generic difference between *ægyptia* and its relatives, on the one hand, and *humilicrus*, on the other, are obvious and clearly indicated in my key to the genera (see Part I., p. 141).

Kirby's conception of the genus *Orthacanthacris* (Cat. p. 444; Fauna Brit. Ind., Acr. p. 224) is based not on the true generic characters, but merely on the name, and he included in it all the species of *Cyrtacanthacrini* with the straight prosternal spine; I have shown already that this character alone cannot be used for separating genera.

The genotype, *O. humilicrus*, seems to be the only known species of this genus, though it is not impossible that the insufficiently described *C. illustrissima*, Karsch (Stett. Ent. Ztg. lvii. p. 297. no. 60), also belongs here.

1. *Orthacanthacris humilicrus* (Karsch). (Fig. 7 d.)

1896. *Cyrtacanthacris humilicrus*, Karsch, Stett. Ent. Ztg. lvii. p. 301. no. 64, fig. 25.

1910. *O[*orthacanthacris*] humilicrus*, Kirby, Cat. p. 444. no. 5.

The dimensions of the male (Eritræa; M.M.), which was unknown to Karsch, are as follows: body 49; pronotum 10; elytra 63; hind femur 26 mm.

Geographical distribution. The species is known from the Slave Coast (Karsch, *l. c.*); Dakar, Senegal (P.M.); Ugogo, E. Africa (Karsch, *l. c.*), and Eritræa (M.M.)

XIII. GENUS *WILLEMSEA*, nov.

Frontal ridge in profile somewhat reclinate, slightly convex; seen from the front it is very slightly dilated above the ocellum, narrowed again at the fastigium, as well as below the ocellum; its surface punctured, slightly impressed below the ocellum; the margins scarcely raised, almost

obliterate before reaching the clypeus. Fastigium of vertex strongly sloping and forming with the frontal ridge a broad curve; its surface flat, margins perfectly obliterate. Eyes oval, prominent, distinctly less than twice as high as long; subocular distance distinctly more than length of an eye, but less than its height; distance between the eyes less than the length of an eye, but distinctly broader than the frontal ridge between the antennæ. Pronotum rounded, somewhat compressed laterally, but scarcely constricted in the prozona; median keel very low, subobliterate by puncturation. Elytra as in *Valanga*. Hind femora short and fairly thick. Male cerci elongato-triangular, with the apex very slightly incurved. Wings infumate.

This is a very peculiar genus, which forms a sort of connecting-link between the *Acridoderi*, which it remotely resembles in the structure of the head, and the *Valanga*-group of genera, to which it is, no doubt, most closely related. It differs, however, so much from the true *Valanga* in the head, pronotum, and the type of coloration, that I do not hesitate to separate it generically. Only one species is known as yet.

1. *Willemsea bimaculata* (Willemse).

1922. *Orthacanthaeris bimaculata*, Willemse, Orthoptera in Nova Guinea, xiii., Zool. 5, p. 720, figs. 8, 9.

I have seen two specimens only, male and female, from Sattelberg, German New Guinea (M.M.).

[To be continued.]

XLVIII.—*Ursus anglicus*, a new Species of British Bear.

By ROBERT T. GUNTHER, F.L.S.

[Plates II. & III.]

A LOWER mandible of this bear was found with other bones about 5 feet below the surface in a pit in the Cherwell gravels, of Pleistocene age, that underlie the Deer Park of Magdalen College. A few of the bones showed scratchings, indicating that they had been rolled along the bed of a fast-flowing stream, but the greater number seem to have belonged to animals that died on the spot or at no great distance away. The bones were found below a well-marked band of recent fresh-water shells, and at about 2 ft. 6 in.

above the upper surface of the Oxford Clay, upon which the gravel rests.

The locality is one where bones have been accumulated in flood-débris at a drinking-place where the Cherwell stream ran clear over a gravel bottom (*cf.* A. H. Church, 'Botanical Memoir,' no. 13, p. 22). Many of them have been penetrated by the roots of the fine elms of Magdalen Grove, one of which, the largest of its kind in Britain, probably owed its gigantic size to the phosphates derived from mammoths' bones.

In February 1922, after many bones from the pit had already been broken up for gravelling a walk leading to the new kitchen-garden, I was able to save a fairly large portion of a mammoth tusk and several molars; but, not realising how annihilating the pickaxe of a really competent digger of gravel can be, I had formed the opinion that in this deposit the bones had for the most part disintegrated, and that teeth only had survived. On the 31st of January last, on hearing that bones had been found, I immediately rushed out, arriving, however, too late to see the remains *in situ*, and found a pile of what appear to be bones of a *Bos primigenius*, stag's horn fragments, many bits of mammoth bones, including parts of two lower jaws and teeth, and, on the top of all, a beautifully preserved ramus, in two pieces, of the lower jaw of a bear. It is in a good state of preservation: only the coronoid process and the incisors being missing (Pl. II. fig. 2).

My friend, Dr. Andrews, of the British Museum, who has superintended the repairing, has given me every facility to examine the jaws of the British Bears in his charge, and, in the kindest way, has informed me as to the recent literature on the subject. Mr. Hinton has also given me access to the bear-skulls in the Zoological Department.

Such of the literature on fossil bears as I have been able to review seems to show that the great range of variation in the characters of the Common Brown Bear, *Ursus arctos*, has caused some writers to include within its limits not only the Grizzly Bear of North America, but also a great number of fragmentary fossilised remains from deposits of different ages.

Owen, for instance, in his 'British Fossil Mammals' included a newly-found Fen Bear in the same species in 1846, and his example has been followed by many authors, including Reynolds, in his 'Monograph on the British Pleistocene Bears,' 1906.

The Magdalen College bear-jaw exhibits characters which

are so much more pronounced than the corresponding characters of recent *U. arctos* as to suggest that Ursine science will be better helped by considering it, and similar contemporary Pleistocene remains, as belonging to a separate species related to but distinct from *U. arctos*, a species originally founded by Linnæus for living examples of European Brown Bears.

The jaw is in such an excellent state of preservation—better than that of most recorded remains of fossil Bears—that it merits independent description; and although fractured across the inferior dental canal, the damage has been skilfully repaired in the Geological Department of the British Museum. The condyle and angular region are in perfect condition, as also is the range of molar and premolar teeth, showing all the features upon which systematists have largely relied for their identifications. It has the special interest of being the first bear to be recorded in Oxfordshire, and one of very few that have been found in central England, between the countries of the Fen Bears (Owen, 1842) and those of Kirkdale in the north (Buckland, 1823) and of the bears of Devon and South Wales in the west (Owen, 1846; Busk, 1873).

The jaw is larger than that of any *U. arctos* that we have seen. The firm ankylosis of the symphysis and the well-worn molar teeth show it to have belonged to a full-grown individual, probably a male somewhat past the prime of life. The teeth, shown in Pl. II. figs. 2 & 5, are as follows:—

Incisors missing.

Canine rather more slender than in *U. spelæus*: long diam. at base of crown, 21 mm.; short ditto, 20 mm.

Premolar₁ missing, but indicated by a well-defined alveolus.

Premolars₂₋₃ absent.

Premolar₄ of the *U. arctos* type, without the subsidiary cusps characteristic of the Cave Bear. Two ridges leading from the main cone to the posterior border give the tooth the appearance of the corresponding tooth in a bear named "*U. horribilis*" that was found at Grays (Pl. II. fig. 4), but the inner ridge may be partly the result of wear.

Molars₁₋₂ similar to those of allied bears. They show considerable signs of wear.

Molar₃ is a tooth of some importance. It is in every way a larger tooth than is found in *arctos*, *horribilis*, or

fossilis bears, which have a subtriangular third molar. In the Magdalen College jaw this tooth is subrectangular with a sulcus down the outer side, recalling the *U. spelæus* type of third molar.

The dimensions of the four teeth are :—

	pm ₁ .	m ₁ .	m ₂ .	m ₃ .
Length	12·5	23	29	25
Width	9·5	15	19·5	19·5

The measures of the lengths of the molars of several fossil Bears are given in the next table of comparative dimensions. A comparison of the length of the molar range with the distance of the canine was found to serve no useful purpose, except to demonstrate the variability of the length of the diastema as compared with the length of the range of molars.

The dimensions of this jaw (in millimetres) as compared with those of a selected series of lower jaws of other bears in the British Museum are :—

	<i>U. anglicus</i> , sp. n. Magdalen College, Oxford.	" <i>U. horribilis</i> ," Grays. No. 22029.	" <i>U. horribilis</i> ," Kent's Cavern. No. 15922.	" <i>U. fossilis</i> ," Goldfuss. 1 (o.c.).
Total length	c. 292	—	—	242 ?
Canine to condyle	275	257 ?	—	230
" " pm ₁	47	?	51	46
Symphysial area :				
Length	83	—	77	69
Width	44	—	40	28
Condyle width	65	—	—	45
Top of condyle to lower side of angle	55	50	—	—
Length of molar range :				
m ₁ + m ₂ together	56·5	53	—	48
m ₃	25·5	21	—	20
Length of m ₁ + m ₂ + m ₃	82	74	—	68

In the first place the Oxford jaw may be definitely distinguished from that of the full-grown Cave Bear, *U. spelæus*, on account of its smaller size; of the presence of an alveolus close behind the canine, indicating a first premolar, which with pm₂ and pm₃ is normally absent in Cave Bears; of the absence of cusps on the inner side of pm₁; of the absence of tuberculation on m₃. Moreover, the canine

seems slenderer, and the subangular process of the mandible is more pronounced than in *U. spelæus*.

It is when we come to the distinctions between our jaw and those of *U. horribilis* and *U. arctos* that difficulties of finding constant taxonomic characters arise. Several Pleistocene jaws in the British Museum agree with the Oxford jaw in important features. Nearest to it comes the above-mentioned jaw, No. 22029, from the Lower Pleistocene of Grays, in Essex, labelled "*U. horribilis*, Ord." (Pl. II. fig. 4). The development of the subangular process is identical in both (Pl. III. figs. 10 & 11). Similar, too, is the depth and rough sculpturing of the fossa, in which the strong masseter muscle was inserted. The Oxford jaw belonged to a more powerful animal, which is indicated by the size of the condyle, which is 6.5 mm. larger in diameter than in the Grays jaw. The diameters are 24.5 mm. and 18 mm. (Pl. III. figs. 7 & 8). The Grays jaw measures 5 mm. less than the Oxford jaw from the top of the condyle to the ventral side of the angle.

A second jaw, that must be taken into account by reason of the very perfect preservation of the proximal end, is M. 2507, from the Welsh submerged forest in Whitesand Bay, near St. Davids (Pl. II. fig. 1). This has been referred to "*U. arctos*." Though otherwise imperfect, this jaw has the coronoid process and condylar region complete, and of similar proportions to those of the Oxford jaw, but the subangular process is less pronounced (Pl. III. fig. 9, s.). The following measurements are striking:—

	Oxford jaw.	Whitesand jaw. (M. 2507).
Condyle to inside of symphysis ..	227 mm.	227 mm.
" " near side of m_2	137 "	137 "
" " top of coronoid process.	—	94 "
" " ventral side of angle ..	55 "	54 "
Depth of mandible between m_2 and m_3	61 "	54 "

Although obviously from a slighter-built animal, we suggest the proportions of this jaw as suitable for the restoration of the contour of the damaged coronoid of the Magdalen College specimen (Pl. II. figs. 1 & 2). The subangular process is less strikingly developed.

The jaw has also been compared with that of the type of *U. fossilis*, Goldfuss, from Muggendorf, Franconia (Nov. Act. Acad. Cæs. Leop. Car. x. pt. ii. p. 259, pl. xx. c), the measurements of which are given above in the table. This evidently belonged to an animal that was smaller in all

respects, with a diastema that is relatively longer than in the Oxford jaw, but of the same proportion as the diastema in the jaw of a recent Brown Bear. The development of the subangle (*s.*) is inconspicuous (Pl. III. fig. 12).

Neither the complete skeleton of the Fen Bear, *U. arctos*, nor any of the other bear-skulls in the Cambridge Museum, which we were able to examine through the courtesy of Prof. Marr and of Dr. Foster Cooper, show the extraordinary development in the thickness of the lower mandible between the angle and the subangle, which is so striking a feature of the Oxford jaw.

We have also referred to the paper of Von Reichenau (Abh. d. Hessisch. Geol. Landesanstalt z. Darmstadt, 1906) and to the excellent summary by Freudenberg (Säugetiere d. älteren Quartärs v. Mittel-Europa, 1914), without, however, finding convincing evidence for referring these British Bears to any Continental species other than the *Ursus arctos*, L., which we think it expedient to divide. It must, however, be mentioned that some of Von Reichenau's figures were taken from fragmentary specimens.

The excellent preservation of the taxonomic characters of this lower mandible, their resemblance to those of some other British Pleistocene bear-remains, and their distinction from those of living *U. arctos* appear valid reasons for the formation of a new species, based on the Magdalen College jaw as the type. For this we propose the name *Ursus anglicus*.

The special features which are suggested by the Oxford and allied jaws as characteristic of this species are: the relatively long tooth-range, including a large subrectangular third molar instead of one of subtriangular outline; no trace of the pm_2 or pm_3 , which not infrequently occur in living Brown Bears; an extensive symphysis of great strength; a rounded alveolar border in the diastema, whereas this border is sharp, in fact a "knife-edge," both in living *U. arctos* and in *U. savini* (Andrews, Ann. & Mag. 1922); condyles large and wide; great thickness of bone in the region of the angle and the subangular process, which last is conspicuously prominent.

In this species we should also include the Essex Bear from Grays, B.M. No. 22029, and No. 858 in the College of Surgeons, both hitherto named *U. horribilis*. The "*U. arctos*," B.M. No. M. 2507, a less powerful bear, merits further consideration.

If subsequent materials should indicate the former existence of different local races, I would name the one, of which

the Oxford jaw is the type, *Ursus anglicus magdalenensis*, in honour of the College within whose walls it was excavated, and of whose foundation I have been a member for more than a third of a century.

EXPLANATION OF THE PLATES.

PLATE II.

Lower jaws of Pleistocene bears.

- Fig.* 1. Jaw from Whitesand Bay, referred to "*Ursus arctos*."
Fig. 2. " Magdalen College, " "*U. anglicus*, sp. n.
Fig. 3. Molar range of Whitesand Bear, "*U. arctos*."
Fig. 4. " " Grays " "*U. horribilis*."
Fig. 5. " " Magdalen " "*U. anglicus*, sp. n.

PLATE III.

- Fig.* 6. Condyle and angle from behind, Whitesand Bear.
Fig. 7. " " " Grays Bear.
Fig. 8. " " " Magdalen Bear.
Fig. 9. Angle and subangle from below, Whitesand Bear.
Fig. 10. " " " Grays Bear.
Fig. 11. " " " Magdalen Bear.
Fig. 12. " " " *U. fossilis*, Goldfuss.

a., angle of jaw; s., subangle of jaw; c., condyle of jaw.

XLIX.—Notes on some British and North African Specimens of *Apus cancriformis*, Schaeffer. By ROBERT GURNEY, M.A., F.L.S.

BEFORE proceeding to the subject of this communication, it is unfortunately necessary for me to defend the use of the name *Apus* for a genus of Crustacea.

This name has been used for generations as the generic name of the Branchiopod Crustacean *Apus cancriformis*, which, from its extreme morphological importance, has figured largely in zoological literature. For this reason, its suppression by systematists, on the ground that its use is not in accordance with the International Rules of Nomenclature, will certainly not be agreed to by writers on general zoological problems, who will no doubt continue to refer to this animal as *Apus cancriformis*. It can scarcely be to the advantage of Zoology that, in this as in many other instances since these Rules came into force, the biologist and the systematist should adopt different systems of nomenclature.

In my opinion, names long in general use should not be changed or suppressed, except for the most cogent reasons and in cases where there is obvious ambiguity. In this case

no ambiguity or doubt has ever attached to the name *Apus*, until the introduction of the Rules gave authority to unearthen names which were still-born and should have remained decently interred.

It has been found that Scopoli in 1777 had named as *Apus* the bird which we have hitherto known as *Cypselus*; wherefore, not only must *Cypselus* lapse, but *Apus*, Latreille (1801), applied to our Crustacean, must also disappear as being preoccupied by *Apus*, Scopoli. But Scopoli had on a previous page described a Crustacean under the name of *Apos*, so that, as this name has priority over *Apus*, it is open to argument that the latter, which differs by only one letter, is thereby invalidated. The ground, therefore, on which *Apus* is transferred to a bird is not, even according to the Rules, by any means secure, and, having regard to the extreme inconvenience of the change, it is surprising that anyone should be found to support it.

Apos, Scopoli, might conceivably be used *pari passu* with *Apus*, but Scopoli's Crustacean was an Anostracan, and his name is a synonym of *Branchipus*. In view of these facts, Keilhack (1909) has revived the genus *Triops*, Schrank*, to replace the Crustacean genus *Apus*, a course which has been followed by others.

I am, however, of the opinion that, where the International Rules obviously conflict with common-sense, there is no obligation that they should be followed, and that, though allegiance to rules of nomenclature is in general desirable and necessary, they should not be allowed entirely to fetter individual judgment. Further, that those concerned with the systematics of one group of the animal kingdom should have regard to the consequences of their actions upon other groups with which they are not familiar.

In this particular instance, I hold that ornithologists should acknowledge that *Apos*, Scopoli, invalidates *Apus*, Scopoli, and should retain *Cypselus*, which is a well-established name. If this be admitted, *Apus*, Latreille, may (by the rules of common-sense †) continue to be used in its old sense, and *Triops*, Schrank, may return to the obscurity from which it was unearthed.

Ghigi (1921) has recently described three new species of *Apus* from the Mediterranean region, all of which are

* Schrank wrote this name both *Triops* and *Triopes*. Ghigi (1921) uses a third name—*Thriops*.

† It must be admitted that *Apus*, Latr., is in any case condemned as a homonym by Art. 34 of the International Rules.

related to *A. cancriformis*, while one of them (*A. mauritanicus*) is founded on specimens already named by Daday as *A. cancriformis*. In separating these species, Ghigi has relied largely on three characters:—

(1) The presence or absence of teeth on the median carina of the dorsal shield.

(2) The form of the spines encircling the abdominal segments.

(3) The armature of the last abdominal segment or telson.

The first two of these characters have not previously been regarded as of great importance in discriminating species, and it seemed to me worth while to examine such specimens of *A. cancriformis* as I possess to see how far these characters can be regarded as constant. My material, all of which I have regarded as belonging to the true *A. cancriformis*, is as follows:—

(1) A number of mature, but small, specimens taken by Mr. Balfour Browne from a pool on Preston Merse, Kirkcudbrightshire, in Sept. 1907 (see 'Nature,' lxxvi. 1907, p. 589).

(2) Ten specimens, male and female, from near Tilghemt, 92 miles south of Laghouat in Algeria.

(3) Two specimens from Laghouat. These and the preceding were taken by Dr. E. Hartert in April 1911.

(4) A few females taken by me in March 1913 from a pool by the Tunis-Bizerta road in Tunisia.

With regard to the three characters named, the result of comparison of this material is as follows:—

(1) In all the Algerian and Tunisian specimens the dorsal carina is perfectly smooth, but, whereas in the Tunisian examples it ends posteriorly in a conspicuous spine, in those from Algeria this spine is either quite small or entirely absent. In the Scottish individuals the conditions are not the same. Here the carina ends in a large spine projecting into the posterior sulcus, and in nearly every case there are one or more small incisions or teeth in its posterior part (fig. 1, B, C). In this respect the Scottish examples differ from the type and approach Ghigi's species *A. mauritanicus*. In one or two cases (Tunis) I have found small denticles scattered on the shield posteriorly (fig. 1, A).

(2) I cannot follow Ghigi in attaching importance to the differences described by him in the size and shape of the marginal spines of the abdominal segments. Whether these spines project or not beyond the edge of the segment

depends largely on the degree of contraction of the abdomen. While the ventral spines of the Scottish specimens are always rather long and pointed, they are short and broad in those from Tunis, but still project beyond the segment. In the Tilghem examples these spines are short and squami-form as in *A. mauritanicus*.

Fig. 1.



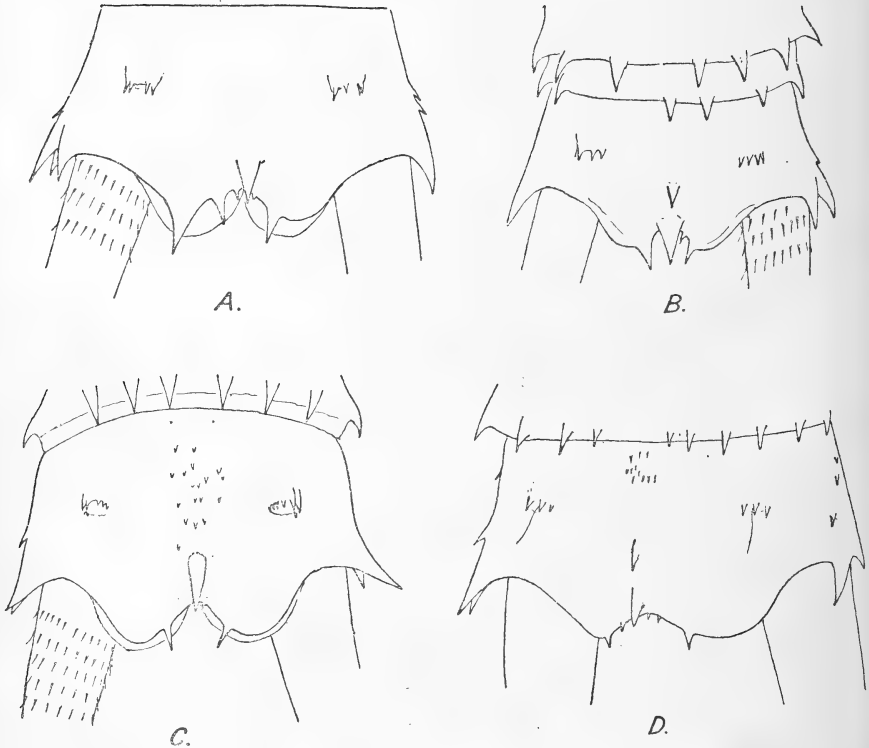
Posterior margin of shell, seen from the side. A. Specimen from Tunis; B (more magnified), from Scotland: *dc.*, dorsal carina, showing teeth. C. Another specimen from Scotland, showing toothed carina.

(3) The form of the telson in *A. cancriformis* and also in Ghigi's new species is very constant, but there are differences in the number and arrangement of the spines thereon. In *A. mauritanicus* the only difference from the type apparently consists in this—that the two lateral spines over the insertion of the furcal rami are of unequal size, the lower one being

the smaller, and that the posterior sulcus is margined by a few small spinules.

The telson of *A. simplex*, Ghigi, differs from the type only in a slightly different arrangement of the posterior marginal spinules, while *A. apulius*, Ghigi, is distinguished by having two strong median dorsal spines in front of the usual

Fig. 2.



Dorsal view of telson. Specimens from: A and B, Scotland; C, Tunis; D, Algeria (Laghouat).

posterior median spine, and also a few spinules on the dorsal surface laterally.

Now, although the Algerian and Tunisian specimens show very little variability with regard to the telson, they do vary to some extent:—

(a) Six out of ten have exceedingly small denticles

scattered irregularly over the whole or part of the dorsal surface. (The ventral surface is always smooth.)

(b) In two there is an additional large median dorsal spine (fig. 2, D).

(c) Several have lateral groups of denticles.

(d) The spines on the outer angles may be from one to four. Usually there are two large spines, but there may be one large one overlapping a smaller one as in *A. mauritanicus*, three equally large, or two large and two small.

The Scottish specimens also are variable in respect to the marginal spines, though none have the scattered surface-denticles noticed above. The marginal spines are arranged differently in almost every individual, and I have seen also in some cases an additional large median dorsal spine (fig. 2, B).

I conclude from these facts that the differences in respect of these characters relied upon for the separation of Ghigi's species are really within the limits of normal variation of *A. cancriformis*.

There are, however, other characters which are regarded as specific, and may be touched upon:—

(1) Length of the longest flagellum of the first leg. Typically this flagellum reaches about to the end of the dorsal shield. In *A. apulius* it reaches to the base of the telson, and even exceeds the whole body in *A. mauritanicus*. Now all my Algerian specimens except one agree, in that the flagellum reaches but little beyond the shield; but in this one, and in all those from Scotland, it reaches to the base of the telson. It is evident that this character is not so constant as has been supposed.

(2) Number of legless segments. This is undoubtedly the most reliable specific character for use in this difficult genus, but even here there is a limited variability. According to Simon and others, there are, in *A. cancriformis*, 6 legless segments in the female and 7 in the male. But I find among twelve of my Scottish specimens that only three have 6 and nine have 7 of these segments. Among the Tunisian and Algerian individuals the majority of females have 7 and the males have 8. One of the characters given for *A. mauritanicus* is the possession of 7 legless segments in the female and 8 in the male, and it is clear that this is not in itself of much importance. Braehm (1893) examined a large material, and found that these legless segments vary from 5 to 7 in the female and from 6 to 8 in the male.

(3) The number of segments uncovered by the dorsal shield is often given as a specific character, though it is

generally recognised to be somewhat unreliable. In my Scottish material the number varies from 11 to 20, with an average of 17. The average numbers for the North African specimens are:—Tunis, 15; Tilghemt, 19; Laghouat, 18. Lilljeborg gives 16 for typical *A. cancriformis*. With regard to this character, all Ghigi's species are rather distinct, having in each case very few uncovered segments, but I do not think that too much importance should be attached to this point.

(4) The number and size of the denticles on the posterior sulcus of the dorsal shield is a character of some importance in comparing species of the *cancriformis* and *numidicus* group, but in the former species the variation is considerable and Ghigi's species fall well within its range of variation. Among Scottish specimens the number varies from 20–30 (average 26), while the average for the North African form is 30 (Tunis) or 28 (Tilghemt). Simon gives the number as 28 to 35.

I conclude from all this that all three of Ghigi's new species should be regarded as synonyms of *A. cancriformis*.

There are three other species which have been generally overlooked, but which should also probably be included in *A. cancriformis*. I refer to *Apus haliciensis*, *A. lublinensis*, and *A. varsoviensis* of Fiszer (1885). I am unable to read Fiszer's Polish description, but I cannot see in his figures any reason for regarding these species as distinct.

It must be admitted that the genera *Apus* and *Lepidurus* are extraordinarily difficult to deal with systematically, but it is clear that any attempt to found new species within them must be based upon an examination of a large amount of material.

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L.—Notes on a new Subfossil Bear from Sweden.

By EINAR LÖNNBERG, F.M.Z.S., etc.

[Plate IV.]

IN connection with the notes concerning the Bears of the *pruinus* group, recently read before the Zoological Society of London, it may be of interest to draw attention to

the fact that formerly also in Europe there existed Bears, which with regard to their large molars exhibit a certain resemblance to the members of the group mentioned. A very good example of this is offered by a subfossil Bear, the lower jaw of which was found many years ago in the province of Halland, southern Sweden.

This mandible has a very striking appearance, because its molars (Pl. IV. figs. 3 & 4) are very much larger than the corresponding ones of a recent *Ursus arctos* (fig. 2). The enamel of m_3 is tuberculated almost as much as in the Cave Bear, but even less coarsely, so far as my material for comparison reaches. The resemblance in this respect with *pruinus* (fig. 1) is also apparent, but not so close. The situation of m_3 of the latter is, however, very similar to that in the fossil Bear from Halland. In consequence of the great size of the molars, in both these species the molar series extends backwards so far that, when viewed from the side, the posterior portion of m_3 is concealed behind *ramus ascendens* of the mandible (cf. fig. 4). This is never the case in *U. arctos*, and, so far as I know, only in quite young Cave Bears, and the present fossil specimen is not very young because m_2 shows plainly worn patches.

From the Cave Bears (including *U. deningeri* and *savini*) the present species differs in having the first, third, and fourth premolars developed, as the alveoli prove (cf. fig. 3). The fourth must have been of a comparatively very large size, as its alveolar length is not less than 15 mm. This is considerably more than in recent *U. arctos*.

The first molar was also large, as its alveolar length is 24.5 mm., thus greater than in recent *U. arctos* and approaching the Cave Bear group, but smaller than in *pruinus*.

The dimensions of the crown of the second lower molar are 27.7 mm. in length, 17 mm. in width. It is thus very much larger than in any living *U. arctos* (cf. fig. 2) and approaching those of the Cave Bear group.

The dimensions of the crown of the third lower molar are 26 mm. in length and 18.2 mm. in breadth. This tooth also is consequently much larger than in the recent *U. arctos* and it (cf. fig. 2) is even somewhat longer than the same in *U. pruinus*. To judge from Freudenberg's measurements (1914), these dimensions appear to be even larger than those of Bears named *U. deningeri* found in Germany, although smaller than those in the similarly named Bears from England. From these notes it may be apparent that this fossil Bear from Halland has a dentition quite unlike any other Bear, uniting the presence of many

premolars, as in the *arctos* group, with the much increased size of the molars as in the *spelæus* group.

In connection with the great size of the teeth stands also the shortness of the interval between the alveolar rims of the canine and p_4 , which in the present specimen is only 28.5 mm. Considering the fact that this animal was not very young, this shortness appears very remarkable. In a mandible (Pl. IV. fig. 2) of a Brown Bear, from Sweden, of equal length, the corresponding distance is 42 mm. In another specimen it sinks to about 35 mm., but, so far as I am aware, never goes beyond this latter measurement, so that the difference, even allowing for individual variation, is sufficiently great.

The shape of the whole mandible is also different from that of a recent Brown Bear. This difference consists of the more equal depth of *ramus horizontalis* along its whole length, and especially in the much greater breadth of *ramus ascendens*. This is illustrated by the following measurements:—

	The fossil mandible (figs. 3 & 4).	Recent specimen (fig. 2).
Total length from back of condyle..	238 mm.	237 mm.
Least height at diastema	44 "	40 "
Height below middle of m_3	53 "	51 "
Width of <i>ramus ascendens</i> just above <i>proc. artic.</i>	78 "	63 "

The lower surface of *processus angularis* is much broader and flatter than in a Brown Bear of similar size. The different markings indicating the insertion of the musculature are very strongly developed, and this, together with the broad *proc. coronoideus*, etc., indicates that this Bear was provided with a very powerful masticatory musculature. This, again, and the large molars with their tuberculated crowns give a hint that this Bear was even less carnivorous than the Brown Bear of the present time. Its diet must have been more omnivorous, or rather herbivorous, because the structure of the dentition must stand in connection with its mode of life.

So far as I can find out, this Bear is so well differentiated from other fossil as well as recent Bears that it must be regarded as constituting at least a separate subspecies, and it may thus be called *Ursus arctos nucifragus*. The latter name will be further explained below.

Most probably a renewed examination of subfossil bear-remains will prove that the same race may at one time have occurred in England and elsewhere in Europe.

The exact locality where this specimen was found is a peat-bog at Årnarp, in the parish of Snöstorp, east of the small river Fylle-å, in the province of Halland, in South-western Sweden. Thanks to the lately very much improved methods of investigation, the small remains found in the empty alveoli, *foramina nutritiva*, etc., can give information about the natural conditions at the place in question when this bone was imbedded. I am indebted to Dr. L. von Post for the following interesting information:—

“The mandible has been embedded in a telmatic sedge-peat, consisting of roots of sedge (*Carex*) and reeds, mosses, and sparse remains of *Sphagnum* and ferns (*Polystichum thelypteris*), and, in addition to this, containing pollen of heather, grasses, and *Typha*. There are also found rhizopods (*Centropyxis*) and diatoms (*Pinnularia*). The peat was formed in a low-lying, periodically flooded swamp, with a vegetation of sedge.

“An analysis of the pollen gives the following result:—

<i>Betula</i>	14	per cent.
<i>Pinus</i>	69	”
<i>Alnus</i>	15	”
<i>Quercus</i>	2	”
	<hr/>	
Total	100	”

“The following are lacking: *Salix*, *Ulmus*, *Tilia*, *Fagus*, *Carpinus*, and *Picea*. If, as above, the sum of all arboreal pollen is put as 100, the amount of pollen of *Corylus* is 44.

“A comparison of this with pollen diagrams from peat-bogs and with the succession of the marine layers in Halland and Scania proves that this pollen spectrum, described above, was formed during the first part of what we here call the post-Arctic warm epoch, or more precisely at a period during the post-Glacial submersion of Southern Scandinavia when the shore-line in the neighbourhood of Halmstad was about in the same position as now. The find is thus from the beginning of the *Littorina*-epoch.

“My investigations of the fossil pollen floræ, as well as the pollen spectrum which has been obtained from this Bear mandible, prove that the forest vegetation in South-western Sweden at that time, besides a number of pines, to a great extent consisted of hazel groves. These hazel groves had during the immediately preceding period played a very important part, and in certain districts of Scania and Halland had even been quite dominating. At the time when this mandible was imbedded and afterwards they were

gradually transformed into mixed forests with alder and oak, in which hazel formed an undergrowth."

It appears to the present writer very probable that this rich occurrence of nut-bearing hazel was of very great importance to the big-toothed Bear, the jaw of which has been described above and, therefore, I have taken the liberty of indicating this connection with the name given.

EXPLANATION OF PLATE IV.

- Fig. 1.* Left half of ramus of mandible of a young individual of *Ursus pruinosus*, Blyth, from Kansu, West China; from above.
Fig. 2. Left half of ramus of mandible of Brown Bears (*Ursus arctos*, Linn.), from Sweden; from above.
Fig. 3. Left half of ramus of mandible of an extinct Bear (*Ursus arctos nucifragus*, subsp. n., from Halland, South Sweden; from above. (Type-specimen.)
Fig. 4. Ditto, from outer side.

LI.—*The Nomenclature and Subspecies of the Purple-faced Langur, with Notes on the other Langurs inhabiting Ceylon.* By MARTIN A. C. HINTON.

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By the kindness of my friend Mr. W. W. A. Phillips and of the Director of the Colombo Museum, the British Museum has lately received a fine series of specimens illustrating the variation of the Purple-faced Langur in South-western Ceylon. This material enables me to clear up some points which have long been doubtful, and to direct attention to some others upon which further information is required.

Pithecus vetulus, Erxleben.

1777. *Cercopithecus vetulus*, Erxleben, Syst. Reg. An. p. 25.
 1780. *Cercopithecus kephalopterus*, Zimmermann, Geograph. Gesch. ii. p. 185.
 1785. *Simia cephalopterus*, Boddaert, Elenchus Animal. p. 58.
 1792. *Cercopithecus silenus purpuratus*, Kerr, An. Kingd. p. 65.
 1795. *Simia porphyrops*, Link, Beiträge, ii. p. 62.
 1800. *Simia veter*, Shaw, Gen. Zool. i. p. 36 (nec Linnæus).
 1807. *Simia latibarba*, Temminck, Cat. Syst. Ornith. et Quadrup. p. 3.
 1812. *Cercopithecus latibarbatulus*, Geoffroy, Ann. du Mus. xix. p. 94.
 1825. *Cercopithecus leucopyrnus*, Otto, N. Acta Acad. Cæs. Leop. xii. p. 505, pl. xlvi. bis.
 1833. *Semnopithecus nestor*, Bennett, Proc. Zool. Soc. 1833, p. 67.
 1847. *Presbytes thersites*, Elliot, Blyth, J. Asiat. Soc. Bengal, xvi. p. 1271.
 1876. *Semnopithecus kelaarti*, Schlegel, Monogr. des Singes, p. 52.

The above is a complete list of the specific names which, at divers times, have been applied to the Purple-faced Langur. In addition, *Simia dentata*, Shaw (Gen. Zool. i. p. 24, 1800), and *Semnopithecus fulvogriseus*, Desmoulins (Dict. Class. d'Hist. Nat. xlviii. p. 439, 1827), are sometimes cited in the synonymy of this species; but I can find nothing in the original descriptions to connect either of these names with this animal.

The Purple-faced Langur was first clearly referred to by John Ray (Syn. An. Quadr. p. 158, 1693) in the following passage:—"Cercopithecus niger, barba in cana promissa. WANDURU Zeylanensibus. Ejusdem musei" [*i. e.*, "D. Robinson è museo Leydensi"]; for the present species is the only one inhabiting Ceylon to which such a description can apply.

The earliest technical name applied to the species is Erxleben's *Cercopithecus vetulus*, diagnosed as "C. barbatus niger, barba alba. Hab. in Zeylona, Asia, Africa." Since the first determinable reference given by Erxleben is to Ray's description, quoted above, there can be no doubt that the name *vetulus* primarily applies to the present species, and therefore, being valid and available for use in the genus *Pithecus*, this name, dating from 1777, must replace *kephalopterus*, Zimm. (1780), on the ground of priority. The fact that Erxleben, by error unavoidable in the year 1777, identified various other species with his *vetulus* does not, of course, affect the question. Many later writers, including Anderson (1878 and 1881) and Elliot (1913), misled by the secondary wider application attributed to *vetulus* by Erxleben have relegated the name to the synonymy of *Macaca silenus*, and have not considered its bearing upon the nomenclature of *P. "cephalopterus."* Others, like Blanford (1889) and Forbes (1894), have rightly given the name a place in the synonymy of the latter species, but have not applied the priority rule strictly.

It will simplify matters to state at once that three well-marked forms of the Purple-faced Langur are represented by the material now available. Indicating these forms as A, B, and C, they may be defined sufficiently for present purposes as follows:—

A. General colour of the body black.

B. " " " dark brown.

C. " " " pale, ashy to brownish grey.

After carefully examining the literature, I find that all the earlier names, viz., *vetulus* (based upon Ray's description of specimens in the Leyden Museum); *kephalopterus*,

cephalopterus, *silenus purpuratus*, *porphyrops*, and *latibarba* (all based primarily upon Pennant's Purple-faced Monkey); and *latibarbatus* and *leucoprymnus* (based upon more recently collected material) refer to the form A. This is, therefore, the typical subspecies *P. v. vetulus*; and of it the British Museum possessed but two examples before the arrival of the fine series collected at Anasigalla by Mr. Phillips. These older specimens are:—one presented by the Colombo Museum from the district of Pasdon Corola (79. 9. 5. 1), and one collected by the Bombay Natural History Society's Mammal Survey at Kottawa in the Southern Province (15. 3. 1. 7).

On the other hand, Bennett's *nestor* (of which the type is now before me, B.M. no. 55.12.24.12) is based upon form B; and of it Schlegel's *kelaarti* would appear to be a synonym.

With regard to *Presbytes thersites*, Elliot and Blyth, based upon a living specimen obtained by Dr. Templeton at Nuera-kelawa to the west of Trincomali, there is some doubt, which can only be resolved by a re-examination of the type in the Calcutta Museum. By Blyth*, Anderson †, and more recently by D. G. Elliot ‡, *thersites* has been treated as a synonym of *P. priamus*; while Blanford §, finding nothing in the description to distinguish the type from "*cephalopterus*," could not "help suggesting that the so-called *Presbytes thersites* was really a variety of *Semnopithecus cephalopterus*, perhaps approaching the variety called *S. kelaarti* by Schlegel." Blyth || (who saw the type in life, as well as after its death and preparation) describes *thersites* as having no crest of hair upon the head; and its "whiskers and beard more developed than in the other entelloid Indian species, and very conspicuously white, contrasting much with the crown and body, which are darker than in *P. priamus*." In these respects, no doubt, *thersites*, as described, resembles *vetulus*; but Blyth states that the crown is darker and not lighter than other portions of the dorsal surface, and he makes no mention of the rump-patch so characteristic of all the known forms of *vetulus*. There is no other evidence of the occurrence of *vetulus* in N.E. Ceylon, while *P. priamus* is there a common species. It is quite possible that *thersites* is really

* Blyth, Catalogue, 1863, p. 12.

† Anderson, Cat. Mamm. Ind. Mus. 1881, i. p. 38.

‡ Elliot, Rev. Primates, ii. p. 96 (1913).

§ Blanford, Proc. Zool. Soc. 1887, p. 626; Mammalia, 1889, p. 35.

|| Blyth, J. As. Soc. Bengal, xvi. p. 1271.

a distinct species ; but even assuming, with Blanford, it to be a form of *vetulus*, then it is clear that *thersites* is a subspecies perfectly distinct from any of the forms A, B, and C mentioned in the above scheme.

It would appear, therefore, that form C has not hitherto attracted the attention of the systematist, and it is described below as a new subspecies, *P. v. phillipsi*. The characters of the three subspecies now recognised may be set forth as follows :—

1. *Pithecus vetulus vetulus*, Erxl.

Hair of crown directed backwards, not radiating, whiskers very long, concealing the lower part of the ears. Black supraorbital hairs but moderately developed. Hair of body of moderate length.

General colour of body and limbs black. Crown of head rufous or yellowish brown, more or less strongly contrasting with the shoulders. Whiskers white, but sometimes tinged with yellow. A conspicuous silvery-white patch, of sub-triangular form, upon the rump ; the base of the triangle bordering the callosities and involving more or less of the root of the tail. Buttocks, hinder parts of loins, and outer surfaces of thighs frosted conspicuously by the silvery hair-tips. Lower limbs and upper surfaces of hands and feet black. Naked parts of face, callosities, palms, and soles black. Basal half or two-thirds of tail dark grey above and below, its distal portion white or yellowish, with a more or less well-developed terminal pencil.

Skull showing a considerable difference in size between the two sexes ; the occipito-basilar length ranging between 88 and 93·6 mm. in adult males, and between 81·6 and 84·5 mm. in adult females. Facial portion short and steep, making with the horizontal plane passing through the external occipital protuberance and the gnathion an angle which ranges between 45° and 48° in adult males and between 49° and 53° in adult females.

For external and cranial measurements, see tables at pp. 513 and 514.

Hab. S.W. Ceylon ; “ wet area ” (average rainfall 100''–200'' per annum).

Material examined.—Twelve from the following localities : Ansigalla, Matugama, Kalutara District (collected by Mr. W. W. A. Phillips), 7 ; Kalutara District (Colombo Museum), 3 ; “ Pasdon Corola ” (B.M., presented by Colombo Museum), 1 ; Kottawa, S.P. (Bombay Nat. Hist. Soc. Mamm. Surv.), 1.

2. *Pithecus vetulus nestor*, Benn.

Essential characters as in *v. vetulus*. General colour of body dark brown. Crown of head paler than rest of back, but contrasting less noticeably with the other dorsal parts than in the typical form. Rump-patch normal, silvery grey, but usually less conspicuous than in the other subspecies. Frosting of buttocks and thighs inconspicuous or entirely absent. Hands and feet dusky above. Tail dark grey at base, paling to white or cream-colour distally.

Skull apparently intermediate between those of *v. vetulus* and *v. phillipsi*.

For cranial measurements, see table at p. 514.

Hab. S.W. Ceylon.

Material examined.—Six, viz., four specimens, including the type (B.M. no. 55.12.24.12, ex Zool. Soc.), without any exact locality; and two (B.M. nos. 72.9.5.2 and 3, presented by the Colombo Museum) from “Raygam Corola.”

Remarks.—Bennett’s type is a mere baby with full milk-dentition. But the other specimens include fully adult and even old individuals; and the material seems sufficient to show that *P. v. nestor* is a well-marked subspecies, distinguished from the others by its peculiar coloration. Unfortunately, none of the specimens is accompanied by collector’s measurements, or by exact information as to locality. “Raygam Corola” is a district immediately to the north of “Pasdon Corola” and the Kalutara district; and a great part of it lies within the “wet area”*. Possibly the present form will be found to represent true *vetulus* in the northern part of the “wet area.”

As to its coloration, dark brown though it be, it can scarcely be regarded as an intermediate between the black *v. vetulus* and the cold-grey *v. phillipsi*; for while in each of the latter forms the contrasts offered to the rest of the dorsum by the crown and rump-patches are as strong as possible, in *v. nestor* these contrasts are softened down, this subspecies thus showing a well-marked tendency to produce a general uniformity of colour.

3. *Pithecus vetulus phillipsi*, subsp. n.

Essential characters as in *v. vetulus*; distinguished by its much paler general colour and more conspicuous crown-patch.

General colour of upper parts, including the outer surfaces

* See p. 512 below.

of the arms and thighs, cold brownish grey, darkest towards the shoulders and withers, lighter and greyer upon the loins and thighs, where the whitish hair-tips increase in length. Crown of head covered by pale yellowish-brown hairs, which are much lighter in colour than in the other subspecies. These pale hairs are continued backwards over the nape, instead of ending just behind the occiput. Whiskers large and white, in very sharp contrast with the surrounding parts. Triangular rump-patch well defined; it, together with the root of the tail, silvery white. Underparts, including the inner surfaces of the limbs, dark brownish grey; but the chin and throat dirty white. Colour of outer surfaces of limbs gradually deepening distally; the hands and feet dusky or almost black above. Tail light brownish grey throughout, with the exception of the tip, which is white.

Skull with the facial portion longer and forming a more acute angle (42° in an adult male, 41° in an adult female), with a horizontal plane passing through the external occipital protuberance and the gnathion, than in *v. vetulus*. The orbits also are slightly deeper antero-posteriorly in *phillipsi*; and correlated with this, firstly, the postorbital region is more constricted and the place of constriction somewhat more posterior; and, secondly, the distances between m^3 and the pterygoid fossa and between m^3 and the condyle are greater. The sexual differences seen in the skulls of *v. vetulus* are not apparent in the skulls of the present form in the material before me. Possibly the only adult male skull now available belongs to an unusually small individual; but if so, then there must be some considerable difference in size between *v. vetulus* and *v. phillipsi*, as will be seen by comparing the measurements of the female skulls of both forms in the table at p. 514.

For external and cranial measurements, see tables at pp. 513 and 514.

Type. Adult male. B.M. no. 23. 1. 19. 1. Original no. 60. Collected at Gonapola, Panadura District, Ceylon, Dec. 12, 1914, and presented to the British Museum by the Colombo Museum.

Hab. S.W. Ceylon, Panadura District (drier zone, average rainfall $75''$ - $100''$ per annum).

Remarks.—We are greatly indebted to Mr. W. W. A. Phillips, who for several years has been engaged in collecting and working out the mammals of Ceylon. From the extensive material which he has gathered in the southwestern part of the island he has most generously enriched the national collection with long series of specimens accom-

panied by most valuable notes. His labours will clear up many difficult problems left unsolved by pioneers like Kelaart, or by the more recent work of the Bombay Natural History Society's Mammal Survey. I have, therefore, great pleasure in associating Mr. Phillips's name with this fine monkey.

It is a remarkable fact that in a small island like Ceylon the mammalian fauna should be broken up into so many subspecies. Of course, the high relief in which part of the island is carved may account in some measure for this, although usually the differences between the highland and lowland forms of the island are specific rather than subspecific. But in the case now before us, as in several others which I think could be cited, relief has nothing to do with the matter, for all three subspecies occur on the low ground within quite a small area, although not in association with each other. Some admirable maps of the rainfall of Ceylon, published in the Report of the Colombo Observatory for 1920, seem to throw a good deal of light upon the matter, suggesting that different subspecies have arisen in response to differences of humidity. In the south-west there is an ovate area, extending between latitudes $6^{\circ} 3' N.$ and $7^{\circ} 23' N.$, and through about $45'$ of longitude, in which the annual rainfall is not less than $100''$, and in places more than $200''$. This tract forms what is termed above the "wet area"; it is inhabited by the typical black subspecies *v. vetulus*, and in the north probably by the slightly less saturate *v. nestor*. This humid area is in contact with the coast only between the latitudes $6^{\circ} 5'$ and $6^{\circ} 40' N.$ Elsewhere it is surrounded by a narrow belt in which the annual rainfall varies between $75''$ and $100''$; to the east this belt stretches across the island as a tongue, which almost reaches the eastern coast. The narrow coastal strip to the south of Colombo belonging to this less humid belt is the country inhabited by the pallid *P. v. phillipsi*. The northern half of the island has for the most part an annual rainfall of between $50''$ and $75''$; and a narrow belt of similar slight humidity occurs in the south-east. In the extreme north-west and in the extreme south-east are still drier narrow coastal strips in which the annual rainfall varies between $25''$ and $50''$. Unless *P. thersites* proves to be a subspecies of *vetulus*, these drier parts of Ceylon ($25''$ - $75''$) are inhabited by *P. priamus* alone; the latter species, in turn, although the most-widely distributed Langur of the island, is quite unknown from the humid area in the south-west. There is, of course, nothing novel in the idea that humidity may play a part in controlling either subspecific variation or the distribution of

particular species; the object of the foregoing remarks is simply to point out that Ceylon offers a very favourable site for the investigation of such problems. Its mammalian fauna is extremely rich and varied, so that Nature has there provided an abundance of control experiments. It is greatly to be hoped that some resident in the northern half of the island, and another in the south-east will take up the matter with Mr. Phillips, and by similar processes of intensive collection and accurate observation gather materials from which all the Cinghalese information may eventually be read.

In concluding this paper, brief mention may be made of the two other Langurs inhabiting Ceylon. In my opinion, *P. ursinus*, Blyth, of the highlands of Ceylon, is a perfectly distinct species from *P. vetulus*, being distinguished by its much more robust build (weight to 20 lbs.), much longer fur, different coloration (although traces of a silvery rump-patch are more or less evident), and peculiar skull. With regard to *P. priamus*, of which a very long series, collected by the Mammal Survey in the northern, eastern, and southern parts of the island, is before me, the existence of a crest of hair upon the vertex, as figured by Blanford*, is shown to be a natural and constant character. It will be remembered that Anderson suspected this crest to be the result of preparation. Whether the island form of *priamus* is distinct subspecifically from that inhabiting the south of India will remain doubtful pending the arrival of further Indian specimens—for at present we have only two examples from the mainland.

*External measurements (in millimetres),
taken in flesh by the collectors.*

	Sex.	No.	Head & body.	Tail.	Hind foot.	Ears.	Weight (lb.).
<i>Pithecus vetulus vetulus.</i>							
Anasigalla (W. W. A. Phillips)	♂	662	540	730	161	38	12½
	♂	..	525	750	150	31	11½
Kalutara District	♂	5b	595	710	160	32	..
(Colombo Mus.).	♂	5	550	700	145	25	..
	♂	5a	580	690	150	30	..
	♂	60	495	712	164	33	..
<i>P. v. phillipsi.</i>	♂	63	560	770	153	36	..
Panadura District	♂	61	530	700	152	31	..
(Colombo Mus.).	♂	62	490	640	153	34	..
	♂	59	490	700	140	32	..

* Blanford, Mammalia, 1839, p. 32, fig. 8.

Skull-measurements (in millimetres).

	<i>vetulus vetulus.</i>		<i>Pithecus</i>		<i>ursinus.</i>		
	5 b. ♂.	20.9.26.1. ♀.	<i>v. nestor.</i> 79.9.5.2. ♂.	<i>v. phillipsi.</i> 60. ♂. Type.	63. ♀.	11.9.9.1. ♂.	15.3.1.5. ♀.
Condyllo-basilar length.	72.8	64.7	..	73.3	74.7	82.2	80
Occipito-basilar length.	93.6	84.5	96.1	93.1	91	102	101
Zygomatic breadth ..	74.5	69.5	71.4	75.1	72.2	81.4	..
Cranial length (orbit to occiput)	76.5	70.5	75.5	71	69.5	80.7	77
Cranial width	58.2	55.4	56	57	58	63.6	55.3
Postorbital constriction	44.3	41	43	41	41	42.3	41.9
Greatest width across orbits	61	54.9	61	60.2	58.9	64.2	62.9
Condyle to m^3	39.1	35.7	..	42	42	47.3	43.4
Palatilar length.....	32.6	28	33.7	33.4	31.7	35.5	34.5
Canine to m^3	34.3	31.1	35.5	33.1	33.5	36.1	36.5
m^1 - m^3	19.1	18.1	19.9	18.5	19	19.8	20.3

P.S., Feb. 1, 1923 :—

Since drawing up the foregoing paper I have found two important letters from Mr. Phillips to me, dated December 5, 1921, and January 11, 1922, which by inadvertence I had overlooked and forgotten. In the earlier letter Mr. Phillips says:—"While examining the *Pithecus* monkeys in the Colombo Museum the other day I found that the *P. kephalopterus* of this district [Matugama] is apparently different from that of the Panadura district nearer to Colombo. The form from down here [i. e., *P. v. vetulus* of this paper], and from the Udugama Hills, is very dark, almost black, with a very well-marked grey sacral region; while that from nearer Colombo is dark brown, sacral region not nearly so well marked, and, in fact, it seems almost intermediate between the Kalutara form of *P. kephalopterus* and the *P. ursinus* of up-country. . . . The boundary between the ranges of the two forms seems to be the Kala Ganga River, which flows into the sea at Kalutara. I am having a series of about a dozen fresh skins of each form collected, which I hope to be able to submit to you before long."

In the second letter Mr. Phillips says:—"Personally I am quite satisfied that the two forms are distinct—inhabiting different areas. No. 1 [*P. v. vetulus*], which I regard as the typical *P. kephalopterus*, ranges from about Ranna (S. Ceylon), through the Udugama Hills, in the Galla district, and up the western coast to the Kala Ganga River . . . and it is

probably found in the Ratnapura district. No. 2 [i. e., *P. v. phillipsi* and probably *P. v. nestor*] is found only to the north of the Kala Ganga, inhabiting the Panadura and Horana districts, and ranging up the west coast to a little way north of Colombo, and inland up the Kelani Valley, probably to about the foot of the Adam's Peak Range. Both of them have a very restricted range, with the Kala Ganga as their mutual boundary, but I am not as yet able to say exactly how far inland each form extends. It cannot, however, be far, as both forms are confined to the wet zone" [that is, the area in which the rainfall exceeds 75" per annum].

"There can be no question of seasonal change, as the two series of skins have been collected at the same time of the year [December] . . . and no question of age As far as I am aware, the two forms are never found together."

I have thought it better to add these extracts from Mr. Phillips's letters in a postscript rather than to remodel a paper which has already been sufficiently difficult to write. It will be seen that Mr. Phillips deserves the fullest possible credit for an interesting discovery, and that the results arrived at in this paper have been rendered possible by his enterprise alone. His description, in the earlier letter, of the form occurring north of the Kala Ganga seems to me to apply better to *P. v. nestor* than to the specimens upon which I have based *P. v. phillipsi*. This, I think, tends to confirm the suggestion made above that the habitat of *P. v. nestor* is in the northern half of the wet zone proper (rainfall exceeding 100"); while *phillipsi* inhabits the rather drier coastal belt (rainfall 75" to 100") to the south of Colombo.

LII.—On the Use of the Generic Name *Brachycercus* in
Plectoptera and *Orthoptera*. By HERBERT CAMPION.

Two recently-published generic names owe their origin to forgetfulness in the one case and long-continued neglect in the other of a genus established as long ago as 1834. The first of the two modern names to be considered is *Eurycenis*, employed by Dr. S. Bengtsson for a new genus of Mayflies, containing a single species removed by him from the genus *Cenis* (Ent. Tidskr. xxxviii. p. 186; 1917). That species

was the "two wing'd Ephemeron" which had flown "within side" his window, figured and described by Moses Harris in 1776, although no name was suggested for it at that time. It was stated to expand about half an inch, and the figures show it as a female sub-imago (Exposit. Eng. Ins. p. 24, pl. vi. figs. 1 & 3). In 1834 John Curtis established the genus *Brachycercus* for the reception of Harris's species, which he named *Harrisella*, and two other British Mayflies, *chironomiformis*, Curt., and *minima*, Curt. (Lond. & Edinb. Phil. Mag. ser. 3, vol. iv. p. 122). The insects to which these names were applied are all females, and consequently have very short setæ. The fact that the corresponding males have very long setæ did not become known until many years later.

In 1836 J. F. Stephens brought forward his genus *Cænis*, which he divided into two sections, the first, which he likewise called *Cænis*, including two "species" "with the filaments several times longer than the body" (that is, male specimens), and the second, *Brachycercus*, Curtis, consisting of five "species" "with the filaments scarcely longer than the body, or shorter, stout at the base" (females). The species described in the section *Cænis* were *macrura*, Steph., and *dimidiata*, Steph., while those referred to *Brachycercus* were *brevicauda*, "Fabr.," *harrisella*, Curt., *pennata*, Steph., *chironomiformis*, Curt., and *interrupta*, Steph. (Ill. Brit. Ent. Mand. vi. pp. 60-62).

In the second edition of his 'Guide to an Arrangement of British Insects,' column 164 (1837), Curtis enumerates, under the same sectional headings, the same seven species given by Stephens, but substituting his own name *minima* for *dimidiata*, Steph. At the same time, he treats *Cænis* as a synonym of *Brachycercus*. The first species cited under *Brachycercus* is again *harrisellus*, or, as he now writes the name, *Harrisii*, and that this fact has the effect of fixing the genotype is evident from the following words, quoted from the preface:—"It may often happen that *all* the species following such generic names would not be considered by the Author who proposed the name as belonging to his group, but the one *immediately* following is always a typical species." According to the same authority, *macrura*, Steph., is the type of the section *Cænis*.

Another attempt to supplant Curtis's genus was made by Burmeister, who erected his own genus *Oxycypha*, with *Brachycercus*, Curt., as a synonym, for the three new species *O. lactea* (= *Cænis dimidiata*, Steph.), *O. luctuosa* (= *Cænis harrisella*, Curt.), and *O. discolor* (= *Tricorythus discolor*, Burm.) (Handb. Ent. ii. p. 796 ; 1839).

In 'An Introduction to the Modern Classification of Insects' (ii. Synop. p. 47; 1840) J. O. Westwood gave full generic rank to each of Stephens's unisexual groups *Brachycercus* (with five species) and *Cænis* (with two species), designating as the respective typical species the one first named by Stephens in each, that is to say, making *Ephemerella brevicauda*, Fabr., the genotype of *Brachycercus* and *Cænis macrura*, Steph., the genotype of *Cænis*.

At last, F.-J. Pictet pointed out that the groups *Cænis* and *Brachycercus* were separated only by a sexual character, the males, with long setæ, being referred to *Cænis*, and the corresponding females, with short setæ, forming the genus *Brachycercus*. He went on to say:—"Lorsque ensuite on a reconnu que cette brièveté des soies est spéciale aux femelles, et que les mâles au contraire en ont d'énormes, il devint nécessaire de modifier le nom et les caractères de ce genre [*Brachycercus*], et M. Stephens leur donna le nom de *Cænis*" (Hist. Nat. Ins. Névropt.; Fam. Éphém. p. 274; 1845). Pictet was, of course, mistaken as to the supposed necessity for changing Curtis's generic name when the characters of his genus were amplified.

Dr. H. A. Hagen again treated *Brachycercus*, Curt., like *Oxygypha*, Burm., as a synonym of *Cænis*, Steph. (Ent. Ann. 1863, pp. 8-10).

Following Pictet, the Rev. A. E. Eaton, in his 'Revisional Monograph of Recent Ephemeridæ or Mayflies,' rejected the name *Brachycercus*, on the ground that "this name was suitable for the female insect only," and employed for the genus the name proposed for it by Stephens (Trans. Linn. Soc. Lond. 2 ser., Zool. iii. p. 18; 1883).

In 1909 Prof. Fr. Klapálek used the name *Cænis* for the genus in question, and the name *Cænidæ* for the family which contains it (Brauer's Süsswf. Deutschl., Ephemerida, p. 14).

Up to this point in the history of the question the Stephensian name *Cænis* had been wrongly allowed to usurp the prior claims of Curtis's name *Brachycercus*. As already related, a change was introduced into the situation in 1917, when Bengtsson separated out the species *harrisellus* and made it the type of a new genus, *Eurycænis*; as that genus has the same genotype, however, it is a simple synonym of *Brachycercus*. *Eurycænis* is included, without comment, in Dr. Georg Ulmer's "Übersicht über die Gattungen der Ephemeropteren" (Stett. Ent. Zeitg. lxxxii. pp. 120-122; 1920).

Before the year 1917, therefore, the generic name *Brachycercus* rightly appertained to all those species which had

been hitherto referred to *Cænis*. In that year the name was restricted by Bengtsson's action to the single species *har-risellus*, and the other species formerly associated with it in the same genus were left without a name, *Cænis* having been invalid from the beginning. I propose to call the genus in question *Ordella*, nom. nov. (a feminine proper name), the genotype being *Cænis macrura*, Steph., as re-described by Bengtsson (*loc. cit.* p. 183).

The preference so long accorded to the name *Cænis* over the older name *Brachycercus*, on the ground of its greater suitability, is, of course, overruled by Article 32 of the International Rules of Zoological Nomenclature, which expressly declares that "a generic or a specific name, once published, cannot be rejected, even by its author, because of inappropriateness."

Finally, turning to the Order Orthoptera, we find that the preoccupied name *Brachycercus* has been applied by Dr. C. Willemse to a new genus of short-horned Grasshoppers from New Guinea, belonging to the subfamily Cyrtacanthacrinæ (*Zool. Meded. Leiden*, vi. p. 7; 1921: *Nova Guinea*, xiii., *Zool.* p. 718; 1922). This Orthopterous genus must be re-named, and I propose for it the name *Megra*, nom. nov., the genotype, *Brachycercus flavum* (sic), Willemse, becoming known as *Megra flava*, Willemse.

LIII.—*Some new African Squirrels.*

By OLDFIELD THOMAS.

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AFTER completing the successful Darfur expedition with Admiral Lynes, Mr. Willoughby Lowe paid a short collecting-visit to the Ivory Coast Protectorate, where he obtained for the National Museum about 70 mammals in the savannah region in the centre of the Protectorate, some 250 miles from the coast. Among these there are three species of squirrel, respectively representing *Heliosciurus rufobrachium** and

* It does not seem to have been previously noticed that the widely spread species known as *H. rufobrachiatatus* ought to bear the above name. The latter was published in November 1842 (*Ann. & Mag. N. H.* x. p. 202, footnote) and the former only in January 1843 (*cf.* Waterhouse, *P. Z. S.* 1893, p. 438).

The name *leucogenys* for the red-checked Fernando Po *Funisciurus*,

punctatus and *Funisciurus leucostigma*, but each appearing to form special local subspecies. All are distinguished by their lighter coloration, as compared with that of their allies inhabiting the more saturate forest districts to the south.

In working them out, four other new African squirrels have come to light, and are here described.

Heliosciurus rufobrachium hardyi, subsp. n.

A remarkably pale race of *rufobrachium*.

General colour above, when in unbleached pelage, clear grizzled grey, almost as pale as in *H. multicolor* or *rhodesiae*, therefore conspicuously paler than in other forms of *rufobrachium*. Under surface dull whitish, with brown bases to the hairs, the chest and inguinal region clearer whitish. Eyelids white. Ears like head, a small postauricular rufous patch. Forearms bright ochraceous; hands buffy. Hind legs and base of tail also rich ochraceous, varying to strong ferruginous; feet grizzled buffy. Tail grizzled grey throughout.

Dimensions of type, measured in flesh:—

Head and body 230 mm.; tail 240; hind foot 50; ear 19.

Skull: greatest length 53; condylo-incisive length 48; zygomatic breadth 30.6.

Hab. Northern part of the Ivory Coast Protectorate. Type from Béoumi, 250 miles north of Grand Bassam.

Type. Old male. B.M. no. 23. 2. 3. 13. Original number 2018. Collected 16 December, 1922. Eleven specimens.

By its pale greyish colour this squirrel is widely different from any known forms allied to *rufobrachium*, but its richly rufous forearms and hind legs clearly indicate that it is really a member of that group.

It is named in honour of Mr. H. R. Hardy, who accompanied Mr. Willoughby Lowe on his Ivory Coast Expedition, and gave him much welcome assistance.

which equally dates from November 1842, and so antedates *erythrogeus*, may be treated as a misprint corrected by its author. The whole footnote was probably written on the proof in such a way that the name was misread, and the description of the face then read by the printer to agree with the name. Waterhouse probably never saw a further proof, and took the first opportunity to correct the name to *erythrogeus* and the description to agree with the facts.

P.S.—After writing this note, I find that the same observation has been recently made by Dr. J. A. Allen [B. Am. Mus. N. H. xlvii. p. 45 (footnote), 1922]. As, however, we differ in our opinion as to what should be done about "*leucogeus*," I leave the note as originally written.

Heliosciurus rufobrachium emissus, subsp. n.

A dwarf race of *rufobrachium*.

Body quite as in typical Fernando Po specimens of *rufobrachium*, with the same general dark tone and muddy-coloured under surface. Under-fur suffused with warm brown. Rufous coloration of forearms and hind limbs well marked. Tail quite as in *rufobrachium*.

Dimensions of the type, measured in the flesh:—

Head and body 210 mm.; tail 225; hind foot 48; ear 15.

Skull: greatest length 49; condylo-incisive length 44.3; zygomatic breadth 29; cheek-tooth series 8.8.

Hab. South-east Nigeria, in the country recently transferred from the Cameroons. Type from Kumbo, about 6° 50' N. and 10° 50' E. Another specimen from near Banyo.

Type. Old male. B.M. no. 23. 1. 22. 50. Original number 781. Collected 29 September, 1921. Two specimens.

Readily distinguished from any described race of the *rufobrachium* group by its markedly smaller size.

Heliosciurus rufobrachium lualabæ, subsp. n.

A small southern race of *rufobrachium*.

Size small, about as in *emissus*. Colour dark, finely speckled, therein contrasting with the coarsely speckled *emissus*. Under surface with the median area, from throat to inguinal region, white, the bases of the hairs on the belly brown as usual. Forearms with the usual ochraceous marking, their inner sides white; hands grizzled ochraceous. Hind limbs with but little ochraceous, their inner aspect whitish; feet like hands. Tail with the light rings whitish or buffy.

Hind foot of type 48 mm. Skull: greatest length 49.5; condylo-incisive length 43.

Hab. Southern Congo. Type from Lodja, Upper Lukenye River; other specimens from Inkongo, Sankuru (*H. Wilson*).

Type. Adult male. B.M. no. 9. 12. 12. 8. Collected and presented by E. Torday, Esq. Three specimens.

This is a similarly small race to the *H. r. emissus* of S.E. Nigeria just described, but whether it is specially closely related to it I am not at present prepared to say.

From *aubryi* and other described forms of *rufobrachium* it is readily distinguishable by its small size and the whitish median area of its under surface.

Heliosciurus rhodesiæ loandicus, subsp. n.

Like *rhodesiæ*, but duller and more drabby throughout; the ears not whitened.

General colour darker than in *rhodesiæ*, without the greyish-white tone of that animal. Ears coloured like the rest of the head, not specially whitened. Forearms fringed with very pale ochraceous. Hands and feet ochraceous, instead of buffy white. Tail less whitened.

Skull as in *rhodesiæ*.

Dimensions of the type, measured in flesh:—

Head and body 200 mm.; tail 245; hind foot 47; ear 13.

Skull: greatest length 47.5; condylo-incisive length 43.

Hab. North Angola. Type from N'Dalla Tando, 800 m. Other specimens from Canhoca (*Ansorge*) and the Quanza River (*Monteiro*).

Type. Adult female. B.M. no. 10. 4. 8. 14. Original number 42. Collected 31 October, 1908, by Dr. W. J. *Ansorge*. Five specimens.

Examples of this squirrel have been in the collection for many years under the erroneous names, first, of *annulatus* and then, when that name was suppressed, of *isabellinus*, but a renewed examination of the type of *isabellinus* shows that I was mistaken in referring it to this Angolan animal. For it agrees absolutely with a number of specimens belonging to the *rufobrachium* group from the Lower Niger, and to the Nigerian form the name should certainly belong.

Both *H. rhodesiæ* and the present subspecies of it would seem to be pale southern representatives of the *H. rufobrachium* group, though the characteristic reddening of the forearms is scarcely perceptible. From *rhodesiæ*, *loandicus* differs by its more drabby general colour and the absence of the white on the ears, so marked in the Rhodesian animal.

Heliosciurus punctatus savannius, subsp. n.

Closely allied to *punctatus*, but paler throughout.

Size as in *punctatus*. General colour above rather paler, owing to the light rings on the hairs being both broader and more whitish; the buffy rings on the under-fur clearer buffy. Under surface lighter; the throat, chest, and inguinal region whitish. Hands and feet paler, grey proximally and buffy terminally, instead of brown and dark buffy. Tail paler throughout, the white hair-tips more prominent.

Skull about as in *punctatus*.

Dimensions of type, measured in flesh:—

Head and body 178 mm.; tail 204; hind foot 42; ear 16.

Skull: greatest length 46·7; condylo-incisive length 41.

Hab. Béoumi, Ivory Coast Protectorate. Alt. 650'.

Type. Adult male. B.M. no. 23. 2. 3. 19. Original number 2043. Collected 22 December, 1922, by Willoughby P. Lowe. Three specimens.

This representative of *H. punctatus*, inhabiting the savannah region of the Northern Ivory Coast Protectorate, is perceptibly paler throughout than the saturate typical form of the coast.

Funisciurus leucostigma niveatus, subsp. n.

A greyish form with snowy-white belly.

General colour above pale olive-grey with much less suffusion of buffy than in other races. Lateral lines buffy or whitish. Flanks dull fulvous, less rufous than in *leucostigma*, and still less rufous than the brilliantly red flanks of *leonis*. Belly snowy-white, conspicuously whiter than in any of the allied forms. White postauricular patches well marked. Hands and feet rather paler buffy than usual. Middle of underside of tail pale ochraceous. Skull rather smaller than in *leucostigma* and *leonis*.

Dimensions of the type, measured in flesh:—

Head and body 198 mm.; tail 160; hind foot 44; ear 20.

Skull: greatest length 48; condylo-incisive length 43·5; zygomatic breadth 26·7.

Hab. Béoumi, 12 miles E. of Bandama, Ivory Coast Protectorate; about 250 miles north of the coast. Alt. 650'.

Type. Old male. B.M. no. 23. 2. 3. 21. Original number 2010. Collected 5 December, 1922, by Willoughby P. Lowe. Five specimens.

This striking form of the *leucostigma* group is readily distinguishable by its greyish back, almost without buffy suffusion, and, especially, by its snowy-white belly.

Funisciurus carruthersi chrysippus, subsp. n.

Like true *carruthersi*, but the under surface broadly washed with yellow.

General colour above of the same greenish olivaceous as in *carruthersi*; not so dark as in *tanganyikæ*. Under surface yellow, not sharply defined from the flanks, the hairs dark slaty, their tips rich yellow; inguinal region ochraceous. Sides of face more or less ochraceous, and hairs of ear of the same colour. Hands and feet grizzled ochraceous, about as in *tanganyikæ*. Tips of tail-hairs yellow.

Dimensions about as in *carruthersi*. Hind foot (dry) 48 mm.

Hab. Wabembe region, west of the north end of Lake Tanganyika.

Type. Adult male. B.M. no. 22. 3. 3. 3. Original number 23. Collected by R. Grauer. One specimen.

This beautiful squirrel is readily distinguishable from true *carruthersi* by its yellow-washed under surface.

It would seem to be the representative of that animal on the Belgian Congo side of Lake Tanganyika.

LIV.—*The West African Forms of Heliosciurus rufobrachium.*
By OLDFIELD THOMAS.

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IN connection with the determination of Mr. Willoughby Lowe's Ivory Coast squirrels, I have found occasion to lay out the whole of our West African specimens of the *rufobrachium* group. These are sufficient to give a fair idea of the forms found in West Africa west of the Cameroons, and appear to show that the recognizable forms are eight in number.

It is curious that on the Gold Coast, and north of it, two brightly coloured forms occur which shut off the dull-coloured Sierra Leone and Portuguese Guinea animals from the similarly dull-coloured forms found in Nigeria and eastwards.

Commencing in the furthest north-west, we have :—

1. *Heliosciurus rufobrachium caurinus*, subsp. n.

General colour of average intensity, near "raw umber," chest and belly washed with whitish; forearms and inner sides of thighs little reddened; hands and feet grizzled buffy and white, tail washed with whitish.

Length of type-skull 52 mm.

Hab. Portuguese Guinea; type from Gunnedj; alt. 50 m.

Type. Adult female. B.M. no. 10. 4. 9. 6. Original number 13. Collected 2nd June, 1909, by Dr. W. J. Ausorge. Four specimens.

2. *Heliosciurus rufobrachium leonensis*, subsp. n.

Like *caurinus*, but more strongly coloured throughout. Back darker, under surface more less or washed with

buffy; forearms and inner sides of thighs ochraceous; feet grizzled ochraceous and black; tail less conspicuously whitish. Skull averaging a little larger.

Length of type-skull 55 mm.

Hab. Sierra Leone and north-westwards. Type from Mano; other specimens from Mozamba and from Berria, extreme Upper Niger.

Type. Adult female. B.M. no. 4. 11. 1. 3. Collected 14th February, 1904, by Robin Kemp. Five specimens.

3. *Heliosciurus rufobrachium maculatus*, Temm.

Sciurus maculatus, Temm. Esq. Zool. Guin. p. 130 (1853) (Gold Coast; type in Leyden Mus.).

Macroxus rufobrachiatus, var. *waterhousii*, Gray, Ann. & Mag. N. H. (3) xx. p. 328 (1867) (type B.M. no. 57. 12. 10. 6, from Ashanti).

Sciurus (Heliosciurus) rufobrachiatus libericus, Miller, P. Ac. Sci. Wash. ii. p. 633 (1900) (Mount Coffee, Liberia; type U.S. Nat. Mus. no. 83834).

Sciurus aschantiensis, Neum. SB. Ges. Nat. Fr. 1902, p. 175 (Ashanti; type B.M. no. 84. 1. 7. 1).

General colour dark; under surface more or less brown-mixed. Forearms and inner sides of thighs deep rich ochraceous rufous, contrasting with the rest of the body.

Hab. Eastern Sierra Leone, through Liberia and the Gold Coast to Ashanti. Specimens examined from Daru, Sierra Leone; Bassa, Liberia; Axim, Gold Coast; and Ashanti.

4. *Heliosciurus rufobrachium hardyi*, Thos.

Supra, p. 519 (type B.M. 23. 2. 3. 13).

Allied to *maculatus* by the marked contrast of the reddish forearms and thighs with the rest of the body, but conspicuously paler throughout; the back pale grizzled grey, the belly whitish.

Hab. Ivory Coast Protectorate, type-series from Béoumi.

Passing to the forms occurring to the east of the brightly-marked *maculatus* and *hardyi*, it might be convenient to commence with the squirrels of Fernando Po, that being the place where the first members of the group were obtained. In that island a considerable number of specimens were obtained by Mr. Seimund on the Fernando Po Expedition of 1903-4, and a study of these shows that the island contains two forms, a highland and a lowland subspecies.

5. *Heliosciurus rufobrachium rufobrachium*, Waterh.

Sciurus rufobrachium, Waterh. Ann. & Mag. N. H. (1) x. p. 202, Nov. 1842 (Fernando Po).

Sciurus rufobrachiatus, id. P. Z. S. 1842, p. 128 (pub. Jan. 1843) (type of both names, B.M. no. 47. 1. 18. 68).

Colour grizzled brownish grey, of medium intensity. Under surface pale brownish, slightly washed with dull buffy whitish. Fringes of forearms and inner sides of thighs distinctly red, but not brilliantly contrasted as in the two last subspecies. Hands and feet grizzled ochraceous. Tail with the lighter rings on the hairs—at least for the basal half—more or less strongly ochraceous.

Hab. Uplands of Fernando Po, 500 to 1800 m.

Of the two forms that occur in the island, both the type, and the specimens obtained for the British Museum by Mr. T. Thomson, and mentioned in Gray's List of 1843, most nearly match the darker form, that found high up on the Clarence Mountains.

6. *Heliosciurus rufobrachium atticola*, subsp. n.

Like true *rufobrachium*, but paler throughout.

General colour above grizzled grey, with much less of the brownish tone found in *rufobrachium*. Under surface pale brownish, the chest and inguinal regions whitish. Fringes of forearms strong buffy. Hands grizzled buffy. Tail without buffy suffusion on its basal half.

Dimensions of type, measured in flesh:—

Head and body 206 mm.; tail 186; hind foot 46; ear 17; greatest length of shell 50.

Hab. Fernando Po, down near sea-level. Type from Santa Isabel, 10 m.; other specimens from Fish Town, 10 m.

Type. Adult female. B.M. no. 4. 7. 1. 75. Original number 7.

Collected 23rd December, 1903, by Mr. E. Seimund during the Fernando Po Expedition. Twelve specimens.

This comparatively pale form was found by Mr. Seimund close down to the beach. It has the appearance of being an inhabitant of an area less saturated than the high ground where true *rufobrachium* occurs.

7. *Heliosciurus rufobrachium isabellinus*, Gray.

Macroxus isabellinus, Gray, Ann. & Mag. N. H. (3) xx. p. 329 (1867).

Very like the low country Fernando Po form, but the

reddish of the forearms is almost imperceptible, that of the thighs is as a rule much reduced, the light chest and inguinal hairs have more prominently dark bases, and the tail is more heavily black-ringed.

Hab. Lower Niger. Specimens seen from Lagos (*Lowe*), Forçados, Degama and Outa (*Ansorge*), and "Bird Rock," 200 miles up the Niger (*Lort Phillips*).

Type. Adult female. B.M. no. 44. 3. 30. 3. Purchased of the dealer Warwick.

This race is very like *H. r. acticola*, no doubt on account of living under similar climatic conditions; but differs enough to have the island form subspecifically separated from it. The type was erroneously identified by me in 1909 with an Angolan member of the group, but there can be no question that the present is its proper allocation.

8. *Heliosciurus rufobrachium obfuscatus*, subsp. n.

General colour very dark, conspicuously darker than the Nigerian *isabellinus*; approximating to "mummy-brown" above; under surface muddy-brown, the chest and inguinal region little lightened. Fringes of forearms and inner sides of legs deep rich rufous. Hands and feet dark mixed brown and dull ochraceous. Tail mixed black and ochraceous, the former more dominant than usual.

Length of type-skull 53 mm.

Hab. Oban district of South-eastern Nigeria; type from Ekkonnanakku. Alt. 200'. One specimen from Rio del Rey (*Sir H. H. Johnston*).

Type. Adult female. B.M. no. 9. 5. 8. 2. Original number 4. Collected 21st March, 1909, and presented by P. A. Talbot, Esq. Thirteen specimens, all obtained by Mr. Talbot, except that from the Rio del Rey.

A very distinct saturated form, markedly different from the comparatively pale Nigerian *isabellinus*, and much larger than the small *emissus* to the east of it.

Of the subspecies of this group found further eastwards and southwards, I am not yet in a position to work out the detailed ranges of *emissus*, *Thos.*, *benga*, *Cabr.*, and *aubryi*, M.-Edw., which occur in that order from north to south through the Cameroons to the Gaboon.

LV.—New Subspecies of *Protoxerus stangeri*, the Giant Squirrel of Equatorial Africa. By OLDFIELD THOMAS.

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THE Museum series of *Protoxerus stangeri* now numbers 92 specimens, ranging from the Gold Coast to Kavirondo, and from Nigeria southwards to N. Angola. They are fairly equally divided among the 14 subspecies which appear to be worthy of subspecific recognition. Of these four new ones need description.

The differences are merely of colour, as I can find no cranial characters of any value.

Protoxerus stangeri dissonus, subsp. n.

Nearly allied to *P. s. eborivorus*, but paler throughout.

Back with the light rings more buffy than in *eborivorus*, less ochraceous, the resulting colour being an approach to that of *nordhoffi*, which is still more yellowish. Shoulders distinctly lighter than back. Under surface more whitish. Crown dark hoary-grey, not abruptly separated. Lateral line grizzled grey. Buffy fringes of forearms well marked, lighter than in *eborivorus*. Hind limbs and feet buffy ochraceous. Tail with the white tips of the hairs more strongly contrasted.

Hind foot of type 65 mm.; greatest skull-length 67.

Hab. Ja River, Cameroons. Type from Bitye, 2000'.

Type. Adult female. B.M. no. 9.10.2.20. Original number 17. Collected 3rd September, 1908, by Mr. G. L. Bates. Six specimens.

This is one of the few cases where an animal of the Ja River, draining eastwards, is definably different from its ally of the Como and Benito rivers, draining direct to the coast; but the difference in general tone from Mr. Bates's examples of *eborivorus* is quite well-marked.

Protoxerus stangeri morens, subsp. n.

A dark-coloured race from the Welle, very like *P. s. eborivorus* of the West Coast.

General appearance very much as in *eborivorus*, consequently much darker than in the geographical neighbour, *notabilis*. The back blackish, finely ticked with ochraceous.

Chest dark grizzled grey, belly more brownish, the hairs tipped with buffy. Ears without buffy postauricular patches. Forearms with scarcely any buffy on their under surface, while they are always distinctly buffy in *eborivorus*; hands practically black. Legs deep rufous, stronger than in *eborivorus*; feet mixed black and rufous.

Hind foot of type 61 mm.; greatest length of skull 66.

Hab. Middle Welle River. Type from Lobi, near Angu, about 24° E.

Type. Adult male. B.M. no. 7. 7. 8. 182. Original number 57. Collected 17th February, 1906, by Boyd Alexander on the Alexander-Gosling Expedition. One specimen.

Considering its distance from the West Coast, and the fact that much lighter-coloured forms (*nordhoffi*, *dissonus*) occur in the intermediate area, this subspecies is curiously like the Gaboon *eborivorus*, but may be distinguished by the reduction of the rufous on the forearms and the darker red hind legs. It is probably really a darkened ally of the Congo *notabilis*.

Protoxerus stangeri notabilis, subsp. n.

Like *centricola*, but colour richer and brighter.

General characters of the *centricola* of Uganda, but the back more strongly ochraceous, this colour also extending more vividly on to the nape and scarcely lightening on the shoulders. Posteriorly the dorsal colour extends richly on to the hips and legs—rich ochraceous rufous instead of brownish rufous. Chest whitish; belly buffy. Lateral line more strongly white-grizzled than in *centricola*. Hands blackish with many of the finer hairs ochraceous; feet rich ochraceous. Tail-hairs more prominently white-tipped.

Hind foot of type 63 mm.; condylo-incisive length of skull 60.

Hab. Ituri region of Upper Congo; type from Avakubi; others from Poko and Mawambi.

Type. Adult male. B.M. no. 14. 2. 11. 7. Original number 199. Collected 1st November, 1912, by Dr. Cuthbert Christy. Six specimens.

This fine animal has hitherto been referred to *centricola*, but a comparison of the series of specimens now available both from the Ituri region and Uganda shows that those of the former are so much more richly coloured as to deserve subspecific distinction.

Protoxerus stangeri torrentium, subsp. n.

A yellowish grey-headed form with a *signatus*-like lateral line.

General upper colour buffy yellowish, grizzled with black, not rufous as in *eborivorus* and *centricola*, but nearly as yellow as in *stangeri*. Top of head strongly-contrasted hoary-grey. Throat greyish white with brown bases to the hairs. Belly-hairs ochraceous buffy, the line edging the belly black as in *signatus*, a few hairs only with white rings. A buffy patch behind each ear. Forearms ochraceous buffy, and the hands also more ochraceous than in the neighbouring forms. Inguinal region and inner side of legs also ochraceous buffy, which becomes more strongly reddish on the ankles and distal part of the feet.

Hind foot of type 60 mm.; condylo-incisive length of skull 58.

Hab. Eastern province of the Congo, to the east of the Stanley Falls.

Type. Adult female. B.M. no. 1. 5. 4. 3. Original number 364. Presented by the Congo Museum, Tervueren. One specimen.

The combination of yellowish ground-colour, contrasted grey head, buffy postauricular patches, and black *signatus*-like lateral line will readily distinguish this well-marked subspecies.

The Museum now possesses four further examples of *P. s. signatus*, collected by the Rev. H. M. Whiteside at Ikau and Bompona.

LVI.—*A new Ray from the Mediterranean.*

By C. TATE REGAN, M.A., F.R.S.

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Raia polystigma, sp. n.

Raia batis (non L.), Bonap. Faun. Ital. Pesci, Fasc. xxix. p. 154, pl. lxxvii. fig. 1.

Disc broader than long, its width $\frac{3}{5}$ to $\frac{2}{3}$ of the total length; anterior margins slightly undulated; outer angles obtuse;

extremity of snout projecting as a short rounded or somewhat pointed process. Vent nearer tip of snout than end of tail. Length of snout about $1\frac{1}{2}$ width of disc; interorbital width $2\frac{2}{3}$ to 3 in length of snout, less than length of eye + spiracle, equal to or greater than longitudinal diameter of eye. Teeth small, close-set, with acutely conical crowns, which may be so worn down that the teeth appear quite flat; 50 to 60 rows in the upper jaw.

One to three præocular and one to three postocular spines; a pair of small scapular spines in the very young; 2 or 3 median spines in advance of these; a median series of more than 40 spines extending forward nearly to the scapular region in the smallest specimen; others with 22 to 28 median spines from the pelvic region to the first dorsal fin; and also with 1 to 4 spines on each side of the anterior part of the tail. Orbital and rostral ridges and rostral projection spinulose; a median patch of spinules in the scapular region; tail spinulose; upper surface otherwise smooth, except for spinules near the anterior margin of the disc in males. Lower surface smooth, except for a narrow border of asperities along the anterior margin, extending about halfway from tip of snout to angles of pectorals. (? Adult male with a single series of alar spines.)

Pale brownish, with numerous rounded dark reddish-brown spots covering the disc; near the middle of the base of each pectoral fin a dark ring with pale centre is surrounded by a pale ring with a circle of spots round it; behind this is a pale area encircled by spots; these characteristic markings are most definite in the smallest specimen. Lower surface white.

Mediterranean.

Four specimens (two ♂ and two ♀), three from Dalmatia and one from Nice, the largest 500 mm. in total length.

A male of 470 mm. is not quite mature, but Bonaparte's figure of a male 500 mm. long shows the sexual characters fully developed.

When specimens of equal size are compared, *R. polystigma* differs from the Atlantic *R. brachyura*, Lafont. (*R. blanda*, Holt & Calderwood), in the larger eyes, the narrower interorbital region, and the fewer teeth; also *R. brachyura* is more spinulose, has a somewhat different coloration, and becomes mature at a larger size.

LVII.—On new Curculionidæ from South Africa.

By GUY A. K. MARSHALL, C.M.G., D.Sc.

[Plate V.]

Subfamily BRACHYDERINÆ.

Pomphus acuticollis, sp. n. (Pl. V. fig. 1.)

♂ ♀. Integument black or piccous, clothed above and below with dense, uniform, pale grey scaling.

Head rather strongly convex transversely, with a deep median furrow; the scaling dense and the setæ short, scale-like, and recumbent; the eyes produced sharply backwards, as in *Protostrophus*, with the greatest depth in the middle. *Rostrum* much narrowed in front, with the sides straight; the dorsum with two sulci diverging from the middle of the base, but not reaching the sides or apex, and with a median impression just behind the epistome, but without any median carina. *Antennæ* with joints 3–6 of the funicle equal and slightly transverse, and 7 distinctly broader. *Prothorax* about three times as broad as long, distinctly broader than the base of the elytra and widening from the apex to the base; the sides approximately straight and indefinitely denticulate, the anterior angles (as seen directly from above) acuminate and projecting obliquely outwards well beyond the eyes, the hind angles produced obliquely backwards in the form of a long spine; the front margin straight, except for a lateral sinuation for the reception of each eye; the hind margin broadly arcuate in the middle and gently sinuate externally on each side; the dorsum very strongly convex transversely and feebly so longitudinally, with an abbreviated median furrow and coarse confluent punctation, which is partly concealed by the dense scaling, the scales being arranged in rosettes. *Elytra* oblong-ovate, widest behind the middle, very broadly rounded behind (as seen from above), the actual apex being slightly drawn in, constricted at the base, so that the basal angles project shortly, and with a small sharp subhumeral tubercle on interval 9; the rows of punctures very irregular and often duplicated, scarcely diminishing behind, and the basal puncture larger than any of the others, each of which contains a minute seta; the intervals even, sufficiently indicated by the rows of recumbent scale-like setæ; the scales round, convex, very closely set, but scarcely overlapping.

Length 3.6–4.5 mm., *breadth* 1.8–2.4 mm.

PORTUGUESE E. AFRICA: Incanine, vi. 1908 (*C. W. Howard*); Inyaka, Delagoa Bay, x. 1912 (*K. H. Barnard*).

Described from four specimens.

Readily distinguished from the two previously described species (*Ann. & Mag. N. H.* (9) i. 1919, p. 8) by the sharply produced eyes, the acute thoracic angles, and the recumbent scale-like setæ.

Proscaphaladeres dispar, sp. n.

♂ ♀. Integument black, rather thinly clothed with grey scales more or less intermixed with brown ones, or *vice versa*.

Head rugosely punctate, with a very deep median furrow and faint longitudinal impression on each side; the eyes very prominent, deepest much behind the middle, the posterior edge of the ocular prominence lying at right angles to the long axis of the head. *Rostrum* as long as broad, distinctly narrowed from base to apex; the dorsum flat, rugosely punctate, with an oblique sulcus running from the middle of the base to the middle of the disk on each side, and a rounded median impression just behind the epistome. *Prothorax* much broader than long, strongly rounded at the sides, widest at the middle, truncate and distinctly marginate at the base, the apex shallowly sinuate; the dorsum very convex longitudinally, with separated low shiny granules and with a very indefinite abbreviated low median ridge; the scales short and oblong, lying transversely. *Elytra* subglobose or very broadly ovate, widest before the middle, broadly rounded behind, with the actual apex invisible from above, the basal margin truncate; the dorsum with shallow striæ containing large punctures, which are partly hidden by the scaling, the intervals slightly convex, even and without rows of setæ; the scales small, ovate, much shorter than those on the prothorax, and not entirely concealing the integument. *Legs* somewhat scabrous, with fairly dense pale scaling, the tibiæ markedly denticulate internally, with the apical fringe of setæ pale, the hind pair with the dorsal edge sinuate and with the obliquely ascending portion of the corbel not longer than the truncate apical part.

Length 6.6–9.6 mm., *breadth* 3–5 mm.

PORTUGUESE E. AFRICA: Delagoa Bay.

Described from thirty-eight specimens.

This species, for which a MS. name of Faust's has been retained, is nearly allied to *P. punctifrons*, Boh. (= *obesus*, Boh.), but in that species the rostrum is almost parallel-

sided; the eyes are much less prominent, deepest in the middle, and with the posterior edge not produced outwards; the prothorax is even more strongly rounded at the sides, broadest well before the middle, coarsely punctate and with only inconspicuous granules; the elytra are less distinctly granulate and the scales are much longer, being at least three or four times as long as broad; the hind tibiæ are not sinuate dorsally, and the ascending portion of the corbel is distinctly longer than the apical part.

Protostrophus indotatus, sp. n.

♂ ♀. Integument black, rather thinly clothed with scaling; the elytra dorsally with grey or brownish scales (often with a metallic reflection), usually uniform, but sometimes mottled with faint darker spots, but the inflexed margins beyond stria 7 entirely bare and shiny; the pronotum darker, with extremely indefinite pale dorsal stripes; the lower surface thinly clothed with narrow pale scales and setæ, except for a dense patch of small pale scales on the metepisternum.

Head coarsely and shallowly punctate, with a broad deep median sulcus, and separated from the rostrum by a gently curved, short, deep furrow; the scaling sparse, the setæ flattened and obliquely raised; the eyes rather strongly produced backwards, deepest a little behind the middle, and the orbit not projecting on the posterior edge. *Rostrum* (excluding the mandibles) a little shorter than the basal width and with the sides gently sinuate; the dorsum quite flat, punctate like the head and without any definite carina. *Antennæ* ferruginous, the distal half of the funicle sometimes darker; the funicle with joint 1 nearly twice as long as 2, joints 3-6 moniliform and slightly transverse, 7 a little longer and broader. *Prothorax* broader than long (3:2), equally broad at base and apex, strongly rounded at the sides, widest at or a little before the middle; the apical margin truncate or feebly sinuate in the middle and sloping gently backward on each side, the base similarly truncate or sinuate in the middle but curving more strongly forward on each side, the basal angle being distinct; the dorsum with large shallow confluent punctures, readily visible through the scaling, and a well-defined, shallowly and finely punctate, smooth median line, extending from the base nearly to the apex; the setæ pale brownish, flattened, sub-recumbent, and with the apex truncate. *Elytra* broadly ovate, widest a little before the middle, truncate at the base,

with the shoulders obtusely rounded and very prominent, and there much broader than the base of the prothorax; the dorsum with shallow, distinctly punctate striæ, the punctures becoming much finer towards the top of the declivity; the intervals broad and almost plane; the scales very short-ovate or almost circular, small and not quite contiguous, like those on the thorax but a little smaller; the setæ more than twice as long as the scales, flattened, and not entirely recumbent, there being two irregular rows on each dorsal interval. *Legs* black, with the tarsi red-brown, moderately densely clothed with narrow elongate pale scales and scale-like setæ; the front tibiæ with very short apical spines and none on the outer edge, the hind pair with the corbels bare.

Length 3.75-4.8 mm., *breadth* 1.8-2.25 mm.

TRANSVAAL: Pretoria, xii. 1921 (*J. C. Faure*, type).
NATAL: Charlestown, iv. 1897 (*A. E. Haviland*).

Described from thirteen specimens.

Most nearly allied to *P. (Strophosomus) ambiguus*, Fhs., which, however, has the prothorax more transverse, less narrowed behind, and much more finely punctate; the elytra are more oblong-ovate, the scales on them are elongate and the setæ are so like them as to be practically indistinguishable.

Protostrophus purcelli, sp. n. (Pl. V. fig. 2.)

Integument black, densely clothed above with pale isabel-line scaling mingled with pale grey scales; the pronotum with a broad median brown band and a narrower one on each side of it in the basal half only; the elytra with very variable rows of brown spots along the striæ, these being usually most conspicuous in striæ 4-6 and sometimes invading most of the dorsum; the lower surface with dense pale grey scaling.

Head separated from the rostrum by a deep curved furrow in the middle only, gently convex and with a deep longitudinal median furrow; the setæ brown, spatulate and subrecumbent; eyes acutely produced backwards, with their greatest depth slightly behind the middle. *Rostrum* much shorter than its basal width, rapidly narrowing in front, with its sides gently sinuate; the dorsum almost flat, with a very shallow median rounded impression in the anterior half and a faint longitudinal one on each side, without any furrow or carina; the scaling entirely concealing the integument. *Antennæ* with joint 1 of the funicle

much longer and thicker than 2, and joints 3-7 transverse. *Prothorax* about half as broad again as long, gradually widening from the apex to behind the middle, where there is a sharp prominent angle, and then rapidly narrowed to the base, which is truncate; the front margin very shallowly sinuate in the middle and more deeply so behind each eye, the anterior angles being obliquely rounded off; the dorsum strongly convex transversely and almost flat longitudinally, with a shallow transverse impression right across the base and often a much fainter one near the apex, also a feeble median longitudinal furrow, sometimes just visible through the scaling, which otherwise conceals all the sculpture. *Elytra* oval, widest about middle, broadly rounded behind, jointly truncate at the base, but with the basal angles projecting obliquely forwards; when the scaling is intact the striæ are almost concealed, the punctures appearing very minute and separated from each other by the length of two or three scales; the intervals broad and smooth, and each with a row of short, stout, recumbent, brown setæ; the scales irregularly tetragonal, closely contiguous, and of the same size as those on the pronotum. *Legs* with five or six stout brown apical spines on the front tibiæ and two juxtaposed a little way up the dorsal edge; the hind pair with the corbels densely squamose.

Length 3·3-3·6 mm., *breadth* 1·8-1·9 mm.

CAPE PROVINCE: Hope Town (*W. F. Purcell*).

Described from six specimens.

Distinguished from the other species of the genus having a similarly angulate prothorax by the squamose corbels of the hind tibiæ.

Protostrophus sebakuanus, sp. n.

♂ ♀. Integument black, the pronotum with the front margin red-brown, densely clothed with uniform grey scaling, but the scales towards the apex of the rostrum with a pale green or coppery reflection.

Head separated from the rostrum by a deep furrow, which is curved strongly forwards in the middle and extends to the sides; the forehead flattened, with a broad and very deep median furrow, and set with suberect flattened setæ; the eyes strongly produced backwards and with the greatest depth behind the middle. *Rostrum* somewhat shorter than its basal width, much narrowed in front, with the sides gently sinuate; the dorsum quite flat, without impressions, and with only a fine median carina; clothed like the head,

except that in the apical half the scales become much smaller and are widely separated. *Antennæ* red-brown, the funicle with joint 1 longer than 2, 4-7 as long as broad, 3 a little longer. *Prothorax* transverse (3 : 5), moderately rounded at the sides, broadest about the middle, sharply constricted at the base, and just in front of the constriction on each side a very small, sharp, obliquely-projecting point; the apical and basal margins truncate and of about the same width, the latter slightly raised; the dorsum very convex transversely, flat longitudinally, but sloping slightly downwards in front, with a very narrow, faint, undulating, abbreviated median carina; the scales circular, contiguous but not overlapping, almost entirely concealing the even integument; the broad flattened setæ subrecumbent. *Elytra* regularly oval, broadest about the middle, laterally constricted at the base; the basal margin jointly and shallowly sinuate, the external angle produced obliquely outwards into a small blunt projection; the dorsal outline only gently convex, deepest about the middle; the striæ feeble, the punctures (when the scaling is intact) appearing very small and widely separated, each containing a minute horizontal seta; the intervals broad, flat, and smooth, each with a row of flattened subrecumbent setæ, sometimes duplicated; the scales like those on the pronotum, but more closely set and slightly overlapping. *Legs* densely squamose, the tarsi red-brown; the front tibiæ with very small inconspicuous apical spines, the hind pair with the corbels bare.

Length 3.5-3.9 mm., breadth 1.8-2 mm.

SOUTHERN RHODESIA: Sebakwe (*D. Dodds*).

Described from five specimens.

Superficially much resembling *P. convexicollis*, Fhs., but in that species the rostrum is not carinate, the pronotum has a median stria, the pronotum and elytra lack the basal projections, and the elytra are much more broadly rounded behind.

Protostrophus cavirostris, sp. n. (Pl. V. fig. 3.)

♂ ♀. Integument black, with dense sandy or sandy-grey scaling, which sometimes has a slight metallic reflection, especially at the apex of the rostrum.

Head separated from the rostrum by a deep curved furrow which is almost entirely hidden by the scaling; the forehead gently convex transversely, very finely wrinkled longitudinally, but the sculpture entirely hidden by the

scaling, except the narrow median sulcus; the setæ scale-like and slightly raised; the eyes strongly produced backwards and with the greatest depth slightly behind the middle. *Rostrum* nearly as long as the basal width, much narrowed in front, the apex being half the width of the base, and the sides gently sinuate; the dorsum transversely convex and rather uneven, with a large rounded fovea in the middle anteriorly and a scale-covered median carina in the basal half; the scaling slightly less dense at the apex. *Antennæ* red-brown, the funicle with joint 1 much longer than 2, and 3-7 slightly transverse. *Prothorax* broader than long, regularly rounded at the sides, widest at the middle, and constricted at the apex behind the eyes; the basal margin subtruncate and scarcely raised, the apex slightly narrower and gently rounded; the dorsum strongly convex transversely and almost flat longitudinally, smooth, the sculpture quite hidden by the scaling, even the abbreviated median furrow being sometimes almost obliterated. *Elytra* oval, obtusely acuminate behind, widest about the middle, and jointly sinuate at the base, with the outer angles projecting slightly forwards; the striæ feeble, the punctures very small (when the scaling is intact), separated from each other by 1-2 scale-lengths and each containing a minute seta; the intervals feebly convex, each with a row (duplicated here and there) of short subrecumbent spatulate setæ; the scales a little smaller than those on the pronotum, tetragonal or pentagonal, closely set, but not overlapping. *Legs* red-brown, densely squamose; the front tibiæ with the apical row of spines small and inconspicuous, the hind pair with the corbels bare.

Length 3-3.9 mm., breadth 1.5-2 mm.

CAPE PROVINCE: Kimberley (*Power*).

Described from four specimens.

Allied to the preceding species (*P. sebakuanus*), but characterised by the elongate and foveate rostrum, the medianly sulcate and laterally simple prothorax, and the less projecting basal angles of the elytra.

Protostrophus perditor, sp. n.

♂ ♀. Integument black, densely clothed above with sandy-grey scales; the prothorax slightly darker than the elytra, with two very indefinite paler discal stripes; the lower surface earth-brown. Sometimes interval 2 on the elytra is brown, and occasionally the whole upper surface is brownish, with a grey stripe on intervals 7 and 8.

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Head twice as broad as long, with a narrow median furrow and set with suberect spatulate setæ; the eyes not very convex, deepest at the middle, strongly produced backwards, the orbits not projecting on the hind margin; the anterior limiting furrow short, shallow, and gently curved. *Rostrum* (excluding mandibles) a little shorter than its basal width, the sides straight; the dorsum flat, with a very shallow median impression on the anterior half and without any carina; the genæ not impressed. *Antennæ* piceous, with the scape squamose; the funicle with joint 1 half as long again as 2, the remainder moniliform and slightly transverse. *Prothorax* twice as broad as long, widest at the middle, the sides moderately rounded, not constricted at the base; the front margin shallowly sinuate on each side for the reception of the eyes, the base gently arcuate, not marginate, and hardly broader than the apex; the dorsum strongly convex transversely, but plane longitudinally, quite even and without any median sulcus or carina; the spatulate setæ subrecumbent and forming a sparse fringe along the basal and lateral margins. *Elytra* broadly ovate, widest at the middle, jointly truncate at the base and there but little wider than the prothorax at its widest, and very broadly rounded behind; the striæ scarcely perceptible, and the feeble punctures in them entirely hidden by the scaling; the intervals broad and each with a row of long, flattened, subrecumbent setæ; the scales small, varying in shape, fitting very closely together, and of about the same size as those on the prothorax. *Legs*: front tibiæ with an apical row of five stout spines (often broken off) and two closely juxtaposed spines at a little distance up the outer edge; the corbels of the hind pair narrowly enclosed and densely squamose. *Sternum* with the front coxæ in the middle of the prosternum; the mesepisterna narrowly separated from the elytra.

Length 2.5–3.6 mm., breadth 1.3–1.9 mm.

TRANSVAAL: Kinross, xi. 1920.

Described from ten specimens, forwarded by the Division of Entomology, Pretoria, with the information that the adults were injuring the foliage of maize and potatoes.

Nearly allied to *P. noxius*, Mshl. (Bull. Ent. Res. x. 1920 pl. xix. fig. 1), but that species differs, *inter alia*, in having the basal margin of the elytra a little narrower than the prothorax, deeply sinuate, and with the outer angles slightly projecting; the striæ are more distinct, and the punctures are visible through the scaling.

Subfamily OTIORRHYNCHINÆ.

Genus CHALEPODERUS, NOV.

Head globose; the eyes prominent, their upper surface on a level with the forehead. *Rostrum* stout, dilated at the apex, the dorsal area much higher at the base than the forehead; the scrobes apical, deep, curved, and convergent behind, so that the dorsal area is constricted in the middle; the epistome bounded by a high sharp curved carina, and rather deeply emarginate on the anterior edge; the mandibles trisetose, with an obtuse median tooth and a sharp longitudinal carina; the mentum cordiform, resting on a very small peduncle, and with only two setæ, near the front margin; the lower surface of the rostrum only as long as the buccal cavity behind the closed mandibles. *Antennæ* with the scape exceeding the front margin of the prothorax; the funicle squamose; the club ovate, acuminate. *Prothorax* with the front margin truncate laterally; the front coxæ in the middle of the prosternum. *Elytra* 10-striate, without true shoulders. *Sternum* with a tubercle behind the front coxæ; the mesepisternum reaching the elytra, the epimeron much reduced; the metasternum much shorter than the mid-coxæ; the episternal suture obliterated in the apical half; the hind coxæ reaching the elytra. *Legs* without a trochanteral bristle; the femora unarmed; the tibiæ straight, minutely denticulate internally, shortly mucronate, the hind pair dilated at the apex, the corbels broadly enclosed and bare; the tarsi spongy beneath, the claws free and with a basal seta. *Venter* with the intercoxal process broadly truncate, but narrower than a hind coxa; ventrite 1 (3) with the apical margin truncate, 2 (4) a little longer than either of the next two, 5 (7) forming an equilateral triangle with the apex rounded in ♀, much shorter and more broadly rounded in ♂.

Genotype, *Chalepoderus hiaticollis*, sp. n.

Allied to *Pycoderes*, Schh., but in that genus the base of the rostrum is not higher than the forehead; the inner edges of the scrobes are straight, so that the interscrobial area is parallel-sided; the lower surface of the rostrum is much longer than the buccal aperture behind the closed mandibles, which have a sharp tooth and no longitudinal carina; the centrosternal piece is not tuberculate behind the front coxæ, and there is a distinct trochanteral bristle; the intercoxal process of the venter is rounded at the base; and the bare portion of the corbels of the hind tibiæ is narrowly transverse instead of broadly rhomboidal.

Chalepoderus hiaticollis, sp. n. (Pl. V. figs. 9, 9 a.)

♂ ♀. Integument black or piceous, covered with dense uniform earth-brown scaling.

Head with the forehead broad, quite flat, and rather strongly wrinkled longitudinally, but the sculpture almost entirely concealed by the scaling; the eyes longitudinal, rather strongly convex. *Rostrum* about as long as broad, slightly narrowed from the base to the middle, then dilated to near the apex; the elevated dorsal area narrowest just behind the scrobes and much dilated behind, with a broad shallow depression in the middle, rather steeply declivous at the base, and with the basal angles broadly rounded; the interantennal area impressed, shining, strongly punctate, and with isolated scales in the punctures, with a low median carina in front, turning into a short deep stria behind. *Antennæ* with the scape gently curved, gradually clavate, densely squamose, and with stout subrecumbent setæ; the funicle with joint 2 a little longer and not more slender than 1, 3 shorter than 1, 4-7 still shorter, subequal, and longer than broad. *Prothorax* about twice as broad as long, the basal margin truncate and fitting under the base of the elytra; the dorsum closely set (except along the apical area) with squamose conical tubercles, which are highest, and form a steep wall, along each side of the broad median sulcus, there being also an oblique non-tuberculate impression on each side in the basal half; each tubercle with a stout compressed seta at its apex. *Elytra* broadly ovate, widest somewhat before the middle, jointly but shallowly sinuate at the base, and obtusely acuminate at the apex; the longitudinal outline rising very steeply for a short distance from the base, then moderately convex, the posterior declivity steep and the actual apex somewhat retracted; the dorsum deeply striate, the striæ becoming shallower behind and containing spaced punctures that are completely hidden by the scaling; the intervals broad and convex, each bearing a row of obliquely raised, flattened setæ; the scales smaller than those on the pronotum, not overlapping, round, convex, and finely ribbed. *Legs* densely squamose and with numerous subrecumbent setæ.

Length 6.5-7.75 mm., breadth 3.5-4 mm.

CAPE PROVINCE: East London, 1915 (*Lightfoot*).

Described from four specimens.

Porpacus vesiculatus, sp. n. (Pl. V. figs. 4, 4 a.)

♂ ♀. Integument piceous, densely clothed with earth-brown scaling.

Head flattened above and densely covered with upright cup-shaped scales, the whole appearing like a honeycomb, with two inflated vesicular setæ near the vertex, appearing like puff-balls and covered with minute granules; a high elevation above each eye, clothed like the head and crowned with three or four vesicular setæ; the sides of the head almost parallel, and both just visible outside the eyes at the same time when viewed directly from above; the lower surface with deep longitudinal striæ on each side. *Rostrum* as broad as the head, subquadrate, with dense honeycomb scaling; the elevated dorsal area widest at the base and rapidly narrowing as far as the antennæ, then widening again for a short distance, with a very deep median furrow and a row of three vesicular setæ on each side of the base. *Antennæ* very stout, the broad scape strongly curved and with dense honeycomb scaling and numerous erect vesicular setæ; the funicle scarcely narrowing towards the apex, with honeycomb scaling and stout erect setæ, which become progressively finer in the apical half, joint 2 as long as 1, the remainder subequal and strongly transverse. *Prothorax* twice as broad as long, gradually narrowed in front, subtruncate at the apex and feebly bisinuate at the base; the whole surface clothed with honeycomb scaling, with two admedian ridges, each bearing about nine vesicular setæ, on each side a lower sublateral ridge (bearing three or four setæ) running from the base to two-thirds the length, and beyond these another still lower complete lateral ridge. *Elytra* suboblong, broadly rounded behind, with the sides sloping obliquely to the angulate shoulder and thence parallel to beyond the middle; the striæ shallow, containing rows of large deep punctures which are lined with scaling; the intervals slightly convex, 1, 3, 5, 7 being a trifle higher than the others and each bearing a row of erect inflated granulated setæ which are deeply concave on the posterior face; at the base of intervals 3 and 5 and on the shoulder a clump of 2-4 setæ, and a similar clump on a small tubercle towards the base of interval 9, but lying behind the shoulder; a low tubercle bearing a tuft of setæ at the top of the declivity on intervals 3 and 5; the scales small, flat, overlapping, and somewhat indistinct. *Legs* with dense honeycomb scaling and erect inflated setæ; the front tibiæ with a row of five separated black spines along the apical margin.

Length 4.5-6 mm., *breadth* 2.1-3 mm.

CAPE PROVINCE: Willowmore (*Dr. H. Brauns*, type); Algoa Bay (*Brauns*); Knysna (*Jarvis*).

Described from seven specimens.

A much narrower insect than *P. horridus*, Boh., which

differs in the two horn-like prominences at the base of the rostrum and the lateral tubercles on the prothorax; joint 2 of the funicle is much longer than 1, and the remaining joints longer than broad; the head is strongly narrowed in front and longitudinally striate above, the scaling being flat and not honeycombed, etc.

Trachyphlæus hardenbergi, sp. n. (Pl. V. fig. 8.)

♂ ♀. Integument black, densely clothed above and below with small brown scales intermingled with an earthy indumentum.

Head appearing almost flat on the forehead and with a low elevation over each eye; but when scraped it is concave, longitudinally striate, with a median sulcus and a high crest above each eye, and it is separated from the rostrum by a sharply angulated furrow that is normally concealed. *Rostrum* as broad as the head, nearly as long as broad, with the sides quite straight and parallel; the dorsal area broad and parallel-sided, slightly overhanging the scrobes at the sides, and normally almost flat, but when scraped appearing deeply excavated longitudinally, with a slight median carina in the basal half; the scrobes continued broadly and deeply right up to the eyes; the mentum with only two discal setæ. *Antennæ* with the scape broad, slightly curved, gradually widened towards the apex, squamose, and with short, recumbent, scale-like setæ; the funicle with joint 1 as long as 2 + 3, joints 3-7 equal and strongly transverse; the club not broader than the funicle. *Prothorax* half as broad again as long, strongly rounded at the sides, widest at the middle, and constricted at the apex, the constriction continued across the dorsum as a shallow impression; the apex truncate, the base arcuate; the dorsum very convex transversely and somewhat uneven, and when scraped very rugosely sculptured, the indumentum being very thick; the setæ short, scale-like, carinae, and sub-recumbent. *Elytra* subquadrate, deeply sinuate at the base, sinuately dilated from the base to the prominent subhumeral angulation, thence almost parallel-sided to far beyond the middle, and broadly subtruncate at the apex, as seen directly from above, the posterior declivity being almost perpendicular; the dorsum with intervals 3, 5, 7 slightly more raised than the others, and 2 and 4 each bearing a low rounded prominence at the summit of the declivity; when scraped the shallow striæ are seen to contain large quadrate punctures; the setæ like those on the pronotum and more numerous on the elevated intervals. *Legs*: the tibiæ with an apical fringe of five or six very short, closely set spines,

and none on the outer edge of the front pair, the hind corbels narrowly enclosed, and only the front tibiæ mucronate; the tarsal claws unusually small.

Length 2.7-3.3 mm., *breadth* 1.5-2 mm.

PORTUGUESE E. AFRICA: Umbelusi, iii. 1921 (*C. B. Hardenberg*).

Described from sixteen specimens.

Distinguished from all the known South African species by the uneven elytral intervals.

Subfamily TANYRRHYNCHINÆ.

Malosomus pumilus, sp. n.

♂ ♀. Integument black, rather shiny, clothed above and below (except on the lower surface of the head and rostrum) with fairly dense, greyish-white scales.

Head subcylindrical and not compressed laterally below, the distance from the edge of the prothorax to the hind margin of the eye nearly equal to the length of the eye; the upper and lateral surfaces with close shallow punctation, the lower surface impunctate; the punctures on the forehead longitudinally confluent, the space between the eyes being equal to the interantennal space; the eyes quite flat. *Rostrum* straight, subconical, stout, about as long as the pronotum, slightly narrowing from base to apex (the sides being quite straight and continuous with those of the head), but tapering rapidly when viewed from the side; the scrobes entirely dorsal, completely exposed, almost as wide as the interantennal space (which is not dilated in front), the lateral edge forming the dorsal margin of the rostrum and continued right to the apex, so that the external apical angles are sharply rectangular; the dorsum with shallow confluent punctation and feebly tricarinate in the middle, the lower surface finely striolate at the base, sparsely punctate elsewhere and without any median sulcus. *Prothorax* much broader than long, strongly rounded at the sides, broadest at the middle, the basal and apical margins arcuate; the dorsal outline feebly convex, the apex being lower than the base; the upper surface with shallow confluent punctation, normally hidden by the scaling, and without any median furrow or carina. *Elytra* broadly ovate, strongly rounded at the sides, widest before the middle and obtusely acuminate at the apex, the basal margin regularly sinuate; the dorsal outline only moderately convex, the posterior declivity sloping inwards, so that the apex of the elytra is not visible from above; the shallow striae with distinct punctures, which are, however,

almost concealed by the scaling; the intervals almost flat, each bearing a row of short spatulate suberect pale setæ; the scales oval, more or less contiguous, but not overlapping. *Legs* rufescent, with dense pale scaling.

Length 2·3 mm., *breadth* 1·2 mm.

ORANGE FREE STATE: Bloemfontein, iv. 1918, on grass.

Described from six specimens forwarded by the Division of Entomology, Pretoria.

Distinguished from all the previously described species of the genus by its very small size, the broadly exposed rostral scrobes, and the parallel-sided interantennal area.

Genus EUONYCHUS, nom. nov.

Euonyx, Marshall (nec Norman, 1867), *Ann. & Mag. Nat. Hist.* (8) i. 1908, p. 19.

Unfortunately the generic name *Euonyx*, Norm., was inadvertently omitted from Scudder's 'Nomenclator,' so that I was not aware of its having been used previously when this genus was described, and a new name is therefore now proposed for it.

The discovery of a second species renders necessary a modification of some of the generic characters. The apical dilatation of the rostrum in the genotype, *E. sulcirostris*, Mshl., is clearly of specific value only; and in the new species the rostrum is not entirely continuous with the forehead, for there is a shallow transverse furrow separating them in the middle, which does not reach the lateral margins and is sometimes almost obliterated by the scaling.

Euonychus bivittatus, sp. n. (Pl. V. fig. 7.)

♂ ♀. Integument black, densely clothed with scaling, which on the whole lower surface, legs, and inflexed margins of the elytra up to stria 6 is grey, usually with a pinkish reflection; the head and rostrum with mingled brown and grey scales; the dorsum of the prothorax and elytra dark brown (in ♂) with two grey stripes starting at the apex of the prothorax and continued along interval 3 of each elytron to well behind the middle; interval 2 with grey scaling for a short distance at the base, intervals 4 and 5 with a few variable grey flecks, and the declivity either brown mottled with grey or *vice versa*. In the ♀ the brown of the upper surface is lighter and the pale markings are therefore less conspicuous.

Head separated from the rostrum by an abbreviated

shallow transverse stria (sometimes obliterated by scaling) and with a median longitudinal furrow continued right up to the vertex; the setæ subrecumbent and scale-like. *Rostrum* as long as the prothorax, gently curved, narrowed from the base to the middle, and thence parallel-sided; the dorsum with the basal half rugulose and with a very shallow median furrow, but the sculpture quite hidden by the scaling; the apical area flat, with the lateral margins sharply carinate and slightly overhanging the sides, the carinæ continued right to the apex, the external apical angles forming rounded right angles; the lower surface bare, and coarsely and closely punctate; the apical portion of the scrobes not truly dorsal in position. *Antennæ* with the scape reaching the middle of the eye in the position of rest. *Prothorax* transverse, strongly rounded at the sides, broadest a little before the middle, constricted just before the base, which is but little wider than the apex; the basal margin subtruncate and distinctly marginate, the apical arcuate; the dorsum strongly convex transversely and slightly so longitudinally, with a narrow flattened median carina, which is sometimes hidden by the scaling like the rest of the sculpture; the setæ very inconspicuous, small, scale-like, and subrecumbent. *Elytra* ovate, broadest about the middle, more strongly rounded at the sides, and more narrowed at the base in the ♀; the basal margin sinuate, much more deeply so in the ♀; the dorsal outline strongly convex, deepest at (♀) or far behind the middle (♂), the posterior declivity perpendicular; the striæ in perfect specimens appearing very fine and shallow, but the punctures just visible through the scaling, each containing a minute recumbent seta; the intervals almost flat, each bearing a row of short, curved, scale-like setæ.

Length 2.5 mm., *breadth* 1.2 mm.

ORANGE FREE STATE: Petrusburg, i. 1919, on grass.

Described from four specimens received from the Division of Entomology, Pretoria.

The only other known species *E. sulcirostris*, Mshl. (1908), is uniformly grey or pale fawn, and has a very differently constructed rostrum; the elevated transverse ridges on each side of the apex give it the appearance of a pig's snout, and the apical half of the dorsal area is parallel-sided and without any lateral carinæ, so that the apices of the scrobes appear more dorsal in position; the lower surface of the rostrum is finely and sparsely punctate, etc.

Subfamily *RHYTIRRHININÆ*.Genus *PHILETÆROBIUS*, nov.

Body much flattened dorso-ventrally. *Head* continuous with the rostrum, strongly exerted, the distance between the hind margin of the eye and the prothorax being equal to the length of the eye; the eyes quite flat, of irregular shape, and entirely concealed from above. *Rostrum* very stout, deflexed, narrower than the head at the base, but gradually dilated in front, the depth equal to the basal width, the sides almost vertical; the scrobes very deep, sharply defined, curving downwards in front of the eye and uniting shallowly beneath; the scaling evenly continuous right up to the apical margin, which is broadly truncate; the buccal aperture very oblique, the mandibles not projecting, bidentate, and squamose at the base; the submentum hardly pedunculate, the mentum rather large, but leaving the maxillary palpi exposed at the sides and bearing two discal setæ. *Antennæ* squamose; the scape short, gently curved, and just reaching the front margin of the eye; the funicle 7-jointed; the club ovate, about as long as the $3\frac{1}{2}$ preceding joints, and without definite annulations. *Prothorax* vertically truncate in front, without any trace of a prosternal furrow; the transverse prosternal stria deep and placed about halfway between the coxæ and the front margin. *Scutellum* invisible. *Elytra* much flattened, strongly inflexed at the sides so as to embrace the abdomen, much broader than the prothorax, obliquely rounded at the shoulders, with 10 striæ. *Legs* with the front coxæ contiguous, the middle pair rather and the hind pair very widely separated; the trochanters without a seta; the femora gradually and not very strongly clavate, simple, the hind pair reaching only the apex of the 3rd visible ventrite; the tibiæ shortly mucronate at the apex, with the dorsal edge somewhat flattened and deeply sinuate in the hind pair, more shallowly so in the anterior pairs, the apical margin armed with 6-8 stout spines in front of the tarsus and 2-3 behind it; the tarsi short and rather stout, not spongy beneath, but squamose and setose, joint 2 transverse, joint 3 a little longer and bilobate, but scarcely broader; the hinder claw reduced to a minute tooth at the base of the other. *Sternum* with the mesosternal process rather prominent, the mesepisterna reaching the elytra and the mesepimera very small; the metasternum much longer than the middle coxæ, its episterna broad, but the suture visible only as a mere rudiment at the base; the hind coxæ separated from the elytra by a little more than their own

width. *Venter* with the intercoxal process gently arcuate and twice as broad as the adjoining coxa; ventrite 1 (nominal) fused with 2 except at the sides, and 2 as long as 3 and 4.

Genotype, *Philetærobius nidicola*, sp. n.

In spite of various important structural differences, the remarkable species for which this genus is founded may best be regarded as a very aberrant form allied to *Gronops*, Schh. The most salient distinctions are: the downwardly directed scrobes, the exerted head, the absence of a prosternal furrow and postocular lobes on the prothorax, the much smaller mesepimera, the unusual tarsal claws, and the much larger sessile mentum.

Philetærobius nidicola, sp. n. (Pl. V. figs. 5, 5 a.)

♂ ♀. Integument black, densely covered with an indumentum of more or less fused scales, which sometimes present a tessellated appearance on the elytra; the head and rostrum dark brown with the apex of the latter and a median stripe on the vertex creamy or buff with a metallic reflection; the pronotum black, irregularly mottled with terra-cotta, or *vice versâ*; the elytra terra-cotta, with irregular spots formed by a rosette-like arrangement of black scales round a puncture and scattered greenish-white scales, the black colour sometimes invading nearly the whole of the disk as far as stria 6; the lower surface with dense pearl-grey scaling, turning to buff towards the sides and apex of the venter.

Head broadly and shallowly constricted behind the eyes, with close shallow punctation that is visible through the scaling; the forehead broadly rounded laterally, concealing the eyes, with a deep median depression continuous with that on the rostrum and with very short, stout, erect setæ; the eyes quite flat, longitudinal, deepest in front, narrowing rapidly behind, and with the upper margin quite straight. *Rostrum* a little longer than broad, widening from base to apex; the upper surface in the same plane as the forehead, with its lateral margins rounded and with a very deep median furrow in the basal half, the sculpturing there hidden by the scaling, and the setæ like those on the forehead; the pale declivous apical area gently convex transversely and with longer, broader, and paler erect setæ. *Antennæ* with joint 2 of the funicle about as long as broad, 1 a little longer, and 3-7 transverse and of about the same width. *Prothorax* as long as broad, rounded at the sides, widest before the

middle, constricted near the apex, the constriction continued obliquely and shallowly towards the disk; the basal margin broadly arcuate, the apical truncate; the disk flat in the middle and gently sloping at the sides, with close shallow punctures almost hidden by the scaling and a few very short, stout, subrecumbent setæ; the apical area broadly elevated and very convex longitudinally. *Elytra* oblong-ovate, much flattened, parallel-sided for the greater part of their length, bluntly acuminate behind, slightly dehiscent at the apex, and with the base deeply and jointly sinuate; striæ 1-6 broad and shallow, containing large close punctures and running in pairs, intervals 3 and 5 being slightly more raised than the others, though interval 1 is still more strongly raised on the declivity only and interval 9 terminates in a transverse callus just above the apex; striæ 1 and 2 unite at the base in a deep fovea, which is narrowly bounded in front by the basal margin; striæ 3 and 4 curve inwards at the base into a similar fovea, which, however, breaks through the basal margin; 5 and 6 do not reach the base, 7 and 8 are scarcely distinguishable at all, and 9 and 10 are shallow in the apical half and obsolete in the basal third; the alternate intervals with very short, thick, black, subrecumbent setæ. *Legs* with dense pale vermiculate scaling, the dorsal edge of the tibiæ (except the apical fourth) and the basal half of the hind femora being brown.

Length 3·5-4·3 mm., *breadth* 1·6-2 mm.

SOUTH AFRICA: without exact locality, from nest of social weaver-bird (*Philetarus socius*).

Described from five specimens. The only external sexual difference appears to be the slighter deeper ventral impression in the ♂.

Subfamily *HYPERINÆ*.

Chloropholus africanus, sp. n. (Pl. V. fig. 11.)

♂ ♀. Integument black, with dense brown scaling and markings of pale fawn and black, the pale scales having a slight metallic reflection; the head pale fawn; the pronotum brown, with two indefinite curved pale stripes, which are broadest towards the base and divide the dorsum into three parts, of which the middle one is somewhat broader and darker than either of the others; the scutellum pale fawn; the elytra brown, with two very irregular broken bands formed of pale fawn spots, one running from behind the shoulder to the middle of the suture, the other behind the middle, and sometimes almost connected together by pale spots on intervals 5 or 6; the lateral margin

continuously pale fawn, a variable row of pale spots on interval 1, and a large triangular pale patch at the apex of each elytron enclosing a black spot; a small black patch round the scutellum, a rather larger one on each shoulder, and some irregular and indefinite black spots between the pale bands and on the declivity.

Head convex, rugosely punctate, and with very elongate scales, which do not entirely conceal the integument; the forehead about as broad as the antennal club, with an elongate median fovea and with the scales densely overlapping and obliquely raised. *Rostrum* about as long as the pronotum, gradually widened from base to apex, coarsely and confluent punctate, with a rather broad, low, smooth median carina, and clothed with transverse setiform scales. *Antennæ* red-brown; the scape gradually clavate and sparsely setose; the funicle with the two basal joints equal, the remainder about as long as broad or slightly transverse. *Prothorax* twice as broad as long, strongly rounded at the sides, widest close to the base, and rapidly narrowed in front; the apex sinuate, the base feebly arcuate, and the longitudinal outline strongly convex; the dorsum with close, even, reticulate punctation throughout; the scales linear, emarginate at the apex, and not entirely hiding the integument, especially in the darker median area. *Elytra* oblong-ovate, truncate at the base, parallel-sided from the shoulders to beyond the middle, and broadly rounded behind; the dorsal outline gently convex and deepest about the middle; the striæ fine, but becoming rather deeper behind, the separated punctures showing through the scaling and each containing a minute horizontal seta; the intervals broad and even, flat on the disk, slightly convex towards the sides and apex, and without rows of setæ; the scales linear, subtruncate, slightly overlapping, but not entirely concealing the integument. *Legs* black, with dense linear pale scales, the tarsi red-brown. *Venter*: anal ventrite of ♂ with two widely separated tufts of hairs on the apical margin.

Length 7-8.5 mm., *breadth* 3.75-4.5 mm.

NYASALAND: Cholo, 1919 (*R. C. Wood*). PORTUGUE E. AFRICA: Caia, Zambesi R., ix.-xi. 1910 (*Dr. H. Swale*, type). NATAL: Kraantzkloof, 1903 (*H. Bell Marley*); Durban, ix. 1913 (*Marley*).

Described from thirteen specimens.

The two Natal specimens have the general brown scaling much lighter than in the typical form, so that the pale markings appear much less conspicuous; they have also a broad median brown stripe on the apical half of the venter.

This is the only species of the genus as yet known from

the African continent, and there are no characters which justify its generic separation from the Madagascar forms. Its general facies is quite that of *C. nigropunctatus*, Gory.

Subfamily *BALANININÆ*.

Timola posticata, sp. n. (Pl. V. fig. 10.)

♂ ♀. Integument piceous brown, the pronotum blackish; the head and prothorax rather thinly clothed with grey or greyish-buff setiform scaling, the latter with three very indefinite stripes formed of slightly denser scales, the darker area on each side of the median stripe bearing scattered brown scales; the elytra with a little more than the basal half of the disk clothed principally with brown setiform scales from stria 1 to 7, elsewhere grey or greyish buff, but intervals 3-6 often with more or less light brown scaling on the declivity, the front margin of the pale apical area being deeply sinuate on each elytron.

Rostrum strongly curved, with coarse, longitudinally confluent punctures and a distinct median carina in the basal half, and there thinly clothed with transverse setiform scales; the punctures distinctly finer and sparser on the apical half, but only slightly finer in the ♀ than in the ♂; the antennal insertion at (♀) or just beyond the middle (♂); the length only slightly less in the ♂; mandibles with a laterally projecting blunt tooth at the base (sometimes obsolete) and a similar downwardly projecting one below it. *Antennæ* with the scape gently curved and with a few setiform scales towards the apex; the funicle with the joints progressively diminishing in length, but even the apical ones longer than broad, and 1 a little longer than 2 and 3. *Prothorax* broader than long, subparallel-sided from the base to near the middle, then narrowing rapidly and subtubulate at the apex; the base bisinuate, the apex truncate dorsally and with feeble postocular lobes; the dorsum longitudinally rugulose, the integument being clearly visible through the rather thin, transverse, elongate, setiform scales. *Scutellum* with long, dense, raised scales. *Elytra* ovate, widest at the rather prominent rounded shoulders and rapidly narrowing to the apices, which are slightly dehiscent; the striæ broad and deep and with large deep elongate punctures, each containing a long setiform scale on its anterior slope; the intervals finely rugulose, plane and broader than the striæ. *Legs* rather densely clothed with grey setiform scaling; the femora quite simple, all the tibiæ with a short apical mucro.

Length 6-7.5 mm., *breadth* 3-3.6 mm.

S. RHODESIA: Umtali, xii. 1900 (*G. A. K. M.*); Bulawayo, xii. 1919 (*A. J. T. Janse*, type); Sawmills, xii. 1921 (*Dr. G. Arnold*). TRANSVAAL: White River, xii. 1906 (*H. Fry*). ORANGE FREE STATE: Lindeque Drift, xii. 1905 (*H. Fry*).

Described from ten specimens.

Among the species of *Balaninus* described from South Africa, the following must certainly be referred to the genus *Timola*, Pasc. (1886):—*albovarius*, Fhs., *apicalis*, Fhs., *hispidus*, Fhs., *murinus*, Fhs., *notatus*, Fhs., *strigirostris*, Fhs., and *suturalis*, Gyl. (genotype).

Subfamily CRYPTORRHYNCHINÆ.

Ocladius *vau*, sp. n. (Pl. V. fig. 6.)

♂ ♀. Integument red-brown, with the prothorax and the disk of the elytra more or less black; the prothorax with thin, recumbent, white setæ; the elytra with a pattern formed of short white setiform scales that are easily abraded: a common broad basal patch extending on each side to stria 3 (sometimes triangular in shape); a small patch at the base of intervals 5 and 9; a stripe starting at the base of interval 7 and continuing parallel with the lateral margin to the suture on the declivity; a common V-shaped mark on the disk, the apex being produced backwards along the suture to join the transverse band on the declivity.

Head finely aciculate, with very large shallow confluent punctures, and with sparse recumbent long white or yellow setæ, the three rostral carinæ extending shortly on to the forehead. *Rostrum* with three dorsal carinæ and four deep punctate sulci, the carinæ reaching the middle (♂) or extending a little beyond it (♂); the outer sulci reaching the apex, the inner pair distinctly shorter and converted (in ♀) into a row of disconnected punctures towards the apex; the ♀ with a row of separate punctures in the basal half above the scrobe, which in the ♂ coalesce to form a shallow furrow; towards the apex there are a few long erect setæ in the ♂ only. *Antennæ* testaceous; the funicle with joint 1 evidently longer than 2, 2-6 longer than broad, and 7 slightly transverse. *Prothorax* subconical, slightly rounded at the sides, and shallowly constricted at the apex, set with large deep punctures that are longitudinally confluent; the intervals between the punctures forming somewhat irregular, narrow, impunctate carinæ, the median one being straight and slightly higher than the others; most of the punctures with stout, recumbent, white or yellowish setæ, a few containing longer finer erect setæ. *Elytra* subglobose, smooth, rather

shiny, minutely aciculate, and with nine regular longitudinal rows of small spaced punctures which become larger and coarser near the apex, the first basal puncture of each row being much larger and deeper than those immediately succeeding it; the intervals very broad, 1, 3, and 5 bearing a row of very distinct punctures, each containing a long erect seta; the suture slightly elevated from the base to the V-shaped marking. *Legs* with the posterior pairs of femora not carinate dorsally, with very shallow confluent punctures on the upper half of the outer face, and with two broad sulci on the lower half; the tibiæ not narrowed dorso-ventrally towards the apex, the hind pair with the dorsal edge sharply denticulate, the outer and inner faces being neither sulcate nor punctate, the denticles very indistinct on the median pair, and the front pair simply carinate dorsally. *Sternum*: the front part of the metasternum on a level with the mesosternum and slightly sloping upwards behind, the posterior edge of the pectoral canal not being sharply delimited. *Venter* with ventrite 1 (3) sloping gradually upwards from base to apex, the apical margin with a small raised lobe on each side, the middle forming an arcuate carina very slightly overhanging ventrite 2 (4), which slopes very steeply downwards from base to apex.

Length 3-3.75 mm., *breadth* 2-2.25 mm.

ORANGE FREE STATE: Bloemfontein, iii. 1918.

Described from six specimens forwarded by the Division of Entomology, Pretoria.

In general facies much resembling *O. obliquisetosus*, Fhs., but in that species the punctures on the pronotum are much larger and the intervals do not form longitudinal carinæ; the elytra bear only five or six oblique rows of minute setigerous punctures, which are not enlarged behind, and there are no large punctures at the base; the femora are scarcely sulcate externally, and the tibiæ are simply carinate dorsally; and there is no elevation at the junction of ventrites 1 and 2.

EXPLANATION OF PLATE V.

- Fig. 1. *Pomphus acuticollis*, sp. n.
 Fig. 2. *Protostrophus purcelli*, sp. n.
 Fig. 3. — *cavirostris*, sp. n.
 Fig. 4. *Porpacus vesiculatus*, sp. n.; a, lateral view of head.
 Fig. 5. *Philetærobius nidicola*, gen. et sp. n.; a, lateral view of head.
 Fig. 6. *Ocladius vau*, sp. n.
 Fig. 7. *Euonychus bivittatus*, sp. n.
 Fig. 8. *Trachyphlæus hardenbergi*, sp. n.
 Fig. 9. *Chalepoderus hiaticollis*, sp. n.; a, lateral view of head.
 Fig. 10. *Timola posticata*, sp. n.
 Fig. 11. *Chloropholus africanus*, sp. n.

LVIII.—*New Species of Fulgorids (Homoptera)*. By F. MUIR, Hawaiian Sugar Planters' Experiment Station, Honolulu, T.H.

THE types and paratypes of the species described below, with one exception, are in the British Museum collection. Measurements are from apex of head to apex of abdomen and from base to apex of one tegmen.

Cixiidæ.

Andes oldi, sp. n.

Male.—Length 3·3, tegmen 6 mm.

In profile frons and vertex slightly produced and subconical; lateral carinæ of frons not meeting at base or on vertex, median frontal carina distinct on apical half of frons. First segment of antennæ very short, broader than long, second segment not longer than wide. *Sc*, *R*, and *M* arising from basal cell, not forming a stalk; stem M_{1+2} shorter than stem M_{3+4} .

Lateral margins of pygofer very slightly and roundly produced. Genital styles flat, fairly broad, curved, and rounded at apex. Anal segment large, longer than broad, anus near apex, sides subparallel to anus, beyond which it is produced to a broad angle and curved ventrad. *Ædeagus* long, periandrium thin, subtubular, left side of apical half produced into a small flange with the two apical corners produced into small curved spines; a long thin spine from apex turned basad, parallel to periandrium and reaching to one-third from the base, a smaller one from the other side of the apex reaching about halfway down the periandrium; penis small, membranous.

Brown; legs light, abdomen darker. Tegmina hyaline; a brown mark at base reaching to middle of clavus, a brownish band across tegmen from the middle of costa to clavus, mottled fuscous over apical cells; veins same colour as membrane, except apices of apical veins, which are white, veins with many small brown granules bearing black macrotrichia. Wings hyaline, fuscous, with dark veins.

Female similar to male, but slightly darker in colour.

One male and one female from Blantyre, Nyassaland (*Dr. J. E. S. Old*, 21. v. 1910). There are two females from Mt. Mlanje (*S. A. Neave*) which may be this species, but I have not included them in the type-series as the male from that district may prove to be distinct.

Brixidia haglundii, sp. n.

In this genus the stem M_{1+2} is longer than the stem M_{3+4} .

Female.—Length 7, tegmen 9 mm.

This species has five apical *Rs* and six apical *Ms*, M_{1a} being present. Light brown. Tegmina hyaline, slightly fuscous, the infuscation darkest over apices of apical cells; at the apices of *Ms* there is a light mark stretching from M_1 to M_{4a} ; veins darker brown, spreading into membrane at cross-veins and apical cross-veins. Wings fuscous, with dark veins.

One female specimen from Gold Coast (*A. E. Evans*, 1918).

Brixia speciosa, sp. n.

In this genus $Sc + R + M$ form a common stalk, whereas in *Brixidia* *M* arises from the basal cell.

Male.—Length 4, tegmen 5.5 mm.

Lateral carinæ of frons meeting together at base of face, no median carina on frons, clypeus 3-carinate; vertex small, triangular, base about middle of eyes; second segment of antennæ distinctly longer than wide. Three apical *Rs*; five apical *Ms*, forking of M_3 and M_4 near *Mf*. Lateral margins of pygofer rounded, medio-ventral process conical in outline. Genital styles narrow at base, widest in middle where it is angular, apical half narrowed to a subacute apex. Anal segment large, fairly broad anus near apex, where segment is broadest, beyond anus curved ventrad, the apex being slightly emarginate with a small projection at each corner of emargination.

Stramineous; three small dark marks on frons and genæ in front of eyes, a slight fuscous band on front femora and tibiæ. Tegmina hyaline, yellow with some colourless areas, a triangular colourless area through costa near base with a smaller and more obscure one slightly distad, a band across the middle, a small area in apical cells and a larger one over media and cubitus. Five distinct round black spots along hind margin, the basal one the largest, raised and shiny, situated in cubital area just apical of clavus, the second in cubitus, third between *Cu* and M_{4a} , the fourth and fifth between M_{4a} and M_3 , a minute white dot between each black spot; the M_{1+2} , M_3 , and M_4 level with the spots white, margined with a fine fuscous line on each side; apical cross-veins brown; veins with minute granules bearing black macrotrichia. Wings hyaline with light veins.

Female similar to male. Pygofer about as wide as long,

flat, ovipositor complete, projecting beyond end of abdomen, anal segment small.

Described from one male and one female, the male from Mt. Mlanje, Nyassaland (*S. A. Neave*, 4. xii. 1912), and the female from South-east Katanga (*S. A. Neave*, 29. ii. 1907).

Brixia stannusi, sp. n.

Female.—Length 3, tegmen 5 mm.

Head as in *B. speciosa*, the 2nd segment of antennæ not quite so long. Tegmina typical. Lateral margin of pygofer rounded, medio-ventral process small, angular. Genital styles fairly large, narrow at base and slightly increasing in width, the apex produced into two processes forming a sub-crescent, the outer process larger than the inner. Anal segment reaching to apex of genital style, longer than broad, slightly widened to apex which is rounded.

Yellow; three small black marks in front of eyes. Tegmina hyaline, slightly ochraceous; cross-veins and apical cross-veins brown, the apical margin dark, apices of apical veins light; veins with small granules the same colour as membrane. Wings hyaline with brown veins.

One male from Zomba, Nyassaland (*H. S. Stannus*, July 1914).

Mnemosyne cubanæ, Stål.

Mnemosyne, Stål, Hem. Afr. iv. p. 150 (1866), no species mentioned; Stål, Berl. ent. Zeit. (1866), type-species *cubanæ* described; Fowler, Biol. Centr.-Amer., Hom. i. p. 102 (1904); Distant, Faun. Brit. Ind., Rhyn. vi. p. 33 (1916).

This genus was described and placed by Stål next to *Cajeta* in the Dictyopharidæ, but both these genera belong to the Cixiidæ. Both Fowler and Distant redescribed the genus, but there was some confusion, as the five mesonotal carinæ are absent or obscure in some species; or appear as three. The chief distinction between this genus and *Oliarus* or *Cixius* lies in the branching of *M*; in *Mnemosyne* the forking of M_1 and M_2 is some distance away from *Mf*, but the forking of M_3 and M_4 is close to *Mf*; in *Oliarus* and *Cixius* the reverse is the case, M_1 and M_2 forking near to *Mf* and M_3 and M_4 some distance from it. The median carinæ on frons and clypeus are often obscure or absent. In most of the species granules bearing macrotrichia are present in greater or less numbers on the membrane, especially in the apical cells.

The type-specimen is a male. The anal segment is large, a little longer than broad, sides rounded, broadest slightly

before apex. Lateral margins of pygofer acutely angularly produced. Genital styles broad at base, narrowing to apex, inner margin convex, outer margin convex on basal half, concave on apical half, at the apex there is a small process at right angles to the apex.

Sc with three branches; *R* with three; M_1 and $2, 3$ and $4, 4a$; $Cu_1, 1a$; a cross-vein in clavus near base between first claval and suture; very few granules in cells. Mesonotum with five very obscure carinæ; vertex without any transverse or oblique carinæ; clypeus without a median carina. There is a specimen marked "var." in the type-material which I consider to be the female. In it the pygofer is wider than long; the anal segment is missing; the ovipositor is as long as the pygofer or slightly longer.

Mnemosyne philippina, Stål.

The type is a female. It has no median carina on clypeus; vertex with small oblique carinæ at apex, the mesonotum with five distinct carinæ. Anal segment longer than wide, narrow. Pygofer wider than long; ovipositor slightly longer than pygofer; pregenital plate truncate on posterior margin. There is a male specimen from Darjeeling, India, with the type-material which represents a distinct species.

I have two female specimens from Surigao, Mindanao (*Baker*, no. 17525).

Mnemosyne planiceps (Fabr.).

I have one male specimen from Central America which agrees with specimens in the British Museum identified as *planiceps*.

The median carinæ on frons and clypeus and three mesonotal carinæ distinct. The pygofer compressed, lateral margin produced angularly with a small emargination near the anal angle; medio-ventral process wider than long, subquadrate and produced into a little point in the middle of apical margin. Anal segment long, thin, tubular with the anus at apex, below the anus the apical margin produced into a large spine at right angles to anal segment and a little longer than half its length. Genital styles boomerang-shape, widest on basal half, apex narrow, truncate, inner margin concave, outer margin convex. Periandrium long, slender, subtubular with a spine arising from base laying alongside and about half the length of periandrium; penis represented by two small membranes at apex. The periandrium is amalgamated to the apodeme of the penis.

Mnemosyne efferatus (Walker).

I have one male specimen from Singapore (*Baker*) which appears to be this species. The genitalia are on the same plan as *planiceps*. The lateral margins of the pygofer are produced angularly and slope up to the base of the anal segment without any anal angle; the medio-ventral process is angular. Anal segment long, tubular, with the ventral apical area produced into a long strong spine about half the length of anal segment. Genital styles longer than broad, straight, apex rounded, sides subparallel to near base, where it suddenly narrows. Ædeagus subtubular, fairly short and thick, a large curved spine arises on the right side from basal half and a small one projects slightly beyond apex.

Mnemosyne maculipennis, sp. n.

Male.—Length 10, tegmen 10 mm.

Oblique carinæ on vertex distinct; five distinct mesonotal carinæ; median carinæ on frons and clypeus missing or very obscure, median ocellus distinct. Forking of *Sc+R* near base; forking of *M* slightly before apex of clavus, six apical *Ms*, 1, 2, 2a; 3, 4, 4a; *Cu* not touching *M*.

Dark brown, frons shiny, light at base of vertex and middle of pronotum, also on hind legs and pygofer. Tegmina hyaline, veins dark; membrane of cells as well as veins thickly dotted with dark granules bearing black macrotrichia, these being most numerous in apical half. Base and outer margin of clavus and a spot at apex fuscous brown; three small marks in costal cell and the stigma, two spots near base, a faint and broken mark over nodal line and another from hind margin near clavus to apex of *R*, and four small spots in *M* and *Cu*, apical cells all fuscous brown. Wings hyaline with brown veins.

Sides of pygofer produced into a fairly long process with rounded apex, with a small rounded projection between it and the base of anal segment; medio-ventral process sub-diamond-shape. Genital styles from ventral view fairly broad, slightly curved, subequal in width to apex, which is rounded; in lateral view with a slight angular projection on the outer margin before apex. Anal segment fairly broad, dorsal surface convex, ventrally concave, apex slightly narrowed and truncate. Ædeagus complex, periandrium drawn out into a thin plate, which is curved to the left and has an irregular serrate edge of four or five teeth; from the apex arises a small plate, from which extends two curved spines,

one reaching to the base of the periandrium and the other half as long; another small curved spine arises from the apex and a fourth a little lower down, which take a complete curve round the periandrium near the apex; the penis is of medium size, membranous.

Female.—Length 10, tegmen 12 mm.

In general build and colour similar to the male. Pygofer wider than long, ovipositor incomplete, sheaths a little longer than pygofer, ovipositor a little shorter. Anal segment small, longer than wide, about half the length of pygofer.

Holotype male, allotype female, from British East Africa. Described from three males and five females from B.E.A. (*S. L. Hinde*, 1913); four males and eleven females from Monkey Bay, Lake Nyassa (*W. A. Lamborn*, 7. xi. 1915), one female from Umfili River, Mashunaland (*Guy Marshall*), and one male from Mozambique (*F. Muir*).

Mnemosyne evansi, sp. n.

Female.—Length 8, tegmen 9 mm.

Oblique carinæ on vertex and median carinæ on frons and clypeus distinct; mesonotum with five distinct carinæ. *M* with five branches, 1, 2 and 3, 4, 4a; *Cu* not touching *M*. Brown slightly mottled with lighter markings. Tegmina hyaline, slightly yellowish, veins darker brown, very few granules bearing black macrotrichia on membrane; a few small brown marks at apex of *R*, *M*, and *Cu*, three small dark marks in costal cell, one in middle of clavus, one at fork of *Cu*, and one at fork of *M*. Wings hyaline, veins brown, slightly fuscous along apical margin.

The female genitalia is similar to *M. maculipennis*.

Described from two females from Gold Coast (*A. E. Evans*, 1913). This species differs from *M. camerunensis*, Dist., in its darker colour and the presence of some granules on the membrane of tegmina, and from *M. maculipennis* by its smaller size, lighter colour, and by having so few granules on the membrane of tegmina.

Mnemosyne camerunensis, Dist.

One specimen without abdomen, which agrees with the type of this species. It is from Oshogbo, South Nigeria (*Dr. T. F. G. Mayer*).

Mnemosyne punctipennis, Dist.

One female specimen from Bang Bo, Indo-China (*R. V. de Salvaza*, 25. iv. 1915), which agrees with the type-specimen.

Borysthenes mlanjensis, sp. n.

Female.—Length 3, tegmen 5 mm.

Sc+R forming a short stalk, *M* arising from basal cell at the same spot as *Sc+R* and forking about level with the apex of clavus, with five apical cells, $M_1, 1a, 2; 3, 4$. Claval vein joining commissure before apex; tegmina but slightly tectiform when at rest, overlapping beyond apex of clavus.

Ovipositor complete, longer than pygofer, which is small and longer than broad with a longitudinal depression. Anal segment very small.

Light yellow; eyes dark brown, apex of labium dark, ovipositor brown. Tegmina hyaline, slightly opaque with waxy secretion, veins yellow except where the dark spots are, a dark mark at base of *M*, one at fork of *Cu*, a light one in middle, another at stigma, and another larger one near apex of costal cell extending into subcostal; a small spot slightly distad of *Sc+R* fork, a small round spot between *R* and *M* at apex; the cross-veins between the fork of M_1, M_2 and the fork of M_3, M_4 and over cross-vein between *M* and *Cu*, fuscous. Wings hyaline, opaque with waxy secretion, a black spot between *R* and *M* near middle, apical cells fuscous, veins yellow, slightly fuscous.

Described from four females from Mt. Mlanje, Nyassaland (*S. A. Neave*, 5. i. 1914). This appears to be the first species of this genus to be reported from Africa.

Derbidæ.

Zoraida fulgans, sp. n.

Male.—Length 7, tegmen 16, wings 5 mm.

The basal median sector joined to the cubitus, making the latter four-branched; wing about one-third the length of the tegmen. Antennæ cylindrical, slightly longer than face.

Lateral margins of pygofer broadly angular, medio-ventral process conical in outline. Anal segment slightly longer than broad, apex with a slight emargination in middle, making it bilobed. Genital styles about as long as anal

segment, longer than broad, inner margin in the middle, produced into a small quadrate process broader than long and curved inward; outer margin nearly straight, slightly curved on apical half, apex bluntly pointed.

Head and thorax light brown mottled with lighter markings, legs light brown, abdominal tergites darker brown, sternites lighter. Tegmina hyaline, veins brown slightly expanded at apices; costal, subcostal, and radial cells, basal portion of median cell, base of cubitus and apical cells reddish brown, a darker brown mark on Cu_{1a} . Costa and apical margins reddish, apical veins fuscous spreading into cells, except at apex where the veins are reddish bordered with white; small lighter spots in costal cells and along subcostal and radial veins. Wings hyaline with brown veins.

Described from one male in the Hope Department, Oxford University Museum, from Ambinanindrano, Mahanoro, Madagascar, captured by the Venerable Archdeacon G. K. Kestell-Cornish, now Bishop of Madagascar.

This fine species belongs to the typical subgenus and comes into the *sinuata* group. It is the first species to be captured in Madagascar of this large genus distributed all over the tropics of the Old World and the Australian-Malayan islands.

Mysidioides africana, sp. n.

Female.—Length 4, tegmen 8, wings 5 mm.

Subantennal process with wide base, longer than broad, rounded; shoulder-keel well developed; face linear, the carinæ contiguous. Antennæ much shorter than face, subpeariform. Pregenital plate large, flat, posterior margin angularly produced in middle.

Light yellow; eyes brown; front legs light brown, middle legs with a brown longitudinal line, hind legs brown at apex of tibiæ. Tegmina hyaline, slightly opaque with waxy secretion; four light brown marks on costa and fuscous marks on apical margin; faintly fuscous from apex of clavus to middle of costa and along fork of clavus, along median cross-veins and the middle of media to costal margin near apex; veins darker than membrane. Wings hyaline with light veins.

Described from one female from Ibadan, South Nigeria.

Dictyopharidæ.

Miasa wallacei, sp. n.

Male.—Length including cephalic projection 12, tegmen 11 mm.

Cephalic projection straight, not curved, otherwise in colour and build similar to *M. smaragdilinea*, Walk.

Anal segment large, steeply tectiform, and the sides very long on apical half. In lateral view somewhat hatchet-shape, dorsal margin straight with the apex at right angles to it, narrow at base, rapidly widening to a little beyond middle, beyond which the margin straight, the truncate apex being about as long as from base to anus and five or six times wider than base.

One male from Biserat, Siam, Malay States.

The type of *M. smaragdilinea*, Walk., is a male from Mt. Ophir, collected by Wallace. It appears to be similar to specimens from Borneo, but dissections may show phallic differences. The anal segment is very distinct; in lateral view the apex is slightly wider than base and the lateral margin is nearly straight.

LIX.—*Three new Fishes from Yunnan, collected by Professor J. W. Gregory, F.R.S.* By J. R. NORMAN.

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Schizothorax yunnanensis.

Depth of body about equal to length of head, which is $4\frac{2}{3}$ in length of body. Upper profile of snout decurved. Breadth of head about twice in the length. Length of snout $\frac{2}{3}$ post-orbital part of head. Diameter of eye $5\frac{1}{4}$ in length of head, interorbital width $3\frac{1}{2}$. Mouth inferior; lower jaw apparently without horny covering; upper lip with a median prolongation; fold of lower lip interrupted; two barbels on each side, subequal, $\frac{2}{3}$ diameter of eye. Scales small and irregularly arranged; 102 larger scales in lateral line; lower part of thorax and abdomen naked, except for some scattered imbedded scales. Dorsal IV 9; the fourth simple ray not very stout, $\frac{2}{3}$ length of head, moderately serrated in its lower half, articulated and slender above; origin of dorsal a little in front of base of pelvics, about equidistant from base of caudal and tip of snout. Anal III 5. Pectoral extending

a little more than half the distance from its base to base of pelvics. Caudal forked (?). Least depth of caudal peduncle $1\frac{4}{5}$ in its length. Greyish, silvery below; dorsal dusky, remaining fins pale.

A single specimen, 270 mm. in total length.

Barbus gregorii.

Depth of body 3 to $3\frac{2}{3}$ in the length, length of head $3\frac{1}{2}$ to 4. Snout equal to or a very little longer than eye, the diameter of which is $3\frac{1}{2}$ to $4\frac{1}{4}$ in length of head and 1 to $1\frac{2}{5}$ in interorbital width. Mouth terminal, lower jaw slightly the shorter; maxillary extending to below anterior edge of eye, or to between nostril and eye. Two barbels on each side, subequal in length, 3 to $4\frac{1}{4}$ in length of head. 36-38 scales in a longitudinal series, 6-7 between lateral line and origin of dorsal, 3-4 between lateral line and root of pelvic. Dorsal III 7-8; the third simple ray a stout spine, with strongly serrated posterior edges, $\frac{2}{3}$ to $\frac{3}{4}$ length of head; posterior margin of fin a little concave; origin of dorsal equidistant from tip of snout and base of caudal or a little nearer the latter. Anal III 5. Pectoral not reaching pelvic. Caudal forked, the lobes as long or nearly as long as head. Least depth of caudal peduncle about $1\frac{1}{2}$ in its length.

Seven specimens, 110-260 mm. in total length.

Allied to *B. margaritanus*, Anderson, and *B. cogginii*, Chaudhuri.

Euchiloglanis myzostoma.

Depth of body 7 to 8 in the length, length of head 4 to $4\frac{1}{2}$. Head a little broader than long. Eyes very small; interorbital width $3\frac{1}{2}$ to 4 in length of head. Snout a little longer than postorbital part of head. Nasal barbel $3\frac{1}{2}$ to 5 in length of head, not nearly reaching eye; outer mandibular barbel longer than inner and about equal to nasal barbel. Fold of lower lip widely interrupted. Width of mouth 2 to $2\frac{1}{3}$ in length of head. Lower angle of gill-opening below middle of base of pectoral. Dorsal I 6; origin in front of extremity of pectoral, equidistant from upper end of gill-opening and root of pelvic, or nearer the latter; adipose fin low, length of base $2\frac{3}{4}$ to $3\frac{1}{4}$ times that of rayed dorsal. Anal 5-6. Pectoral with 14-15 branched rays, equal to or a little longer than head; not reaching pelvic. Pelvic with 5 branched rays, reaching vent or not

quite as far. Caudal subtruncate. Caudal peduncle 3 times as long as deep. Uniform brownish.

Ten specimens, 75–125 mm. in total length.

Closely allied to *E. davidi*, Sauvage, from which it is distinguished especially by the wider mouth and the more slender caudal peduncle. I am indebted to Dr. Pellegrin for one of the types of *E. davidi*. This is in bad condition, but is evidently of the same species as the better-preserved specimens in the collection of the British Museum (Natural History), from the mountain streams running into the Min River, Sze Chuen Province, China.

PROCEEDINGS OF LEARNED SOCIETIES.

GEOLOGICAL SOCIETY.

January 24th, 1923.—Prof. A. C. Seward, Sc.D., F.R.S.,
President, in the Chair.

The following communication was read :—

On Reptilian Remains from the Karroo Beds of East Africa.
By Sidney Henry Haughton, B.A., D.Sc., F.G.S.

Three specimens of a small fossil were found by Mr. F. P. Mennell, F.G.S., in black shale in the middle of the Karroo Formation, near Tanga, on the coast of Tanganyika Territory. Two are well preserved, and are now described in detail. They represent a new genus and species of aquatic reptile, in general appearance much like *Mesosaurus*, but differing in its shorter neck, thinner ribs, relatively larger and more massive fore-limb, the presence of a large rounded sternum, and of only four distal carpal and tarsal bones instead of five. It is perhaps more closely related to *Youngina*, and may be regarded as an aquatic adaptation of that type. If so, the shale at Tanga is approximately of the same age as the Middle Beaufort Beds of South Africa.

February 16th, 1923.—Prof. A. C. Seward, Sc.D., F.R.S.,
President, in the Chair.

The President delivered his Anniversary Address :—

The Earlier Records of Plant-Life constituted the subject of the Presidential Address. Attention was drawn to the danger of excessive absorption in descriptive work, leading to insufficient

consideration of such conclusions of general geological interest as can be drawn from the accumulated data. Reference was made to the views of Dr. Church on the origin of life in the waters of a primeval world-ocean, and on the origin of terrestrial vegetation from highly-organized Algæ transferred by emergence of portions of the Earth's crust above the surface of the water from an existence on the ocean-floor to life on land. It was suggested that the vegetation of the land may have received additions from upraised portions of the crust at more than one epoch in the history of the Earth. The course of evolution could probably be more correctly illustrated by the conception of separate lines of development, than by that of a branching tree implying the common origin of the main groups of plants. The unfolding of plant-life must be considered in relation to the changing geological background. The climatic and physical conditions of the Pre-Cambrian Era were briefly considered, and various kinds of indirect evidence of the existence of plant-life were critically examined: reference was made to graphite, supposed algal remains in association with oolitic structure, *Cryptozoon*, and the structures described by Dr. C. D. Walcott as Algæ or as the result of algal agency. Attention was called to the importance of carefully investigating diffusion-phenomena, as illustrated by the so-called Liesegang figures, as a possible explanation of the origin of some of the structures which are usually attributed to organic agency. We have no knowledge of any Pre-Cambrian land-flora. Palæobotanical records from Cambrian, Ordovician, and Silurian strata were briefly summarized, including some account of *Girvanella*, *Eophyton*, *Solenopora*, *Nematophycus*, *Pachytheca*, and *Parka*. Reasons were given for assigning some of the Cambrian Algæ described by Dr. Walcott to the Cyanophyceæ, especially *Marpolia spissa*.

In the second part of the Address, the older Devonian floras were reviewed, and some of the more characteristic genera described, special attention being directed to the petrified plants from the Rhynie chert-bed, discovered by Dr. W. Mackie, and described in detail by Dr. R. Kidston and Prof. W. H. Lang. Reference was made to the differences between the older Devonian floras and those of Upper Devonian age. The question of the common origin of the phyla of Lycopods and Ferns was considered, and preference was expressed for the view which regards them as independently-evolved groups. In conclusion, the wide geographical range of *Archæopteris* was emphasized, and reference was made to the difficult problems raised by the occurrence of Upper Devonian floras well within the Arctic circle, at least equal (in the variety of the plants and in the vigorous development of the vegetation) to the more southern floras of Ireland, Belgium, and other regions.

February 28th, 1923.—Prof. A. C. Seward, Sc.D., F.R.S., President, and afterwards Prof. W. W. Watts, Sc.D., F.R.S., Vice-President, in the Chair.

The following communications were read :—

1. 'The Late Glacial Stage of the Lea Valley (Third Report).' By Samuel Hazzledine Warren, F.G.S.

Since the publication of the previous papers on the subject, one new section of the same series of deposits has been found. This was in a different situation from the others, as it occurred at the level of, and in the area occupied by, the Middle or Taplow Terrace, whereas all the other sections were in the Low Terrace. It consisted of a bed of seed-bearing clay, in the middle of an old gravel-pit, partly built over, and consequently its precise stratigraphical relations to the Taplow gravel were not discoverable. The Taplow deposits yield a fairly temperate fauna and flora, and it is therefore concluded that the Arctic deposit cannot be of Taplow date. The site is close to the head of a small streamlet, and it is assumed, although it cannot be proved, that the Arctic plant-bed is of Low-Terrace or Ponders-End date, and that it represents the silting of a stream which flowed across the Taplow Terrace.

The paper is accompanied by a report on the Arctic flora by Mrs. E. M. Reid & Miss M. E. J. Chandler, in which some 48 species of flowering plants are recorded, and the conclusion is reached that there is nothing to distinguish the flora from that of the previously-described localities of the Lea Valley.

2. 'The *Elephas-antiquus* Bed of Clacton-on-Sea (Essex), and its Flora and Fauna.' By Samuel Hazzledine Warren, F.G.S.

The paper describes detailed work on the flora and fauna of the well-known *Elephas-antiquus* Bed of Clacton-on-Sea. The deposit fills a deep, narrow, steep-sided river-channel which apparently had only a very short course, and flowed into the Thames or one of its tributaries when that river occupied the deep channel now submerged off the coast of Essex. The small Clacton channel was cut during this period of rejuvenescence in the Taplow-Terrace stage of the Thames Valley, and its silting-up may have been due to the first setting-in of the submergence which culminated in the estuarine sands that overlie the Elephant-Bed and occupy the upper part of the cliff-section.

The Clacton bed yields evidence of an abundant flint-industry which is one of the best-known representatives of the Mesvinian series. This is of Late Chellean or Early Acheulean date, although it shows no cultural connexion with those industries, but it may very well be the precursor of Mousterian.

The deposit is also rich in mammalian remains, and the commonest species are *Elephas antiquus*, *Rhinoceros megarhinus*, *Rh. hemitachus*, *Bos primigenius*, and *Cervus browni*.

MISCELLANEOUS.

On the Dates of G. W. F. Panzer's 'Fauna Insect. German.,'
1792-1844. By C. DAVIES SHERBORN.

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IN 1896, when preparing vol. i. of 'Index Animalium,' I dealt with Panzer, collating the first and second editions with E. Saunders's 'Index' (London, 1888). Then and ever since I have searched in all directions for clues to the dates of issue of the parts of edition i., and have been so far successful as to get a workable result. This is here tabulated for use and correction when anyone else takes the matter up.

The principal sources from whence these dates have been obtained are Allgem. Lit. Zeit.; Meyer's Zool. Annalen; Götting. gelehrte Anz.; Beckmann's Phys. Oek. Bibl.; Wiegmann's Archiv f. Naturges.; Panzer himself, Germar, Walckenaer, Treitschke, and many other authors and publications, quotations from which here would not advance the matter further, but merely cumber the issue.

The dates in [] are not absolutely exact, but can be relied on for all practical purposes:—

Heft.			Heft.	
1.	1792.	Sept.	36.	[1796.]
2.	"	Oct.	37.	"
3.	"	Nov.	38.	"
4.	"	Dec.	39.	[1797.]
5.	1793.	Jan.	40.	"
6.	"	Feb.	41.	"
7.	"	Mar.	42.	"
8.	"	Apr.	43.	"
9.	"	May.	44.	"
10.	"	June.	45.	"
11.	"	July.	46.	"
12.	"	Aug.	47.	"
13.	"	Sept.	48.	"
14.	"	Oct.	49.	[1798.]
15.	"	Nov.	50.	"
16.	"	Dec.	51.	"
17.	1794.	Jan.	52.	"
18.	"	Feb.	53.	"
19.	"	Mar.	54.	"
20.	"	Apr.	55.	"
21.	"	May.	56.	"
22.	"	June.	57.	"
23.	"	July.	58.	"
24.	"	Aug.	59.	"
25.	[1795.]		60.	"
26.	"		61.	[1799.]
27.	"		62.	"
28.	"		63.	"
29.	[1796.]		64.	"
30.	"		65.	"
31.	"		66.	"
32.	"		67.	"
33.	"		68.	"
34.	"		69.	"
35.	"		70.	"

Hefl.		Hefl.		
71.	[1799.]	131.	1835.	
72.	"	132.	" May.	
73.	[1800.]	133.	"	
74.	"	134.	"	
75.	"	135.	"	
76.	"	136.	"	
77.	"	137.	1836.	
78.	"	138.	"	
79.	"	139.	"	
80.	[1801.]	140.	"	
81.	"	141.	" Oct.	
82.	"	142.	" Oct.	
83.	"	143.	" Oct.	
84.	"	144.	1837. Jan.	
85.	"	145.	" Feb.	
86.	1804.	146.	" Mar.	
87.	"	147.	" Apr.	
88.	"	148.	" May.	
89.	"	149.	" June.	
90.	"	150.	" July.	
91.	"	151.	" Aug.	
92.	"	152.	" Sept.	
93.	"	153.	1838. Jan.	
94.	"	154.	" Feb.	
95.	"	155.	" Mar.	
96.	"	156.	" Apr.	
97.	[1805.]	157.	" May.	
98.	"	158.	" June.	
99.	[1805 or 6.]	159.	" July.	
100.	[1806.]	160.	" Aug.	
101.	}	161.	" Sept.	
102.		162.	" Oct.	
103.		163.	"	
104.		164.	" Oct.	
105.	}	165.	1839. Jan.	
106.		166.	"	
107.		167.	" Mar.	
108.		[1809.]	168.	" Apr.
109.	[1812-13.]	169.	" May.	
110.	1823.	170.	"	
111.	1829. Mar.	171.	"	
112.	}	172.	"	
113.		[1829-30.]	173.	"
114.	1830. Mar.	174.	[1840.]	
115.	}	175.	"	
116.		[1830-33.]	176.	1841. Jan.
117.		"	177.	" Feb.
118.		"	178.	"
119.	1833. Oct.	179.	" Apr.	
120.	" Dec.	180.	" May.	
121.	1834.	181.	" June.	
122.	"	182.	" July.	
123.	"	183.	1844.	
124.	"	184.	" Sept.	
125.	[1834.]	185.	"	
126.	"	186.	"	
127.	}	187.	"	
128.		[1834-5.]	188.	" Oct.
129.		"	189.	" Nov.
130.	1835. <i>Ante</i> Sept.	190.	" Dec.	

On the Dates of C. L. Koch, 'Deutschlands Crustaceen, Myriapoden und Arachniden,' 1835-44. By C. DAVIES SHERBORN.

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THESE forty Hefte, though a separate work, formed part of Panzer's 'Fauna Insect. German.,' by pre-issue, co-issue, or immediate reprint:—

Heft					
1	of Koch is	133	of Panzer, issued		1835.
2	" "	132	" "		1835.
3	" "	136	" "		1835.
4					
5	} issued by Koch in 1837 is	137	" "		1836.
6		138	" "		1836.
7		139	" "		1836.
8		140	" "		1836.
9		141	" "	Oct.	1836.
10		142	" "	Oct.	1836.
	of Koch is	145	" "	Feb.	1837.
11	" "	146	" "	Mar.	1837.
12	" "	148	" "	May	1837.
13	" "	149	" "	June	1837.
14	" "	150	" "	July	1837.
15	" "	151	" "	Aug.	1837.
16	" "	152	" "	Sept.	1837.
17	" "	155	" "	Mar.	1838.
18	" "	158	" "	June	1838.
19	" "	159	" "	July	1838.
20	" "	160	" "	Aug.	1838.
21	" "	161	" "	Sept.	1838.
22	" "	162	" "	Oct.	1838.
23					
24	} issued by Koch in 1839 is	167	" "	Mar.	1839.
25		168	" "	Apr.	1839.
26		169	" "	May	1839.
27		170	" "		1839.
28		171	" "		1839.
29		178	" "		1840.
30		174	" "		1840.
		175	" "		1840.
31	of Koch is	177	" "	Feb.	1841.
32	" "	182	" "	July	1841.
33	" "	183	" "		1844.
34	" "	180	" "	May	1841.
35	" "	185	" "		1844.
36	" "	186	" "		1844.
37	" "	187	" "		1844.
38	" "	188	" "	Oct.	1844.
39	" "	189	" "	Nov.	1844.
40	" "	190	" "	Dec.	1844.

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[NINTH SERIES.]

No. 65. MAY 1923.

LX.—*New or imperfectly known Corythoderini from British India* [Coleoptera]. By G. C. CHAMPION, F.Z.S., A.L.S., and E. WASMANN, S.J., Hon.F.E.S., Dr.Ph.H.C.

[Plate VI.]

INTRODUCTION.

THIS paper is based upon a study of various Indian Corythoderini belonging to Group V. of Schmidt's arrangement of the Aphodiinæ, the species of which are enumerated by him in part 20 of Junk's 'Coleopterorum Catalogus,' 1910. The material examined includes that belonging to the British Museum, the Hope Collection at Oxford (in which Westwood's types of *Chatopisthes fulvus* are to be found), and the Andrewes Collection, supplemented by three species captured by my eldest son "at light" at Tanakpur, Kumaon, in May 1921—about 40 specimens in all.

The sexes of these insects, with one exception, have hitherto been imperfectly understood, owing to lack of material. The ♂, as stated by Wasmann in his description of *C. heimi*, has the head broader and more distinctly bisinuate in front than in the ♀.

The tuft or fringe of hairs at the apex of the elytra is common to the two sexes. *Stenocorythoderus* has the elytra

depressed below the base (the basal tubercles thus appearing larger) and the sulci more oblique (and fewer in number) than in *Termitopisthes* and *Chaetopisthes*; and the prothorax furnished at the base with a subtriangular projection in the middle behind.

These extraordinary Aphodiid-beetles are all termitophilous, and they come freely "to light," sometimes as many as three species occurring together at the same place; Father Heim, too, has found more than one species in the nests of *Odontotermes obesus*.

Since this article has been in type Dr. Wasmann, to whom I wrote some time ago on the subject, has called my attention to his revision of the group Corythoderini issued in 1918 [Wien. ent. Zeit. xxxvii. pp. 7-17, pls. i., ii.], which, owing to the disturbed state of affairs on the continent, had not reached many of the libraries in this country, and had thus been overlooked by me. In this revision he adds two new genera, two new subgenera, and six new species to the Indian fauna, bringing the number of the latter up to thirteen, several of which are represented in the material before me. He has now been kind enough to examine the two new species described by me, and to write descriptions of several others which required comparison with insects previously named by him. The result of this examination has made it necessary for me to rewrite this paper, and to divide it into two portions: I., for which I am responsible, and II., by Dr. Wasmann. The latter includes his notes on or descriptions of the eleven species submitted to him, four more of which he considers to be new, making, with the two described by myself, six additions to the Indian list. In my own contribution the determinations of the known species other than *C. fulvus*, Westw., and *C. simplicipes*, Reiche, have been confirmed by Dr. Wasmann or are on his authority. He has prepared photographs of all the new species; these are reproduced on Plate VI., the references to which are given in the second portion of this paper.

Part I. By G. C. CHAMPION.

STENOCORYTHODERUS, Wasmann (1918).

1. *Stenocorythoderus braminus*.

♂. *Stenocorythoderus braminus*, Wasm. Wien. ent. Zeit. xxxvii. pp. 11, 12, t. 1. fig. 6 (1918).

Hab. Anand, Guzerath (*type of Wasmann*), Khandesh (*T. R. Bell, ex coll. Andrewes: iv., v. 1903*).

Three specimens captured by Mr. Bell "at light" in 1903, one of them with a larger and broader head than the others, presumably ♂, like the type, agree well with Wasmann's description and figure of *S. braminus*. The prothorax in this insect has two narrow, conical, pointed prominences at the base, separated by a short deep sulcus and limited externally by a sinuous excavation, and the transverse basal groove interrupted in the middle by a subtriangular prominence extending backward from between the conical tubercles. The elytra are deeply transversely depressed below the base, and have two oblique, posteriorly-widened, convex costæ on the inner portion of the disc (the inner one sutural), separated by broad deep sulci, the sutural ridge at the base and the humeri raised and strongly tuberculiform; the lateral portions and apex are almost smooth. The anterior tibiae are unidentate at the apex; the others are moderately broad and arcuately dilated at the base within. The basal joint of each tarsus is small. The type (length 2.6 mm.) was found in a nest of *Odontotermes obesus*. *Paracorythoderus marshalli*, Brauns (1900), from the Orange Free State, found in nests of *Odontotermes transvaalensis*, Sjöst. (= *Termes tubicola*, Wasm.), is an allied larger insect, with four anteriorly-evanescent, oblique, narrow sulci on the elytra, separated by rather broad convex interspaces, longer legs, &c.

TERMITOPISTHES, Wasmann (1918).

1. *Termitopisthes schmidti*, sp. n.

Elongate, convex, narrow, shining, ferruginous, clothed with scattered, short, fine, erect hairs, the basal groove of the prothorax fulvo-tomentose behind; very sparsely, finely, the transversely-depressed anterior portion of the head coarsely punctate. Prothorax scarcely as long as broad, with an anteriorly-abbreviated, deep median sulcus, which is gradually widened and still more deeply impressed towards the base, the convex space on either side of it produced behind into two subconical, backwardly-projecting prominences, which are limited externally by a short, very deep, sinuous sulcus, the basal groove sinuate laterally and extending forward along the margin to near the obtuse anterior angles, the thickened lateral margin dilated at about the middle, in front of the ear-like projection arising from near the hind angles. Elytra about as wide as the prothorax; each with four deep, posteriorly-abbreviated sulci, the juxta-sutural groove widening forwards, the dividing costæ

moderately convex, becoming narrower and sharper towards the base, the second, third, and fourth projecting forwards and dentiform in front; the apical declivity smooth, without cilia.

♂. Head rather broad, bisinuate in front, the median tooth prominent; anterior tibiæ bidentate at tip; intermediate and posterior tibiæ comparatively short, very little longer than the tarsi, widened from near the base, feebly sinuate, the posterior pair swollen at the tip; intermediate and posterior tarsi stout, short, the joints 1-4 swollen and submoniliform, gradually becoming smaller, 1 much thicker than 2.

♀. Head smaller, the anterior margin obliquely extending backward on each side of the small median tooth; intermediate and posterior tibiæ a little narrower, more equal in width, bowed inward, the tarsi of the same legs more slender and less swollen.

Length $2\frac{3}{4}$ -3 mm. (♂ ♀.)

Hab. Tanakpur in Kumaon (*H. G. Champion*: 8. v. 1921).

Nine specimens, one only of which is ♀, all attracted to "light." Separable from *T. wasmanni*, Schmidt, by the narrow median sulcus of the prothorax; the more convex elytral costæ, the second, third, and fourth of which (instead of the second only) are dentiform at the base; the shorter, apically-thickened posterior tibiæ; and the much stouter, submoniliform basal joints of the intermediate and posterior tarsi. See Wasmann, *infra*. A figure of it is included on Pl. VI. figs. 1, 2.

2. *Termitopisthes wasmanni*.

Chatopisthes wasmanni, Schmidt, Stett. ent. Zeit. lxxii. p. 33 (1911).

Termitopisthes wasmanni, Wasm. Wien. ent. Zeit. xxxvii. pp. 9, 14 (1918).

♂. Anterior margin of head feebly sinuate on each side of the median tooth; elytra subparallel at base; anterior tibiæ sharply bidentate at apex; intermediate and posterior tibiæ moderately broad, not produced at their outer apical angle, slightly dilated near the base within, the posterior pair feebly sinuate.

♀. Anterior margin of head almost as in ♂; elytra narrower at base, thus appearing more widened posteriorly; anterior tibiæ sharply unidentate at apex and with the ante-apical tooth smaller; intermediate and posterior tibiæ a little narrower, the latter more strongly sinuate.

Length $2\frac{4}{5}$ -3 mm. (δ ♀ .)

Hab. Nowatoli, Chota Nagpur (*type and Mus. Brit.*), Central India (*Capt. Boys, in Mus. Oxon.*), Tanakpur, Kumaon (*H. G. Champion: 8. v. 1921*).

I have seen eleven examples of *T. wasmanni*, including eight (♀ ♀) from the type-locality, all females but one. The following are its chief features: head with the anterior portion rather coarsely punctured; prothorax with a posteriorly-widened, very deep median sulcus, limited on each side towards the base by a stout, backwardly-projecting, conical prominence, exterior to which is a short deep sulcus, the transverse basal groove bordered externally by a fulvo-tomentose, strongly sinuate, laterally-projecting, ear-shaped ridge, the basal groove itself continued forward along the sides to near the anterior angles, the lateral margins thickened and dilated at the middle; elytra each with four deep, posteriorly-abbreviated sulci, the juxta-sutural groove widened forwards and extending to near the tip, the dividing costæ becoming broader and flatter towards the apex and curved inward anteriorly, the second raised and produced into a stout dentiform projection in front, the apex smooth and not ciliate; the basal joint of the intermediate and posterior tarsi short. According to Arrow [*Ann. & Mag. Nat. Hist.* (9) vi. p. 434, Oct. 1920], *T. wasmanni* is the δ of *C. fulvus*, Westw., but this cannot be the case, both sexes of each species being represented in the material before me. See Wasmann, *infra*, and Plate VI. fig. 3.

3. *Termitopisthes nobilis*.

Termitopisthes nobilis, Wasm. Wien. ent. Zeit. xxxvii. p. 14, t. 2. fig. 11 (1918).

Hab. Bangalore, S. India [*type*], Calcutta (*Mus. Brit.: ♀*).

There is a broken example of this species in the British Museum. The type was found with *Odontotermes bangalorensis*, Holmgr. See Wasmann, *infra*.

4. *Termitopisthes laticollis*.

Termitopisthes laticollis, Wasm. Wien. ent. Zeit. xxxvii. p. 15, t. 1. figs. 9, 10 (1918).

Hab. Bangalore, S. India, and Hoshangabad, Central India (*types of Wasmann*), Khandesh, S. India (*T. R. Bell, ex coll. Andrewes, in Mus. Brit.*).

Found with *Odontotermes bangalorensis* at Bangalore. The

Khandesh example was attracted to light. See Wasmann, *infra*.

5. *Termitopisthes parallelus*, sp. n.

Hab. Dehra Dun (Dr. M. Cameron, in *Mus. Brit.*: 9. v. 1921).

A description of this new species is given by Wasmann, *infra*, and a figure of it is included on Pl. VI. fig. 4.

CHÆTOPISTHES, Westwood (1847).

1. *Chættopisthes fulvus*.

♂. *Chættopisthes fulvus*, Westw. Trans. Ent. Soc. Lond. iv. p. 242, pl. xvii. figs. 6, 6 a-g (1847); Wasm. Deutsche ent. Zeitschr. 1899, p. 156, and Wien. ent. Zeit. xxxvii. pp. 9, 16 (1918).

♂. Anterior margin of head bisinuate and triangularly produced in the middle; intermediate and posterior tibiae extremely broad, each angularly produced at the outer apical angle (fig. 6 f of Westwood).

♀. Anterior margin of head obliquely directed backward from the small median tooth; intermediate and posterior tibiae not quite so broad, the outer apical angle of the former obtuse, that of the posterior pair angularly extended.

Length $3\frac{1}{2}$ –4 mm. (♂ ♀.)

Hab. CENTRAL INDIA (*Capt. Boys: types in Mus. Oxon.*, ♂ ♀); "India bor." (*Mus. Brit.*: ♂); Nowatoli, Chota Nagpur (R. P. Cardon, in *Mus. Brit. and Mus. Wasmann*: ♀), Malwas (*sec. Wasmann*).

Five specimens are placed under *C. fulvus* in the Hope Collection at Oxford: one ♂ and two ♀ ♀ of the insect figured by Westwood, and two ♀ ♀ of *T. wasmanni*, Schmidt. The type of *C. fulvus* (♂) has the prothorax broader than long, convex, the median sulcus narrow and very deep, and the transverse basal groove strongly sinuate on each side above the hind angles and connected laterally with the sinuate deep marginal sulcus; the elytra each with five very deep sulci extending from the base to near the tip, the dividing costae rather broad and strongly convex throughout, and the apices closely fulvo-ciliate; the anterior tibiae strongly unidentate at tip; and the tarsi rather slender, joint 1 of the intermediate and posterior pairs about as long as 2–4 united. A ♂ from Reiche's Collection, acquired by the British Museum in 1867, labelled "*C. fulvus*, Westw.,

India bor.," with the elytra more inflated posteriorly than in the type and the apical ciliation (? abraded or withdrawn beneath the elytra) partly wanting seems to belong to the same species.

2. *Chætopisthes (Chætopisthides) tibialis*, sp. n.

Hab. Khandesh, S. India (T. R. Bell, ex coll. Andrewes, in *Mus. Brit.*).

Three males, attracted to light. A description of this new species is given by Wasmann, *infra*, and a figure of it is included on Pl. VI. fig. 5.

These specimens differ from *C. fulvus*, Westw., ♂, in the anteriorly-dilated prothorax; the strongly-tufted apices of the elytra; the basally-dilated intermediate and posterior tibiæ, the outer apical angles of which are not extended outward; and the widened basal joint of the corresponding tarsi.

3. *Chætopisthes (Neochætopisthes) singalensis*, sp. n.

♀. Elongate, convex, shining, flavo-testaceous, clothed with scattered, short, fine, erect hairs, the basal groove of the prothorax fulvo-tomentose behind; very sparsely, finely, the transversely-depressed space on the front of the head rather coarsely punctate. Anterior margin of head obliquely directed backward on each side of the small median tooth. Prothorax broader than long; with a very deep, narrow, median sulcus and an equally deep transverse basal groove, the latter extending sinuously forward along the margin to near the rounded anterior angles, the reflexed basal margin projecting laterally and the lateral margin also arcuately dilated before the base. Elytra oblong-oval; each with five deep sulci, the dividing costæ convex and very prominent, extending to the apex; the humeri prominent; the apices narrow, each with a single tuft of rather long, radiating, stiff, fulvous hairs. Legs elongate; anterior tibiæ bidentate at apex; intermediate and posterior tibiæ much longer than the tarsi, moderately widened, straight on their outer edge; tarsi rather slender, joint 1 of the intermediate and posterior pairs about as long as 2-4 united.

Length 3 mm.

Hab. Trincomali, Ceylon (*Bainbrigge Fletcher*: 8. vi. 1907).

One female. A close ally of *C. fulvus*, Westw., differing

from the same sex of that species in the much narrower and straighter tibiæ, the anterior pair of which are distinctly bidentate (as in *T. wasmanni*); and the acuminate apices of the elytra, each of which is furnished with a single radiating tuft of long stiff hairs. The strongly costate, deeply 5-sulcate elytra separate it from *C. simplicipes*. See Wasmann, *infra*. A figure of *C. singalensis* is included on Pl. VI. fig. 6.

4. *Chætopisthes* (*Neochætopisthes*) *simplicipes*.

Chætopisthes simplicipes (Reiche), Gestro, Ann. Mus. Genova, (2) x. p. 907 (1891) (incomplete descr.); Wasm. Wien. ent. Zeit. xxxvii. p. 17, nota (1918).

Elongate, narrow, moderately shining, testaceous, very sparsely punctate, and clothed with a few fine, short, flavescent hairs, the basal groove of the prothorax fulvo-ciliate. Anterior margin of head sinuate on each side of the small median tooth in ♂ and obliquely directed backward from it in ♀. Prothorax convex, a little broader than long, with a very deep, narrow median sulcus and a deep basal groove, the latter extending forward along the sides to beyond the middle, the margins somewhat dilated in their basal half. Elytra long, oblong-oval; each with a short humeral and four dorsal sulci, the latter extending to near the tip, the dividing costæ convex, becoming wider and less raised posteriorly, the apices somewhat produced, narrow, and furnished with a tuft of stiff, bristly, fulvous hairs. Anterior tibiæ bidentate; intermediate and posterior tibiæ moderately broad, straight on their outer edge, slightly dilated near the base within; tarsi rather slender, joint 1 of the intermediate and posterior pairs about as long as 2-4 united.

Length 3-3½ mm. (♂ ♀.)

Hab. "India bor." (*ex coll. Reiche, in Mus. Brit.: ♀*), Nilgiri Hills, alt. 3500 ft. (*H. L. Andrewes: ♂*).

An immature ♀ in the British Museum, labelled as above, is presumably referable to the species in M. Oberthür's Collection, mentioned by Dr. Gestro in his account of *C. termiticola*. The mature ♂ from the Nilgiris has a broader, anteriorly bisinuate head. From *C. tibialis*, Wasm., this insect may be distinguished by the less dilated anterior portion of the prothorax in the ♂; the narrower, 4-sulcate elytra, with the costæ less raised on the apical declivity; the much narrower intermediate and posterior tibiæ, which are straight on their outer edge; and the slender tarsi. See Wasmann, *infra*, and Plate VI. fig. 7.

5. *Chætopisthes* (*Neochætopisthes*) *brevipes*, sp. n.

Hab. Nowatoli, Chota Nagpur (R. P. Cardon, in *Mus. Brit.* : vii.–viii. 1897).

A description of this new species is given by Wasmann, *infra*, and a figure of it is included on Pl. VI. fig. 8.

6. *Chætopisthes* (*Neochætopisthes*) *longulus*, sp. n.

Hab. Tanakpur in Kumaon (*H. G. Champion* : 8. v. 1921).

One female only captured at "light." A description of this new species is given by Wasmann, *infra*, and a figure of it is included on Pl. VI. fig. 9.

Part II. By E. WASMANN.

The following species have been communicated by Mr. Champion for description or verification:—

1. *Stenocorythoderus braminus*, Wasm.
(No. 223, p. 12, and Taf. i. fig. 6*).

Compared with my type from Anand (Guzerath). Agrees with it perfectly.

1 ♂, Khandesh.

2. *Termitopisthes schmidti*, Champ., sp. n.
(Pl. VI. figs. 1, 2.)

Differs from the other species of this genus (No. 223, pp. 13–15) by its nearly linear, high, cylindrical body, which is three times longer than broad; the broad but scarcely laterally prominent border of tufts at the base of the prothorax; the *very broad, moniliform tarsi*, whose segments in the middle and hind tarsi are as broad as or broader than long; the broad hind tibiæ *enlarged towards the apex*; and, finally, by the *6-toothed* base of the elytra, the three first pairs of costæ being produced into a short but sharp tooth (see fig. 2). The base of the first common costa (the suture) is not dentiform. Shape of prothorax similar to that of *nobitis*, Wasm. (No. 223, p. 14), with the sides parallel and

* This quotation refers to "Myrmecophile und termitophile Coleopteren aus Ostindien.—II. Scarabæidæ" (*Wien. ent. Zeit.* xxxvii. 1918, pp. 1–23, and pls. i. & ii.).

the anterior angles nearly quadrate. In other respects (form of the body etc.) more nearly allied to *laticollis*, Wasm. (No. 223, p. 15).

Long. 2·7, lat. 0·9 mm.

1 ♂, Tanakpur.

3. *Termitopisthes wasmanni*, Schmidt. (Pl. VI. fig. 3.)

Compared with my co-types of *wasmanni* from Schmidt and with my type of *nobilis*, Wasm. Agrees perfectly with *wasmanni*. This species is easily distinguished by the dense and coarse puncturing of the prothorax and its distinctly rounded sides.

1 ♀, Chota Nagpur, and a ♂ (?) from Tanakpur.

I give a photograph of the ♀ specimen, as I did not figure the species in my paper No. 223.

4. *Termitopisthes nobilis*, Wasm. (No. 223, p. 14, and Taf. ii. fig. 11).

Agrees with my type.

1 ♀, Calcutta.

5. *Termitopisthes laticollis*, Wasm. (No. 223, p. 15, and Taf. i. figs. 9 & 10).

Agrees with my type.

Easily recognized by the prothorax being broader than the elytra.

1 ♀, Khandesh.

6. *Termitopisthes parallelus*, Wasm., sp. n.
(Pl. VI. fig. 4.)

Easily distinguished by the broad, nearly parallel shape, resembling *Chaetopisthes brunneus*, Wasm.*, in this respect; the subquadrate, coarsely but sparsely punctured prothorax; the elytra nearly plain, except the second, highly elevated costa, which is prolonged into a basal tooth; the very long and towards the base much enlarged and deepened middle furrow of the prothorax; and by the soft and dense white pubescence of the elytra.

* No. 223, p. 17, taf. ii. fig. 13; type from Kirkee, near Poona, Bombay Pres.

In the fissure of the middle furrow of the prothorax on its bottom the white membrane of the exudatory tissue is visible (see Wasmann, "Zur näheren Kenntnis des echten Gastverhältnisses," *Biolog. Centralbl.* 1903). The golden-tomentose border of the base of the prothorax is very broad and ends in a very large, circular, laterally-prominent tuft of hairs. The sides of the anterior margin of the clypeus are rounded, the middle advances suddenly into a blunt point. The middle furrow of the prothorax begins very near the anterior margin; the disk is slightly convex, the sides near the anterior angles being feebly rounded (nearly parallel). The semilunar process above the hind edges projects as far as the circular tuft of hairs below it. The lateral furrow of the prothorax is deep, ending on each side in a blackish groove. The costæ of the parallel elytra are only very feebly elevated, except the slightly higher common sutural ridge and the very highly carinate second costa, which is produced into a tooth at the base. The interval between the second costa and the suture is extraordinarily large. The tibiæ and tarsi are setose, the elytra covered with very fine, dense, and pretty long white hairs. The first joint of the middle and hind tarsi is scarcely longer than the second.

Long. 3, lat. 1 mm.

Differs from *Termitopisthes* ("Chætopisthes") *termiticola*, Gestro (*Ann. Mus. Civ. Genova*, xxx. 1891, p. 904 & fig.), by its dark reddish-brown colour (*termiticola* is flavo-testaceous), the broader, more parallel body, the simply rounded sides of the clypeus, the semilunar lobe over the hind edges of the prothorax, the flatter, densely pubescent elytra, etc.

1 ♂, Dehra Dun, labelled as found "at light."

7. *Chætopisthes* (*Chætopisthides*) *tibialis*, Wasm., sp. n.
(Pl. VI. fig. 5.)

Nearly allied to *sulciger*, Wasm. (No. 223, p. 15), but differing thus:—Colour clearer yellowish red; elytra with very large but flat punctures on the intervals of the sulci (in *sulciger* not distinctly punctured); *the middle and hind tibiæ much longer and broader than in sulciger*, as long as the respective femora (in *sulciger* much shorter than these), three times longer than broad near the base (in *sulciger* four times longer than broad). [I have compared *both* sexes of my types of *sulciger* with *tibialis*!]

Long. 3.6, lat. 1.3 mm.

1 ♂, Khandesh.

8. *Chatopisthes* (*Neochatopisthes*) *singalensis*, Champ., sp. n.
(Pl. VI. fig. 6.)

Allied to *assmuthi*, Wasm. (No. 223, p. 16). Differs from the latter by having the sides of the prothorax *rounded* and strongly convergent towards the apex, and by the much *coarser puncturing* of the prothorax. Colour, as in *assmuthi*, very clear, almost straw-yellow ("stroh-gelb"). Shape less elongate, shorter.

Long. 3, lat. 1·3 mm.

1 ♀, Trincomali.

9. *Chatopisthes* (*Neochatopisthes*) *simplicipes*, Reiche (after Gestro!). (Pl. VI. fig. 7.)

In his remarks on this species (Ann. Mus. Civ. Genova, 1891, p. 907; see Wasmann, No. 223, p. 17) Gestro stated that Reiche's type was too imperfect for description. The specimen (♂) which you identify now with *simplicipes* differs from *assmuthi* in the following points:—Prothorax with sparse, *coarse* punctures (in *assmuthi* the puncturing is extremely fine), broader in form, not parallel-sided as in *assmuthi*, but a little narrowed towards the apex, the semi-lunar process above the hind edges more prominent; elytra *longer*, $2\frac{1}{2}$ times longer than broad (in *assmuthi*, ♂, scarcely twice as long as broad), the whole body therefore more elongate. Tarsi, colour, and size (long. 3·6, lat. 1·3 mm.) as in *assmuthi*.

1 ♂, Nilgiri Hills.

10. *Chatopisthes* (*Neochatopisthes*) *brevipes*, Wasm., sp. n.
(Pl. VI. fig. 8.)

Near *heimi*, Wasm. (No. 223, p. 17), of the same size and form of the prothorax and elytra; but differs thus:—Elytra less highly convex than in *heimi*; *tibiæ much shorter* [I have compared six of my specimens of *heimi*, ♂ and ♀, with *brevipes*]. In *brevipes* the middle and hind tibiæ are only half as long as the respective femora, and scarcely longer than the tarsi; in *heimi* they are only a little shorter than the respective femora, and much longer than the tarsi. Moreover, the tibiæ and tarsi in *brevipes* bear longer and more numerous setæ (short bristles) than in *heimi*. Colour red as in *heimi*, but less shining.

Long. 3·2, lat. 1·2 mm.

1 ♀, Chota Nagpur.

11. *Chaetopisthes* (*Neochaetopisthes*) *longulus*, Wasm., sp. n.
(Pl. VI. fig. 9.)

Distinguished from all hitherto described species (see Wasmann, No. 223, pp. 15–17) by its very slender, elongate body; the oblong, nearly quadrate prothorax, with towards the base a much enlarged and deepened middle furrow, whose terminal edges are a little prominent (approaching to that of *Termitopisthes*); the highly carinate costæ of the elytra (the costæ not prominent at the base as in *Termitopisthes*!); and the very long and slender, outwardly-curved hind tibiæ.

The prothorax is slightly longer than broad, with the sides parallel, the semilunar process above the posterior edges very prominent, and a narrow, but laterally somewhat prominent yellow tuft at the posterior margin. The elytra are very elongate, $2\frac{1}{2}$ times longer than broad, only slightly enlarged in the middle (the specimen being a ♀, the elytra will be narrower still in the ♂); the apex broadly bordered with four tufts of yellow bristles. The hind tibiæ are as long as the hind femora, very slender, curved outwardly near the base. Tarsi slender, the first segment of the middle and hind pairs much prolonged. Colour rufo-ferruginous, the intervals of the costæ on the elytra a little darker.

Long. 3·5, lat. 1·15 mm.

1 ♀, Tanakpur.

EXPLANATION OF PLATE VI.

[The photographs have been made by E. Wasmann on Silber-Eosinplatten ("Obernetter"). As the specimens are mounted on white card, shades and false reflexes are inevitable; some of them, moreover, are in imperfect condition. Nevertheless, these photographs will be an important help for the recognition of the types.]

All figures are magnified 10 : 1, except fig. 2, which is 13 : 1.

Fig. 1. *Termitopisthes schmidti*, Champ., sp. n. Type.

Fig. 2. — —. Side-view of the same type.

Fig. 3. — *wasmanni*, Schmidt. Compared with co-type.

Fig. 4. — *parallelus*, Wasm., sp. n. Type.

Fig. 5. *Chaetopisthes* (*Chaetopisthides*) *tibialis*, Wasm., sp. n. Type.

Fig. 6. — (*Neochaetopisthes*) *singalensis*, Champ., sp. n. Type.

Fig. 7. — (—) *simplicipes*, Reiche (teste Champion).

Fig. 8. — (—) *brevipes*, Wasm., sp. n. Type.

Fig. 9. — (—) *longulus*, Wasm., sp. n. Type.

LXI.—Two new Siluroid Fishes from the Ivory Coast, collected by Mr. Willoughby P. Lowe. By J. R. NORMAN.

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Chrysichthys velifer, sp. n.

Depth of body $4\frac{1}{2}$ in the length, length of head $3\frac{1}{2}$. Head $1\frac{1}{2}$ times as long as broad, upper surface of postorbital part slightly rugose; occipital process rather narrow, extending to the small interneural shield; snout rounded, $1\frac{1}{2}$ times as broad as long; diameter of eye $4\frac{2}{3}$ in length of head, $1\frac{3}{4}$ in length of snout, and about twice in interorbital width; mouth inferior, its width twice in length of head; præmaxillary band of teeth nearly straight, $3\frac{1}{4}$ times as long as broad, length of band more than $\frac{1}{3}$ width of head; vomeropterygoid teeth forming a narrow band interrupted in the middle; nasal barbel about $\frac{1}{3}$ diameter of eye; maxillary barbel $\frac{1}{2}$ to $\frac{2}{5}$ length of head; outer mandibular barbel longer than inner, about $\frac{2}{5}$ length of head. Gill-rakers rather long, 13 on lower part of anterior arch. Dorsal I 6; about $1\frac{1}{4}$ times as distant from base of caudal as from end of snout; spine feebly granulated in front; third soft ray longest, reaching to root of caudal when laid back. Base of adipose fin shorter than that of rayed dorsal, $2\frac{1}{2}$ in its distance from latter. Anal 11–12; 8 rays branched. Pectoral $\frac{3}{4}$ length of head, spine feebly granulated on outer border, strongly serrated on inner. Caudal deeply forked, upper lobe longest. Caudal peduncle $1\frac{1}{3}$ as long as deep. Grey above, silvery white beneath.

A single specimen, 370 mm. in total length, from Bandama River.

Closely allied to *C. nigrodigitatus*, Lacep., from which it may be distinguished by its broader snout, wider mouth, and longer dorsal rays.

Gephyroglanis lowei, sp. n.

Depth of body 5 times in the length, length of head $3\frac{2}{5}$. Head moderately depressed, granulated and striated above; opercle also slightly striated; occipital process longer than broad, in contact with the interneural shield; snout about as long as eye, which is oval and $3\frac{1}{4}$ times in length of head; interorbital width a little more than $\frac{1}{2}$ diameter of eye; nasal barbel minute; maxillary barbel a little shorter than head; outer mandibular barbel a little longer than inner, and slightly more than $\frac{1}{3}$ length of head; width of mouth about $\frac{1}{2}$ that of head; præmaxillary band of teeth straight.

Dorsal I 6; $1\frac{1}{2}$ times as distant from base of caudal as from end of snout; spine $\frac{2}{3}$ length of head; first three soft rays subequal, as long as head, reaching adipose fin when laid back. Base of adipose fin nearly twice in its distance from rayed dorsal. Anal 11; 8 rays branched. Pectoral spine $\frac{2}{3}$ length of head, strongly serrated on inner border. Caudal deeply forked, with pointed lobes. Caudal peduncle about $1\frac{1}{2}$ as long as deep. Brownish above, lighter below; base of rayed dorsal and adipose fin dusky; anal with a dark patch; a blackish patch behind gill-cover.

A single specimen, 105 mm. in total length, from Bandama River.

Closely allied to *G. tilhoi*, Pellegrin, differing chiefly in the form of the dorsal fin.

LXII.—*The Geographical Races of Lutreolina crassicaudata.*
By OLDFIELD THOMAS.

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THE distribution of the South American mink-like Opossum, *Lutreolina crassicaudata*, is a very peculiar one, as the animal occurs in British Guiana, and then only reappears in Paraguay and Argentina, being completely absent throughout Amazonia and Brazil.

Whether the British Guiana form, for which the name *turneri* is available, should be treated as a separate species from the southern ones, is rather doubtful, but after some consideration I am inclined to keep to the opinion expressed in the Catalogue of Marsupials that all the forms of the group may be considered as one species. For the range in size of the southern forms just includes that of *turneri*, so that there is no gap in the measurements, at least of the males, even if there is the great gap in geography. And, again, the southern forms, though presenting well-marked geographical races, all do, or seem likely to, intergrade, as there are there no geographical gaps to make unbridged gaps in the characters.

The forms I should recognize may be distinguished as follows:—

- A. Sexes materially different in size, skull-length of ♀ about 85 per cent. of that of ♂.
- | | |
|---|---------------------------|
| a. Skull-length of ♂ about 60 mm.; of ♀ 52. | |
| British Guiana | 1. <i>L. c. turneri</i> . |
| b. Skull-length of ♂ about 70 mm.; of ♀ 59. | |
| Paraguay | 2. <i>L. c. crassi-</i> |
- [caudata]*

B. Sexes approximately equal in size.

- c. Size larger, both males and females with skull 68-75 mm. in length.
- a³. General colour more brownish. Lower Parana from Santa Fé to Montevideo. 3. *L. c. paranalis*.
- b². General colour paler and more yellowish. Province of Buenos Ayres 4. *L. c. bonaria*.
- d. Size smaller; ♂ skull 60 mm., ♀ 58. South Uruguay and Rio Grande do Sul. 5. *L. c. lutrilla*.

1. *Lutreolina crassicaudata turneri*, Günth.

Size comparatively small: skull-lengths, ♂ 60 mm.; ♀ 52, the latter the smallest adult skull in the collection. General colour dark brown.

Only recorded locality, Better Hope, Demerara (*Rev. W. Y. Turner*).

Type. B.M. no. 79. 5. 1. 3.

2. *L. c. crassicaudata*, Desm.

Size larger: skull-lengths, ♂ 70, 65 mm.; ♀ 59, 57, 55. Colour greyish olivaceous.

Hab. Paraguay. Museum specimens from the Chaco west of Asuncion (*Insley, Marquis de Wavrin*).

3. *L. c. paranalis*, subsp. n.

Size large, the skulls of males of about the same length as in *crassicaudata*, and the females equalling the males, so as markedly to exceed those of the Paraguayan forms; skull-lengths, ♂ 69, and others, broken, of about the same size; ♀ 70, 69, 67, 68, 61, 68; two of unknown sex 74, 72. General colour comparatively dark brown, that of the type approximating to "buffy brown." Under surface also dark, and the peculiar purplish tinge found in the living animal more persistent in the skins than it is in other forms.

Dimensions of type (measured in the flesh) :—

Head and body 311 mm.; tail 282; hind foot 46; ear 26.

Skull: greatest length 69; combined length of ms^{1-3} 11.

Hab. Province of Santa Fé, extending apparently to the delta of the Parana and eastward to Montevideo. Type from Las Rosas, Santa Fé. Others from Noetinger, in the same province.

The range of this subspecies, both to north and south, is as yet rather doubtful, for though the Museum possesses specimens of the group from Corrientes and Goya to the north, and Isla Ella, Parana Delta, and Colon, Montevideo, which I provisionally refer to it, yet these are all more or less immature, and so not diagnostic. But *Lutreolina* does

occur all the way down the river, so that there is no gap which might indicate a specific separation between *crassicaudata* and *paranalis*.

Type. Adult female. B.M. no. 17. 5. 2. 22. Original number 2770. Collected 6th November, 1916, by Robin Kemp. Presented by Oldfield Thomas. Twelve specimens.

4. *L. c. bonaria*, subsp. n.

Size averaging even slightly larger than in *paranalis*, and similarly equal in the two sexes. General colour paler, more yellowish buffy. Under surface also paler.

Dimensions of the type (measured in the flesh):—

Head and body 350 mm.; tail 305; hind foot 47; ear 28.

Skull: greatest length 67; combined length of *ms*¹⁻³ 10.9.

Other skulls measure: ♂ 75, ♀ 76, 64.

Hab. Buenos Ayres Province, from the neighbourhood of Buenos Ayres (Belgrano) to Cape San Antonio; type from Los Yngleses, Ajó.

Type. Adult female. B.M. no. 20. 2. 7. 44. Original number 21. Collected 20th July, 1919, by H. E. Box, and presented by Oldfield Thomas. Eight specimens.

The greater pallor of these southern *Lutreolines* is very evident on the comparison of a series of them with those of Santa Fé, representative of *L. c. paranalis*, though individually the difference is not very striking.

5. *L. c. lutrilla*, subsp. n.

Size decidedly less than in any other of the southern forms, the male just equalling, and the female barely exceeding, the corresponding sexes of the little British Guiana subspecies. Colour at present indeterminable, as Darwin's specimen is apparently bleached, and the Rio Grande do Sul one is in spirit, but the general tone is probably about as in *paranalis*.

Dimensions of the type (measured on a skin preserved in spirit):—

Tail 230 mm.; hind foot 32; ear 20.

Skull: greatest length 58; combined length of *ms*¹⁻³ 9.4.

Greatest length of male skull 60.

Hab. Rio Grande do Sul and S.E. Uruguay. Type from San Lorenzo, R. Grande do Sul.

Type. Adult female, skin in alcohol. B.M. no. 85. 6. 26. 26. Collected by Dr. H. von Ihering.

Darwin's specimen from Maldonado, figured in the "Voyage of the 'Beagle,'" would appear to be the same form, which is distinguished by its very small size.

LXIII.—*On a Collection of Mammals from Tanganyika Territory.* By P. S. KERSHAW.

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THIS collection, which was sent to the British Museum for identification by the Game Warden of the Territory, Mr. C. F. M. Swynnerton, is of great interest, and has brought to light several new species. Both large and small mammals are included. The former include particularly fine series of spotted hyænas and river-hogs, which admirably illustrate the differences in pelage due to age.

The bulk of the collection was contributed by the Game Warden and his Assistant Game Warden, Mr. Arthur Loveridge, and their native employees. Other specimens were secured by Mr. C. B. Goss and Mr. D. W. Bishopp, Assistant Game Wardens, Mr. D. K. S. Grant, Conservator of Forests, while Mrs. Billinge of Rumruli, Iringa, has sent a skin of the rare monkey *Colobus gordonorum*, and two eland skins, one of which needs description as a new form.

All the type-specimens have been presented by the Game Department to the British Museum, as well as those of other species, which in some cases were not represented in the Museum collection. For these valuable donations I beg to express to the Game Warden, Mr. Swynnerton, the thanks of the Trustees.

As many of the localities are not to be found on most maps, I have added the approximate longitude and latitude the first time the names appear in the paper.

1. *Colobus palliatus*, Pet.

K. 199 (2 skins). Iringa (?), 35° 35' E., 7° 50' S.

2. *Colobus (Piliocolobus) gordonorum*, Matsch.

K. 193. Iringa District (topotype).

This skin, a flat one, is the first example of this species to be received by the Museum. It is much worn, the hairs being very short. The whole dorsal area from the tail to the black of the shoulders is rusty-red with a trace of black. According to Matschie this area should be shining black. He says, however, that the hairs have an orange band below the black tip. The worn state of the pelage will probably account for this discrepancy. In any case, there is much individual variation in the colour of the red members of this genus.

3. *Papio neumanni*, Matsch.

♀. K. 71. Usshora, Mkalama, 34° 25' E., 4° 25' S.

4. *Papio cynocephalus*, Linn.

♂. K. 20. Kilosa, 36° 55' E., 6° 55' S.
K. 170 (6). Tindiga, near Kilosa.

5. *Epomophorus wahlbergi*, Sund.

K. 200. No data.

6. *Lavia frons*, Geoff.

K. 201. Mangogo, Namanyere.

Namanyere is the district N.E. of Karema on Lake Tanganyika, about 31° to 32° E., 6° to 7° S.

7. *Rhynchocyon swynnertoni*, sp. n.

Most nearly related to *R. reichardi*, from Marungu, S.W. of Lake Tanganyika.

Ground-colour rather lighter than in *reichardi*, due to the light portions of the hairs being light yellow, and not golden or reddish yellow. This feature is most marked on the head, face, and cheeks, which appear almost grey when put in juxtaposition to *reichardi*. On the back are six stripes. The two centre ones are a blackish brown, rather wider than in *reichardi*, and with four yellow spots, not white or yellowish white as in *reichardi*. There are six spots in the second stripe, the anterior one very faint. These are rather lighter in colour than in the first stripe. The third stripes are of a rusty-red colour and obsolescent. They might perhaps escape notice, were not the colour brought out by the four, or perhaps five, light spots. Throat cream-buff. Hairs of chest buff with grey bases. Belly very thinly clothed with ochraceous hairs, succeeded posteriorly by a naked area beginning 50 mm. from the tail, and reaching to the tail-root. The average width of this naked area is 25 mm. Hair between tail and thighs on each side long and rufous-coloured. Forearm rufous above, contrasting with body-colour. Hands cinnamon. Feet russet with some darker markings. Tail of the *cirnei*, not the *stuhlmanni* type; black above, greyish brown below for proximal 142 mm.; smoke-grey above and below for terminal 52 mm. The extreme tip may be missing in this specimen.

Measurements of the type (taken from the dried skin):—
Head and body 270 mm.; tail 194; hind foot, greatest length with nail 76, without nail 68.

Skull missing.

Type. Adult female. Original number K. 29. B.M. no. 23. 3. 4. 5. Collected 22nd November, 1921, by Mr. C. F. M. Swynnerton.

Type-locality. Kipera, Kilosa.

Although not so gaily clad as *reichardi*, this species is more brightly coloured than any others of the subgenus hitherto described.

8. *Rhynchocyon (Rhinonax) petersi*, Boc.

K. 166. Lushoto Forests, Usambara.

9. *Elephantulus renatus*, sp. n.

A species with sternal gland. General colour of head and back drab. A large patch behind each ear whitish, passing into yellowish white. White markings about the eye large, but not so conspicuous as in *E. ocularis*. Hairs of under surface white with very short slaty bases. Colour of snout in front of the eyes drab-grey. Hands and feet white. Hairs of tail brown above, white below.

Dimensions of the type (taken in the flesh):—

Head and body 135 mm.; tail 122; hind foot 32; ear 22.

Skull: greatest length 36; nasals 13.5; interorbital breadth 6.4; length of upper tooth-row 17.6.

Type-locality. Gwao's, near Itigi, Singida, 30° 40' E., 4° 25' S., about 85 miles N.W. by N. of Kilimatinde.

Type. Adult female. Collector's number K. 56. B.M. no. 23. 3. 4. 6. Collected by Mr. Arthur Loveridge.

E. renatus is distinguished by the absence of any russet colour and by the conspicuous white patch behind the ears. It appears to be most nearly related to *E. pulcher* and *ocularis*, but is quite different in colour from either.

10. *Felis serval hindei*, Wrought.

♂. K. 174; ♀. K. 177. Kilosa.

K. 173. Mkalama.

The Mkalama skin has a much lighter ground-colour than the Kilosa skins, this being buff except in the middle of the back instead of ochraceous-buff.

11. *Felis ocreata*, Gmel.

♂. K. 85. Otto Plantation, Kilosa.

The body-colour of this specimen is a light grey, thickly covered on the sides and shoulders with small cinnamon

spots. Face and hind limbs striped. End of tail irregularly ringed, with black tip. There are thin black stripes on the head. Down the centre of the dorsal area the spots coalesce so as to form indistinct stripes. Hands and feet light yellowish brown.

This may prove hereafter to be a distinct local race.

12. *Acinonyx jubatus raineyi*, Hell.

K. 167. Purchased from native.

Although the locality is not given, the skin agrees so well with Heller's description that I have ventured to give the subspecific name. It is better to disregard Hiltzheimer's *A. guttatus ngorongorensis*, which was a Zoological Gardens specimen. In any case, the present skin does not conform at all to his account.

13. *Civettictis civetta orientalis*, Matsch.

♂. K. 49. Wami River (Karani Hussein's), Morogoro, 37° 35' E., 6° 55' S.

14. *Genetta suahelica*, Matsch.

♂. K. 46; ♀. K. 45. Mkata River (Karani Chibabwa's), Morogoro.

♂. K. 44. Mkata Station, Morogoro.

♂. K. 47. Kanga Camp, Mkata R., Morogoro.

♂. K. 43. Kimamba Station, Morogoro.

K. 226. Gongwe, Namanyere, 30° 30' E., 7° S.

K. 175. Malolo, Kilosa.

♂. K. 62. Mdjengo's, Singida.

15. *Helogale undulata*, Pet.

♂. K. 59. Jumbe Mbulu's, near Singida.

♂. K. 69. Mdjengo's, Singida.

16. *Mungos mungo*, Gmel.

♀. K. 72. Usshora, Mkalama.

17. *Hyæna hyæna schillingsi*, Matsch.

K. 24. Malolo, Kilosa (without skull).

♂. K. 66. Mtali's, Mkalama.

The Kilosa specimen agrees very well with Matschie's description of *schillingsi*, the only difference being that the ground-colour is light yellowish grey instead of whitish grey. The Mkalama skin is very much lighter. The ground-colour is practically white. The hairs of the long mane have very extensive white bases, so that the general effect is a light

greyish brown. The hairs of the tail are white with very short black tips. The feet are dirty whitish brown. This agrees in some respects with Matschie's account of *H. h. bergeri*. For geographical reasons, however, and pending the arrival of sufficient material for a judgment to be formed as to individual variation in this genus, I have placed the specimen under the earlier name.

It may be noted that the skull of K. 66 shows the second upper premolar in the diagonal position mentioned by Hollister in his paper on "East African Mammals" (Bull. 99, Smithsonian Inst. U.S. Nat. Mus. part i. p. 140, 1918).

18. *Crocuta crocuta germinans*, Matsch.

- K. 184, K. 186 (2); ♀. K. 4. Kilosa.
 K. 25. Malolo, Kilosa.
 ♀. K. 26. Mbwengi, near Kilosa.
 K. 183. Rudewa, near Kilosa.
 K. 185. Kidodi, near Kilosa.
 K. 184. Ugalla, 32° E., 6° 20' S.
 K. 187. Kigoma, 30° E., 4° 40' S., on Lake Tanganyika.
 ♂. K. 73. Simbo, Tabora, 33° E., 5° S.
 ♂. K. 67. Mtali's, Mkalama.
 ♂. K. 242. Handeni, Usegua, 38° E., 5° 45' S.
 ♂. K. 243. ? Mwanza.

In this fine series of spotted hyænas, there is an immense range in colour-variation. No two skins are alike, even those from the same locality. Age seems to be the dominating factor. The young in this series are grey with a brown dorsal tinge, black spots, dark brown feet, and long hair. The old are buff and white, with greyish-brown or russet spots, white or cream-buff feet, and very short hair. In the transition-period from youth to old age, the ground-colour appears to pass from grey to russet, clay-colour, and tawny, becoming lighter till the buff and white of old age is reached. The spots, which vary in size and regularity, change gradually from black to dark russet and grey-brown. The long hair of youth becomes short and mangy-looking in old age, while the feet change from black-brown to cream-buff or white.

19. *Canis mesomelas mcmillani*, Hell.

- ♂. K. 63. Mlawa, near Mkalama.
 K. 172. Mkalama.
 K. 194. No data.
 All have the tail black-tipped.

20. *Mellivora capensis*, Schreb.

♂. K. 42. Jumbe Abdullah Funge's, Mkindo River, Morogoro.

An old female with a white mantle and skull-length of 135 mm. This animal seems to be quite different from the Kilimanjaro form, *M. sagulata*, Holl.

21. *Funisciurus vexillarius*, sp. n.

A large handsomely marked squirrel, allied to the *carruthersi* group, with a large and very broad skull.

Fur long and very thick, not so soft as in *carruthersi*. Hairs of back of two kinds, (1) the shorter ones, which are blackish-slate at the base, becoming dark mummy-brown, with cream subterminal rings and black tips; (2) the longer ones which are black throughout their length. The general result is a cream-grizzled greyish brown. Rings of hairs on head and muzzle yellowish brown instead of cream. Lower half of ear with a conspicuous fringe of white hairs. Parts about the mouth tawny ochraceous. Hands tawny ochraceous. This colour deepens up the arm till it becomes a rich red-tawny covering the shoulder. Feet tawny ochraceous, which colour tinges the thighs and flanks, but the colour here is less vivid than on the arm. Hairs of underparts dark grey with long cream tips. Tail for the two proximal thirds clothed with hairs ringed pure black and white, the distal third being pure tawny. These tawny hairs, which are 70 mm. in length, have very short (3 mm.) black bases.

The rings on the tail-hairs are quite different in character to those of *F. carruthersi* and *F. c. tanganyikæ*. In the two latter there is a very long basal light ring, followed by one shorter black ring with a light tip. In *vexillarius* there are five white rings and four black of approximately equal length, the basal and terminal ones being white. This gives the tail a totally different appearance to that of *carruthersi*.

The skull is remarkable for its large size and exceptional breadth, while the teeth are correspondingly large.

Dimensions of the type (from the dried skin):—

Head and body 242 mm.; tail 210; hind foot without claws 52.

Skull: greatest length 54; basilar length 44.4; palatilar length 24.5; zygomatic breadth 33.6; interorbital breadth 17.5; nasals, length 16, greatest breadth (at posterior end) 9; breadth of brain-case 24.2; length of upper tooth-series, exclusive of p^3 , 9.2, with p^3 10.5; greatest length of mandible (without incisors) 33; greatest depth 19.6.

Type. Adult. Original number K. 202. B.M. no. 23. 3. 4. 24. Collected by Mr. C. F. M. Swynnerton.

Type-locality. Wilhelmsthal, Lushoto, Usambara.

Excepting the species next to be described, it would perhaps be proper to regard *carruthersi* as the nearest relative of this elegant and striking species. There is no sign of a side-stripe nor any other characters to connect it with the *pyrrhopus* group. The great size and exaggerated breadth of the skull are different to anything else in the genus.

The curious bright tawny tip to the tail is perhaps part of the process of some seasonal change. It certainly has a somewhat unnatural appearance.

22. *Funisciurus byatti*, sp. n.

This is another large species differing in colour and skull-characters from *vexillarius*.

The quality of the fur is much the same as in *vexillarius*, but much scantier. General colour of back grizzled mummy-brown, becoming greyer on the sides and dull rufous on the flanks and outside of thighs. Individual hairs as in *vexillarius*, but ochraceous-buff subterminal rings. Nose, parts about mouth, and a broad streak running through the eye to the ear rufous. Crown like back, but with a slight rufous tinge. Ear without a white fringe. Arms and shoulders dark rufous. Underparts as in *vexillarius*, but darker, the hairs having much shorter cream tips. Hands and feet tawny ochraceous. Tail coloured for one-fifth of its length like the back. The distal four-fifths is clothed with hairs having three buff rings and two black, the subterminal black ring, especially towards the end of the tail, being very broad. These rings are very apparent when the tail is viewed from the lower side. The tip of the tail is buff, not black as in *carruthersi*.

The skull, which is nearly as long as in *vexillarius*, is nevertheless very much narrower. The brain-case is more than 2 mm. smaller in breadth, the interorbital space 2 mm. narrower. The nasals of *vexillarius*, though of the same length as those of *byatti*, appear to be short and stunted when compared with them, owing to the great breadth of the former. Teeth not so broad as in *vexillarius*.

Measurements of the type (taken from the dried skin) :—
Head and body 264 mm. ; tail 210 ; hind foot 52.

Skull : greatest length 53 ; basilar length 43 ; palatilar length 24·8 ; zygomatic breadth 31 ; interorbital constriction 15·5 ; nasals 16×8 ; breadth of brain-case 22 ; greatest length of mandible (without incisors) 33, greatest

depth 19.6; length of upper tooth-series exclusive of p^3 9.2, with p^3 10.4.

Type. Adult. Original number K. 203. B.M. no. 23. 3. 4. 25. Collected by Mr. C. F. M. Swynnerton on the 3rd May, 1920.

Type-locality. Moshi, Kilimanjaro.

This species is named in honour of Sir Horace Byatt, the Governor of Tanganyika Territory, who has done so much to promote the study of the natural history of this imperfectly-known zoological region.

23. *Paraxerus palliatus suahelicus*, Neum.

♂. K. 35. Wami River, Morogoro.

♀. K. 34. Mkata River, Morogoro.

24. *Paraxerus ochraceus*, Huet.

♀. K. 36. Mkindo River, Morogoro.

25. *Paraxerus ochraceus aruscensis*, Pag.

K. 204. Moshi-Aruscha, Kilimanjaro.

26. *Dipodillus luteus*, Dollm.

♂. K. 74. Ulugu, Usshora, Mkalama.

K. 55. Gwao's, near Itigi, Singida.

27. *Taterona vicina*, Pet.

♀. K. 64 a, K. 64 b. Mlewa, near Singida.

♀. K. 54. Mbono, near Itigi, Singida.

28. *Tachyoryctes ibeanus*, Thos.

♀. K. 86. Nairobi, Kenya Colony.

29. *Rattus alexandrinus*, Geoff.

♂. K. 224 (3); ♀. K. 224 (4); ♂. K. 223; ♀. K. 223. Kilosa.

♂. K. 216. No locality.

30. *Rattus (Mastomys) coucha microdon*, Pet.

♂. K. 39; ♀. K. 39 (3). Bogoti, Wami River.

♀. K. 37 (3). Wami River.

♀. K. 81 (4). Kipera, near Kilosa.

♂. K. 75. Tabora.

♂. K. 57 (3). Jumbe Mbulu's, near Singida.

♂. K. 38; ♀. K. 38. Mkindo River, Morogoro.

K. 207, K. 227. No data.

31. *Rattus* (*Æthomys*) sp.

♂. K. 54. Mbono, near Itigi, Singida.

Allied to the *chrysophilus* group, but with smaller feet. The skull is unfortunately missing.

This opportunity may be taken to describe a new species of rat recently received from Uganda. It may be called

Rattus somereni, sp. n.

A small mouse-like form with tail equal in length to head and body.

This rat bears a superficial resemblance—except, of course, in tail and feet—to a young *Taterona*, the usual streaked mouse-brown of the back passing into the lighter and richer tawny of the sides till it meets the sharply separated pure white of the underparts, the hairs of which are white to their bases. Hands and feet white. Tail thickly clothed throughout its length with extremely short hairs, brown above, whitish below.

The skull is very similar to that of *R. blainei*, from Bahr-el-Ghazal, but the zygomatic plates are set more vertically, causing the infraorbital foramina to be narrower. Also the anterior internal cup of m^2 is somewhat reduced.

Dimensions of the type:—

Head and body 93 mm.; tail 93; hind foot 20; ear 15.

Skull: condylo-incisive length 25; basal length 25; breadth of brain-case 11; nasals (median line) 9.5; inter-orbital breadth 4.8; upper molar series 4.5. Palatal foramina as in *R. blainei* extend back to about the centre of m^1 .

Hab. Kabaroni, North Bugishu, Bukedi District, Eastern Province, Uganda, in the western foot-hills of Mount Elgon. Caught in grass on the mountain side, 7000 feet.

Type. Young male. Collector's number 108. B.M. no. 22. 12. 13. 31. Collected by Mr. W. N. van Someren, 13th February, 1922, and presented to the British Museum by the Chief Sanitation Officer, Entebbe.

The specimen, judging from the teeth, is young, and has clearly not grown to its full size. Unfortunately it is a male, so that the mammary formula has yet to be ascertained. Its affinities appear to be with the group of small multimammate rats, such as *R. blainei* and *gambianus*.

32. *Leggada bella*, Thos.

♂. K. 41. Jumbe Abdullah Funge's, Mkindo River, Morogoro.

K. 213. No data.

33. *Lophuromys aquilus*, True.

♂. K. 219 (2); ♀. K. 219. Bismarck Hut, Kilimanjaro.

K. 218 (3). No data.

♂. K. 53; ♀. K. 53 (2). Bagito, Uluguru Mts.

34. *Arvicanthis abyssinicus tenebrosus*, subsp. n.

♂. K. 76 c; ♀. K. 76 a, K. 76 b. Tabora.

A form darker in colour than any other subspecies of *abyssinicus* hitherto described.

No trace of a dorsal stripe. General colour between seal- and clove-brown. The light rings on the hairs much reduced. When viewed from in front, these rings are very inconspicuous, so that the pelage appears remarkably dark, especially on the head and shoulders. Viewed from behind the light rings show up more, producing a grizzled greyish-brown appearance. Halfway down the back a russet tinge appears, which increases over the flanks and root of the tail. Head the same colour as fore part of the back. Ears seal-brown. Fore feet dark seal-brown. Hind feet tinged with russet. The usual bicoloured tail. Under surface of body brown washed with grey.

Dimensions of the type:—

Head and body 125 mm.; tail 120; hind foot 30; ear 18.

Skull: greatest length 34; condylo-incisive length 33; basilar length 28; zygomatic breadth 18.2; nasals (median line) 12.5; interorbital breadth 5.1; brain-case breadth 14; diastema 8.7; upper molar series 7.2.

Type-locality. Tabora.

Type. Adult female. Original number K. 76 a. B.M. no. 23. 3. 4. 32. Collected on the 20th November, 1921, by Mr. Arthur Loveridge.

A. a. tenebrosus is remarkable for the darkness of its pelage, which is much darker than in *nubilans*. Its nearest neighbours are the light-coloured *A. a. neumanni* to the east in Irangi and *A. a. muansa* to the north, the colour of which is said by Matschie to be not unlike Peters's figure of *Pelomys fallax*, though more drab.

35. *Lemniscomys griselda rosalia*, Thos.

♀. K. 40. Bogoti, Wami River.

♀. K. 82. Kipera, near Kilosa.

36. *Lemniscomys barbarus* subsp.

♂. K. 60. Poona, Singida.

This specimen conforms exactly to Osgood's account of

L. b. albolineatus of Lukenya Mountain, Kenya Colony, except in the colour of the ears, which are tawny ochraceous instead of buff or cream-buff. There are three specimens among the abundant material in the British Museum—one from Fashoda, one from Bahr-el-Ghazal, and one from Northern Nigeria—with just this light type of coloration, all of which, so far as colour goes, are precisely similar to the one under notice. These three occur as isolated examples in districts occupied by *L. b. zebra* and *L. b. nigeriæ*. It should be noted that the type of *albolineatus* was also unique, and I am not aware that any more examples have come to light. These facts create a suspicion that these light-coloured individuals may be only aberrations from the true types.

37. *Rhabdomys pumilio diminutus*, Thos.

♀. K. 220. Bismarck Hut, Kilimanjaro.

38. *Otomys angoniensis elassodon*, Osg.

♀. K. 85. Rumruli, Iringa District.

39. *Thryonomys swinderianus variegatus*, Pet.

♂. K. 171. Kipera, Kilosa.

40. *Rhynchotragus kirki nyikæ*, Hell.

♀. K. 248. Tabora.

41. *Damaliscus korrigum eurus*, Blaine.

K. 247. Lake Chada, Namanyere.

A duiker antelope, received by the British Museum from Mount Elgon, is found to be a new species, and is here described:—

Cephalophus barbertoni, sp. n.

Type. Adult male (B.M. 23. 2. 15. 1). Collected and presented by Mr. I. Mitford-Barberton, F.R.G.S.

A medium-sized duiker with stout horns, allied to *C. ignifer*. Colour of back ochraceous rufous, brighter than in *ignifer*. A few black hairs appear on the nape and withers mixed with the others. Occipital tuft and crown a deep red-chestnut, the latter with a few black scattered hairs. A black line from the centre of the upper part of the eye to

the muzzle, above which it meets a similar line from the other eye. Below this line and starting from the eye there runs an ochraceous-rufous line 40 mm. long and 5 wide towards the muzzle, forming an "eyebrow." Below this the sides of the face are russet. Outside of ears dark brown with russet bases. The inner margin and lower third of the outer shortly fringed with white hairs. Throat and chin white. Belly brown in the middle line, ochraceous rufous at the sides. Parts between thighs white. Tail missing. Legs from "knees" and hocks to hoofs seal-brown. Hairs of occiput directed forwards, those of the nape backwards.

Skull broad and heavily built with large brain-case, exceptionally deep preorbital fossæ, and short anterior palatal foramina. Premaxillæ just reach nasals.

In the following measurements the numbers in brackets refer to *ignifer* (the type-specimen).

Dimensions of the type (taken from the dried skin):—

Head and body 897 mm. (810); hind foot with hoof 225 (240); ear 81 (81).

Skull: basal length 161 (162); greatest breadth 84.5 (79.5); muzzle to orbit 91.5 (94); nasals 75.5 × 34 (73 × 32); anterior palatal foramina 20 (25); palatilar length 96 (97); length of upper tooth-row 51.4 (53); of three upper premolars 22.3 (23.4); interorbital breadth, taken at the centres of the posterior margins 77 (70.5); greatest breadth across frontals at points midway between orbits and horn-cores 65.2 (60.5); greatest cranial breadth 67.4 (60).

Horns 92 (98) long, 86 (82) round the base, and with a basal diameter of 32 (31).

Type-locality. Mount Elgon, 7000 to 8000 feet, N.E. of Lake Victoria Nyanza.

C. barbertoni differs from *ignifer* mainly in the brighter chestnut of the pelage, the reduced dark face-markings, the white throat, the large brain-case, the deep preorbital fossæ, and the short anterior palatal foramina.

42. *Cephalophus (Sylvicapra) grimmii shirensis*, Wrought.

♂. K. 330. Mpiana, Namanyere.

43. *Redunca redunca tohi*, Hell.

♀. K. 249. Kachungu, Namanyere.

44. *Redunca fulvorufula chanleri*, Roths.

♀. K. 250. Maturiga, Namanyere.

45. *Kobus ellipsiprymnus*, Og.

♀. K. 232. Jumbe Nyani, Kissaki, Morogoro.

46. *Kobus defassa*, Rüpp.

♀. K. 228. Busenga, Ugalla River, Namanyere.

47. *Æpyceros melampus suara*, Matsch.

K. 111 (2). Rudewa, Kilosa.

The horn of one specimen measures in a straight line $19\frac{1}{2}$ inches (50 cm.).

48. *Tragelaphus scriptus massaicus*, Neum.

♂. K. 252. Kangamoja, Kigoma.

♀. K. 13 (2). Kilosa.

♂. K. 18. Kilosa (skull only):

49. *Strepsiceros strepsiceros* subsp.

K. 255. Malolo, Iringa.

There are nine stripes on each side, the anterior one rather faint. This skin was obtained from natives, and lacks the head, legs, underparts, and tail. The number of stripes shows that it must be related to *S. s. frommi*, Matsch.

50. *Taurotragus oryx billingæ*, subsp. n.

♀. R. 190. Uleti, Iringa (type).

The female and young elands of the Iringa District are so remarkable in their coloration, and differ so much from other forms, as to deserve a subspecific name. It appears to be a highland form. Mrs. Billinge of Rumruli, Iringa, in whose honour the subspecies is named, in March 1922 presented the skull and skin of an adult female, which she had shot, to the Game Department of the Tanganyika Territory. The Department has sent the skin to the British Museum for identification, and has kindly permitted it to be added to the Collection.

The skin lacks the head and hoofs.

The neck is a dusky fawn. The back, from the withers to the tail is bright bay, reminiscent of the colour of the Bongo, *Boocercus*, but rather lighter. This colour is continued along the upper part of the tail to the tuft at the end. Median line black, except for a short space behind the withers, where it is white. Eight clearly marked vertical stripes, and a few fainter ones behind them over the quarters. The bay-colour of the back passes gradually into the white of the belly. A black patch above the hind surface of knee.

So far as can be judged from the remains of the pasterns, they are black as in *pattersonianus*.

Mrs. Billinge, writing to the Game Department, says: "The elands here [Iringa] are very short in the leg, round, and heavy, and not tall. The cows are very red indeed, with black manes, and many long and distinct stripes. The younger cows are far redder than the accompanying skin, and, with the sun on them, appear as red as any animals can. The bulls, three of which I have observed closely and through glasses, are absolutely blue, and appear, even on the inside of legs, to have no fawn at all. The mane is black and very heavy. They have little below the neck, but a great deal above. The horns of both sexes are very short, massive, and heavy, with very wide spreads, and, so far as I can observe, the tips invariably point outwards; whereas in the others [Ruaha] they point inwards in all those I have seen. The contrast in colour is the sharpest I have ever seen between sexes in mammals. The country they frequent is the high cold parts, with huge great boggy and grassy plains, and the slopes, where they spend most of the year, thick, but low and scrubby, mahobohobo forests. They will face hills, when chased, that goats would think twice over, and, in spite of huge size and short legs, appear to go up them and among the boulders with the greatest of ease. They are in small herds of about four or five, the biggest I have seen consisting of about ten. I have never seen a small calf, so conclude that these are 'laid by.' The natives say that elands do this."

51. *Taurotragus oryx* subsp.

♀. R. 189. Kazera's, Kiganga, Ruaha, about 35° 37' E., 7° 30' S.

In this skin, also sent by Mrs. Billinge, the head and the entire legs are wanting. This is more of the ordinary eland type, though there is a distinct ruddy tinge on the back. The stripes are few, three on one side and two on the other, on the shoulders. This eland will probably be found to be identical with *pattersonianus*, but the skin is too fragmentary for this question to be settled.

Mrs. Billinge, of the eland from the Ruaha River, writes: "These elands are much higher on the leg, flatter-sided, and taller, and do not appear such heavily built animals, though actual difference in weight cannot be much. They are all, bulls and cows alike, the fawn-red of the present skin. A very old bull may look a little bluer, but not much.

None of them, except yearlings and two-year-olds, have many or distinct stripes, which are very short and apparently disappear when they grow up. Their horns are long and light, and turn in at the points, and all I have seen and watched had a very narrow spread between the horns. Also their faces are much longer and narrower than the Uleti elands, which have short, comparatively broad, faces, almost like cattle. They seem to me very different in type—the bulls even more than the cows.”

52. *Choiropotamus choiropotamus dæmonis*, Major.

K. 32. Kilimanjaro Reserve (skull only).

The skin is said to have been “black with a little white.”

53. *Choiropotamus choiropotamus johnstoni*, Major.

K. 196 a, K. 196 b, K. 197 a, K. 197 b. Ilonga near Kilosa.

54. *Phacochærus athiopicus massaicus*, Lönnb.

K. 195 (2 skulls, 1 skin). Rudewa, Kilosa.

55. *Procapra matschiei*, Neum.

K. 244 (5 skins). Mwanza, south coast of Victoria Nyanza.

Also 13 skulls, all from Mwanza.

These are all topotypes of *matschiei*. Neumann's account is very meagre. In fact, all that can be gathered from it is that it is a large species belonging to the large-toothed group of *capensis*, etc.

It may be said here that the skulls are large and heavily built, with an average basal length in the adults of 98 mm., and zygomatic breadth 60. The colour of the skins varies from yellowish brown to dark brown, and in all cases the crown of the head is suffused with rufous. Perhaps the light-coloured animals are young, as the skins are smaller, but unfortunately the skulls are not numbered.

56. *Heterohyrax brucei victoria-njansæ*, Brauer.

K. 244 (1 skin). Mwanza.

Also 3 skulls, all from Mwanza.

The quality and colour of the fur are quite different to the preceding species, being soft, short, and grey tinged with brown. Hairs of underparts white with grey bases. Dorsal spot tawny ochraceous, with central hairs tipped with white. Head missing.

Skull: basal length 79 mm.; zygomatic breadth 49.5.

LXIV.—*The Native Rat of Pearson's Islands, S. Australia.*

By OLDFIELD THOMAS.

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PROF. F. WOOD JONES, of Adelaide, has now been able, largely by the kind help of Sir George Murray, to make a second visit to the isolated Pearson's Isles, off the southern coast of South Australia, the place where he had previously obtained the interesting Rock-Kangaroo (*Petrogale pearsoni*) which I described last year*.

He has now sent half a dozen specimens of the local rat—the only other land-mammal of the islands,—and this I find to be a peculiar species, allied to the still existing *Rattus greyi* of the mainland of South Australia, but so modified as to demand local separation.

On the suggestion of Prof. Wood Jones I have named this animal in honour of Sir George Murray, the Lord Chief Justice, and Chancellor of the University of Adelaide, by whose generosity and assistance the former's expedition to the islands was rendered possible. Such exploratory work is of the greatest value to science, and Sir George's assistance in this respect cannot be too warmly appreciated.

Rattus murrayi, sp. n.

Most nearly allied to *R. greyi* of the mainland. Size about as in that animal. Fur fine and soft. General colour pale greyish washed with buffy brown, the grey showing through the brown more than in *greyi*, and the general tone consequently paler. Under surface drabby grey, the hairs broadly slaty at base, their tips drabby whitish; line of demarcation scarcely marked. Hands and feet white, with a certain darkening on the metapodials and digits which is not present in *R. greyi*. Tail rather shorter than in *R. greyi*, but imperfect or diseased in most of the specimens, this being, perhaps, due to severe competition in a small island.

Skull essentially similar to that of *R. greyi*, with similarly reduced supraorbital ridges; but the palatal foramina are more widely open and the bullæ are rather larger—the latter a character one would not expect to find in an island animal.

Molars conspicuously smaller than in *R. greyi*, and, indeed, far smaller in proportion to the skull than in the great majority of the species of *Rattus*.

* Ann. & Mag. Nat. Hist. (9) ix. p. 681 (1922).

Dimensions of the type (measured on the spirit-specimen before skinning):—

Head and body 134 mm.; tail 116; hind foot 28; ear 19.

Skull: greatest length 36·4; condylo-incisive length 34; nasals 14·6; interorbital breadth 5; breadth of brain-case 15·2; palatal foramina 7·5 × 3; length of bullæ 6·7; upper molar series 5·1.

Hab. Pearson's Islands, Investigator Group, S. Australia.

Type. Adult male (skinned from spirit). B.M. no. 23. 3. 28. 6. Collected by Prof. F. Wood Jones. Six specimens, all males.

This distinct species is readily recognizable by its pale colour, shortened tail, large bullæ, and, most of all, by its unusually small teeth.

LXV.—*New Subspecies of Metachirus.*

By OLDFIELD THOMAS.

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Metachirus opossum melantho, subsp. n.

A heavily blackened form from Colombia.

Upper surface deep blackish, absolutely black on the head, lightened on the body by silvery-grey tickings, but throughout darker than in other subspecies, the black not so restricted to the spine as to form a marked dorsal line. Under surface strongly contrasted buffy whitish, the hairs on chin, chest, and inguinal region buffy to their bases, those on neck and belly broadly slaty proximally except just along the exact centre line. Face black, supraocular spots very small, only about 7 mm. in diameter, and 11 mm. from each other; postauricular light spots scarcely perceptible. Front of forearms and hips very strongly contrasted whitish, the line of demarcation from the general dark colour sharply marked. Hands and feet with dark metapodials and sharply contrasted white toes. About one-quarter of the scaly part of tail white.

Dimensions of the type (measured in the flesh):—

Head and body 250 mm.; tail 280, its scaly part 230, its white tip 60; hind foot 40; ear 30.

Skull: condylo-basal length 66; combined length of ms^{1-3} 12.

Hab. Western Colombia, Chaco region. *Type* from Condoto, 300'.

Type. Young adult male. B.M. no. 14. 5. 28. 30. Original number 343. Collected 1st February, 1914, and presented by Dr. H. G. F. Spurrell. One specimen.

This is a very strongly contrasted black and white form, no doubt most nearly allied to Osgood's *Metachirus andersoni** (or, as I should prefer to call it, *M. opossum andersoni*) of Yurimaguas, N. Peru, but differs by its more uniformly blackish back, without development of a dorsal line, its less wholly clear buffy under surface, its smaller supraocular spots, and its contrasted whitish front surfaces of the forearms and hips.

Metachirus opossum nigratus, subsp. n.

A large blackish form with dark under surface.

General upper coloration about as in *andersoni*, the ground-colour dark with a black dorsal line, narrow on the nape, broad on the back. Under surface dull muddy greyish brown, with a small patch only on the chest buffy to the bases of the hairs. Crown and muzzle black. Supraocular spots of the usual large size, 12-14 mm. in diameter and about 7 mm. from each other. Postauricular whitish spots small, but more evident than in *melantho*. Arms dull greyish, like sides, their front surfaces scarcely lighter; hands and feet black to the metapodials, the digits brownish white. Tail with about one-fifth of its scaly part white.

Dimensions of the type (measured in the flesh):—

Head and body 265 mm.; tail 275, its scaly portion 240, its white end 40 mm.; hind foot 40; ear 35.

Skull: condylo-basal length 69; combined length of ms^{1-3} 12. Another skull from Chanchamayo is no less than 81 mm. in condylo-basal length.

Hab. Middle Peru. *Type* from Utcuyaco, Dept. Junin, 1600 m.; another skin and a separate skull from Chanchamayo.

Type. Adult female. B.M. no. 0. 7. 7. 62. Original number 947. Collected 21st April, 1900, by P. O. Simons. Presented by Oldfield Thomas.

This is also a dark form related to Osgood's *andersoni*, but differs by its muddy-coloured instead of buffy under surface, darker digits, and shorter white tail-tip.

* Field Mus. Publ. No. 168, p. 95 (1913).

Metachirus opossum azaricus, subsp. n.

A uniform grey subspecies without blackened crown.

Size rather smaller than in other subspecies. General colour above uniform mouse-grey without median dorsal darker line, the sides scarcely lighter than the back. Under surface buffy throughout, of greater or lesser intensity. Crown only faintly darker than the back, not definitely blackened as it is in most of the allied forms. Eyes, however, surrounded by black as usual. Supraocular spots fairly large, but not very sharply defined; their diameter about 12 mm., the space between them too vaguely defined for exact measurement, but somewhere about 9 mm. broad. Arms and legs grey, paler than the body. Hands and feet dull whitish. Tail with about half the scaly portion white.

Dimensions of the type (measured in the flesh):—

Head and body 277 mm.; tail 295; hind foot 35; ear 36.

Skull: condylo-basal length 65; ms^{1-3} 10.2.

Hab. Paraguay. Type from Sapucay.

Type. Old female. B.M. no. 3. 2. 3. 36. Original number 820. Collected 8th August, 1892, by W. Foster. Eight specimens.

By its smaller size and unblackened crown this Opossum is readily distinguished from the other subspecies of *M. opossum*, although the black crown is not always very strongly developed in the Brazilian *M. o. quica*.

I cannot refrain from naming it in honour of the famous Paraguayan naturalist Azara, as the animal I previously named after him, *Pseudalopex azarica*, suffered a nomenclatural mishap, as was also the case with the well-known *Didelphis azaræ*, whose name proved to be antedated by the ugly term *D. paraguayensis*, Oken.

Another name of Oken's, *Didelphis austro-americana**, belonging to the present group, should be considered as a synonym of *D. opossum*, L., as its basis is the same as that of *opossum*, and, now that the latter name has been restricted to the Surinam animal, *austro-americana* should follow it as a synonym, leaving *quica* available for the Brazilian subspecies.

Metachirus opossum crucialis, subsp. n.

A pale grey form without median dorsal line.

General colour pale mouse-grey, though the type may be a little faded. Median area of back not darker, so that the

* Lehrb. Nat. iii., Zool. ii. p. 1148 (1816).

whole upper surface is uniform grey. Under surface white, not very sharply defined, the hairs white to their roots, except just on the sides of the belly. Crown and muzzle scarcely darker than back; supraocular patches very large, about 13 mm. in greatest diameter, and only about 3 mm. from each other, the separating line being quite narrow. Arms and legs grey like body; hands and feet whitish. Tail with its white end about one-third of its scaly portion.

Dimensions of the type (measured on a re-made skin):—

Head and body 255 mm.; tail 260, its scaly part 200, its white tip 70; hind foot 38.

Skull: condylo-basal length 58.5; ms^{1-3} 10.3.

Hab. Central Bolivia. Type from Santa Cruz de la Sierra.

Type. Adult female. B.M. no. 47. 11. 22. 15. Collected by Mr. Thomas Bridges.

Evidently most nearly allied to the Paraguayan form, but distinguishable by its greyer colour (even if somewhat faded), the larger supraocular patches with unusually narrow division between them, the whiter under surface, and shorter white tail-tip.

Metachirus nudicaudatus imbutus, subsp. n.

Most nearly allied to *M. n. phæurus*, with which it agrees in the reduction of the white on the tail, but the body—and especially the flanks—strongly suffused with ochraceous, in this respect closely matching the more northern *M. n. colombianus*, Allen. Back darker along the middle line, but without a definite stripe. Under surface dull whitish from chest to anus, the throat and bands along sides of belly clear ochraceous. Crown and centre of nape black. Supraocular spots small, ochraceous. A well-marked ochraceous patch behind the base of the ear. Line from eye to ear blackish. Cheeks dull ochraceous. Forearms and legs grey; metapodials dark brown, digits whitish. Tail on the upper side dull brown nearly to the tip, below dull brownish white.

Dimensions of the type (measured in the flesh):—

Head and body 238 mm.; tail 259; hind foot 39; ear 29.

Length of lower jaw 40.5.

Hab. Mindo, Ecuador. 4200'.

Type. Adult male. B.M. no. 13. 10. 24. 71. Original number 183. Collected 12th June, 1913, by Gilbert Hammond. Presented by Oldfield Thomas. One specimen.

M. n. phæurus is the form characteristic of the humid western lowlands of Ecuador, and has a remarkably dull

brownish general colour, in addition to the reduction or absence of the white on the tail. The present form, coming from the higher ground towards the Andes, agrees with it in the latter character, but the body-colour is practically as bright and rich as in *colombianus* to the north or *tsehudii* from further south in Peru.

Metachirus nudicaudatus infuscus, subsp. n.

Most nearly related to *M. n. bolivianus*, Allen, with which it shares the blackish dorsal line, but the general colour is very much darker, darker in fact than in any other subspecies of *M. nudicaudatus*. While the sides of the back, outside the blackish median area, are in *bolivianus* buffy greyish, they are here approximately "mummy-brown," succeeded below by dull tawny on the flanks. Under surface buffy, strongest on the throat and edges of the belly. Cheeks and supraocular spots ochraceous, the dark line between eye and ear fairly well marked. Hands and feet dark brown, the digits scarcely paler. Tail brown with about 3 inches at the end white, the junction of the two colours quite irregular.

Dimensions of the type (measured on the skin):—

Head and body 240 mm.; tail 260; hind foot 38.

Skull: condylo-basal length 50; ms^{1-3} 8.6.

Hab. Inambari River, Peru.

Type. Adult male. B.M. no. 2. 7. 27. 8. Collected by G. Ockenden. One specimen.

Distinguished from *bolivianus* by its much darker general colour, browner feet, and the lesser extension of white on the tail. The size of the single skull is also less than is usual in the group.

Metachirus nudicaudatus modestus, subsp. n.

A dull greyish race almost without the rufous or fulvous tones found in other subspecies.

General colour above drab-grey, without darker median line on the back, and with scarcely any fulvous suffusion. Flanks slightly more fulvous, but far less so than in the Brazilian *M. n. myosuros*. Under surface uniform buffy, the hairs buffy to the roots. Throat but slightly more ochraceous. Supraocular spots sharply defined, nearly white. Cheeks buffy. Crown strongly black, and the line between eye and ear also black. Hands brown to the metapodials; fingers and whole of hind feet whitish. Tail nearly all white, the basal four inches only irregularly brown above.

Dimensions of the type (measured in the flesh):—

Head and body 255 mm.; tail 315; hind foot 40; ear 37.

Skull: condylo-basal length 56; ms^{1-3} 9.5.

Hab. Paraguay ; type from Sapucay.

Type. Adult female. B.M. no. 3. 2. 3. 38. Original number 850. Collected 2nd September, 1902, by W. Foster. Three specimens, adult and two young.

This Opossum is most nearly allied to the Brazilian *M. n. myosuros*, but is distinguishable by its more uniform greyish colour, without the usual ochraceous suffusion, which is especially marked on the flanks of the Brazilian form.

The young specimens, each about four inches in length, agree closely in colour with the adult, except that, as is not unusual in the young, there is more indication of a darker dorsal line.

LXVI.—*Two new Guenons from the Ivory Coast, West Africa.* By OLDFIELD THOMAS.

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JUST as the Squirrels obtained by Mr. Willoughby Lowe in the Ivory Coast Protectorate represented local races of previously-known Gold Coast and Sierra Leone forms, so his Monkeys prove on comparison to be distinguishable as local subspecies from their nearest allies.

Cercopithecus büttikoferi pygrius, subsp. n.

General characters as in true *büttikoferi*, but lighter throughout, with light greyish sides to the rump.

Dorsal colour more yellowish than in *büttikoferi*, less tawny ; narrowed on the rump, where it is banded on each side by a sharply-defined zone of pale grey, continuous with the white underside of the tail. Under surface more prominently white. Colour of head as in *büttikoferi*, though the light rings of the hairs are a little paler. Arms grizzled slaty, darkening to black on to hands, without the strong fulvous suffusion found in *büttikoferi*. Hind limbs similarly greyer and less buffy, the backs of the hams whiter. Tail rather paler than in *büttikoferi*.

Dimensions of type :—

Head and body 525 mm. ; tail 788 ; hind foot 150 ; ear 28.

Skull : upper cheek-tooth series 24·5.

Hab. Bandama, Central Ivory Coast Protectorate.

Type. Adult male. B.M. no. 23. 2. 3. 1. Original number 2069. Collected 3rd January, 1923, by Messrs. Lowe and Hardy. One specimen.

Readily distinguishable by the light greyish bands on the sides of the rump, the greyer arms and legs, and the purer white under surface. The Museum possesses two co-types of *büttikoferi* from the St. Paul's River, Liberia, with which the above comparison has been made.

Cercopithecus campbelli lowei, subsp. n.

Like true *campbelli*, with the exceptions that the dorsal colour is brighter, more yellowish, and less tawny; the forehead-crest begins deep fulvous at once instead of there being a certain number of whitish hairs at its front edge; the legs from the hips downwards are black (not quite as black as the feet), instead of being dark smoky grey; and the under surface is more distinctly white, well defined on each side from the smoky-grey line which separates it from the colour of the flanks.

Dimensions of the type (measured in the flesh):—

Head and body 545 mm.; tail 780; hind foot 147; ear 28.

Skull: greatest length 99; upper cheek-tooth series 25.

Hab. Bandama, Ivory Coast Protectorate.

Type. Adult male. B.M. no. 23. 2. 3. 2. Original number 2070. Collected 4th January, 1923, by Messrs. Lowe and Hardy. Two specimens.

The above differences are quite constant as compared with the six Sierra Leone and Liberian specimens, including the type, which have been used for making the comparison.

Named in honour of Mr. Willoughby P. Lowe, to whose abilities the Mammal Collection is so much indebted. He made a speciality of collecting Mammals during the recent Lynes-Lowe Expedition to Darfur, and has now obtained quite a number of interesting forms, including three new Squirrels, in the Ivory Coast Protectorate.

LXVII.—*Note on the Siluroid Fishes of the Genera Glyptosternum and Exostoma.* By C. TATE REGAN, M.A., F.R.S.

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IN 1842 McClelland (*Calcutta Journ. Nat. Hist.* ii. p. 584) established the genus *Glyptosternon*, which he diagnosed as follows:—

“Teeth like velvet, mouth situated in the lower part of the

head, which is broad and flat; eyes small and directed upwards; spines, when present, are concealed within the membranes of the fins; the pectoral and pelvic fins are broad, falcate, and situated in a plane with the lower surface of the head and body, which is more or less covered with mammillated and striated cuppers, for the purpose of adhering to stones. Without osseous plates on the body."

In 1860 Blyth (*Journ. Asiatic Soc. Bengal*, xxix. p. 153) divided McClelland's genus into four, restricting the name *Glyptosternon* to the first species—*G. reticulatus*.

Unfortunately nothing is known of *G. reticulatus* beyond McClelland's short description, which is as follows:—" *Glyptosternon reticulatus*, nob.—Without spines, the first ray of the pectoral and ventral fins soft and pinnate, giving off soft pointed cartilaginous rays along the anterior margin, which are enveloped in the membrane of the fin. *The under surface of the head and of the anterior part of the body form a flat corrugated surface.*"

Günther (*Cat. Fish.* v. p. 185) regarded *Glyptothorax*, Blyth, as a synonym of *Glyptosternon*, writing (p. 188) "McClelland, in describing his *Glyptosternon reticulatus* from Afghanistan, appears to have had a species very similar to *Gl. striatum*." With this opinion I agree, and I do not think the matter can be carried farther until *Gl. reticulatus* has been rediscovered and redescribed.

I have given these details because Mr. S. L. Hora, in a recent paper (*Rec. Ind. Mus.* xxv. 1923), proposes to transfer the name *Glyptosternon* (or *Glyptosternum*) to a number of species which have usually been placed in the genus *Exostoma*. His reason is that McClelland's description of the fins of *G. reticulatus* applies to these species.

Fortunately he gives some good figures, which will allow those who have not specially studied this group to judge for themselves. Those of species of the so-called *Glyptosternum* (Hora, nec auct.) show that the striation of the lower surface of the outermost rays of the paired fins extends over their whole surface, and that the chest is not "corrugated," but is covered with smooth skin. On the other hand, the figure of *Glyptothorax pectinopterus* (pl. iv. fig. 3) shows a structure of the paired fins and of the head and chest which might well be described in the words used by McClelland for *G. reticulatus*, the striation of the outermost rays of the pectoral and pelvic fins being restricted to their outer halves, and the "corrugated" structure of the adhesive disc being apparent.

In my opinion, there is no justification for Mr. Hora's use

of the name *Glyptosternum*, and every reason for retaining it in the generally accepted sense. For the species which differ from the type in having the skin covering the pectoral and pelvic spines smooth—not striated—the name *Glyptothorax* may be used by those who consider them worthy of generic or subgeneric distinction, Blyth's diagnosis being based on his new species *Gl. trilineatus*, which may be regarded as the type of *Glyptothorax*.

Mr. Hora has examined a fish from Tenasserim in the collection of the Indian Museum, which may or may not be one of Blyth's original specimens of *Exostoma berdmorei*. This fish is broken in pieces and not fit for investigation, but Mr. Hora thinks it may be a *Glyptothorax*. He therefore proposes to make *Exostoma* a synonym of *Glyptothorax*. A reference to Blyth's original description will leave no doubt that he had before him examples of a species congeneric with McClelland's *Gl. labiatum*. The description of the four separate patches of teeth, the lips united to form a sucker, the small gill-openings, the exceedingly slender dorsal spine, the long low adipose fin, and the smooth flat lower surface leave no doubt that *Exostoma berdmorei* is an *Exostoma* in the sense in which I used the name in 1905 (*Ann. & Mag. Nat. Hist.* (7) xv. p. 182), and nothing like a *Glyptothorax*.

LXVIII.—*The Fishes of the Family Icosteidæ.*

By C. TATE REGAN, M.A., F.R.S.

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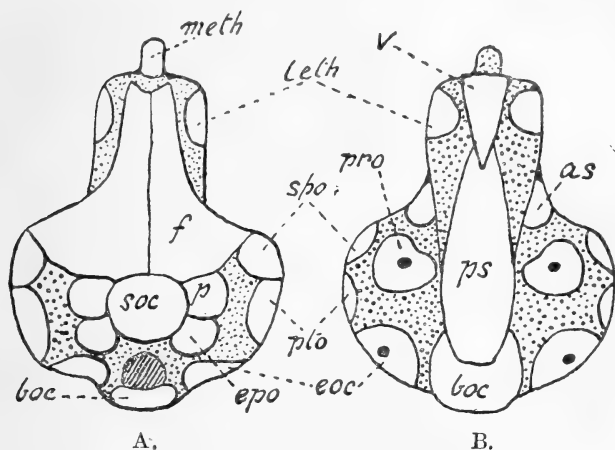
THE isolated family Icosteidæ comprises the monotypic genera *Icosteus* and *Acrotus*, from deep water off the Pacific coast of North America.

The family may be characterized as follows:—

Body ovate, strongly compressed, naked, or with scattered prickles. Mouth terminal, bordered above by the non-protractile præmaxillaries. Teeth in jaws small, pointed, uniserial; palate toothless. Gill-membranes separate; 4 gills; pseudobranchiæ present; 6 or 7 branchiostegals. No spinous fin-rays; dorsal and anal long, many-rayed; caudal peduncle slender and caudal fin fan-shaped; pectorals well up on sides, with subvertical curved base; pelvics, when present, 5-rayed, well behind pectorals. Air-bladder large,

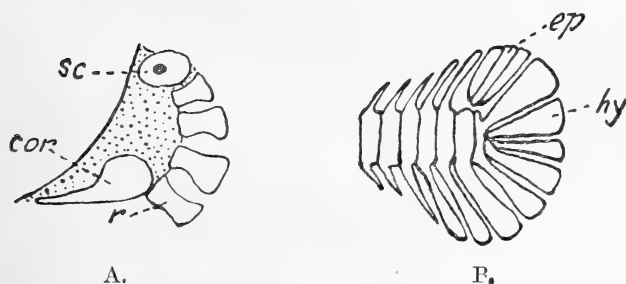
without duct. Skeleton weakly ossified, largely cartilaginous, soft, and flexible.

Fig. 1.

Skull of *Icosteus*, from above (A) and from below (B).

f, frontal; *p*, parietal; *meth*, mesethmoid; *leth*, lateral ethmoid; *soc*, supraoccipital; *boc*, basioccipital; *eoc*, exoccipital; *epo*, epiotic; *pto*, pterotic; *spo*, sphenotic; *pro*, prootic; *as*, alisphenoid; *ps*, parasphenoid; *v*, vomer.

Fig. 2.

*Icosteus enigmaticus*. Skeleton of pectoral (A) and caudal (B) fins.

sc, hypercoracoid (scapula); *cor*, hypocoracoid; *r*, radials;
ep, epurals; *hy*, hypurals.

I have studied the skeleton of an example of *Icosteus enigmaticus*, but the skull has been pushed out of shape,

so that the accompanying figures are to some extent diagrammatic. There appears to be a complete cartilaginous cranium, which is rather broad and somewhat depressed. The membrane-bones—parietals, frontals, mesethmoid, vomer, and parasphenoid—are thin. The cartilage-bones—basioccipital, supraoccipital, exoccipitals, epiotics, pterotics, sphenotics, prootics, alisphenoids, and lateral ethmoids—are for the most part separated from each other by cartilage. The slender palatine is attached to the anterior end of the vomer; the pterygoids, quadrate, etc., have no feature of special interest; the opercular bones are very thin, almost membranous.

The post-temporal is simple, attached to the epiotic; its lower fork is represented by a ligament. The coracoid ossifications are widely separated by cartilage, on which the four rather large radials are inserted. The small separate pelvic bones are remote from the pectoral arch.

The basalia of the dorsal and anal fins are not connected with the neural and hæmal spines.

The vertebral column comprises 70 vertebræ; the ribs are feeble and sessile; the hypurals have a radiating arrangement.

The exact systematic position of the *Icosteidae* is uncertain, but the great development of cartilage and the weakness of the bones is evidently secondary, and there is nothing in their organization to prevent the assumption that the *Icosteidae* represent a specialized and somewhat degenerate development of the *Perciform* type.

LXIX.—*The Classification of the Stomioid Fishes.*

By C. TATE REGAN, M.A., F.R.S.

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THE Stomioids are Teleostean Fishes of the order *Isospondyli* (or *Malacopterygii*); they are oceanic, some descending to considerable depths. They differ from the *Clupeoids* in possessing photophores, which are usually arranged in two series on each side of the lower part of the body. The dentigerous maxillary enters the gape and is firmly attached to the præmaxillary. The ribs are attached to short autogenous parapophyses which are inserted in pits

in the vertebral centra. The caudal fin skeleton is nearly as in the Clupeidæ, without upturned vertebræ.

A study of the osteology shows that the Stomiatoïds form two well-marked groups, of which the Gonostomatidæ and Astronesthidæ respectively are the most primitive families. The Gonostomatidæ are very near the Elopidae. Comparing *Photichthys* with *Elops** I find a striking agreement in the head-skeleton, the general form of the skull and the relations of the bones being almost exactly the same. In *Photichthys* the orbitosphenoid appears to be absent and the posterior temporal fossæ are somewhat smaller than in *Elops*, but there are no other differences of importance.

The skull of *Astronesthes* is much more specialized. There are no distinct subtemporal or posterior temporal fossæ, the frontals extend to the posterior end of the cranial roof, and the parietals are very small and separate. The præmaxillaries have anterior expansions which extend upwards over the mesethmoid, and the maxillary has no supramaxillaries (supplemental bones). The skeleton of *Astronesthes* shows many resemblances to that of the Cretaceous Enochodontidæ, a family that may belong to this group.

Synopsis of the Families.

- I. Præmaxillary without anterior expansion; maxillary with two supramaxillaries. Parietals meeting above supraoccipital. No barbel. Dorsal in advance or above anterior part of anal.

Body elongate. Skull elongate, with parasphenoid nearly straight. Epiotics separate; basi-sphenoid and alisphenoids present. Post-temporal forked; a mesocoracoid 1. *Gonostomatidæ*.

Body deep, strongly compressed. Skull short and deep, with parasphenoid bent at a right-angle. Epiotics meeting below supraoccipital; basi-sphenoid and alisphenoids absent. Post-temporal united with supracleithrum to form a rectangular bone, with short horizontal upper and long vertical lower limb; no mesocoracoid. Supraneurals projecting as a keel in front of dorsal fin 2. *Sternoptychiidæ*.

- II. Præmaxillary with strong anterior expansion extending upwards over ethmoid; maxillary slender, without supramaxillaries. Parietals very small and separate, or absent.

- A. Supracleithrum and mesocoracoid present; dorsal in advance of anal; an adipose fin; pectorals well developed.

* The head-skeleton of the Elopidae has been well described and illustrated by Ridewood (P. Z. S. 1904).

- Parietals present. A small plate-like post-temporal.
 First vertebra normal. Dorsal fin above or
 behind pelvics 3. *Astronesthidæ*.
- Parietals absent. No post-temporal. First vertebra
 very long. Dorsal fin well in advance of pelvics. 4. *Chauliodontidæ*.
- B. Parietals, post-temporal, supracleithrum, and mesocoracoid ab-
 sent. Dorsal and anal wholly or in great part opposed; no
 adipose fin; pectorals usually small or absent.
- Mouth wide; a hyoid barbel 5. *Stomiatidæ*.
- Mouth very wide; no barbel; mandibular sym-
 physis connected with hyoid by an elastic liga-
 ment; no integument between rami of lower
 jaw 6. *Malacosteidæ*.

Family 1. *Gonostomatidæ*.

I have examined skeletons of *Photichthys* (51 vertebræ), *Gonostoma* (39 vertebræ), and *Maurolicus* (34 vertebræ). Other important genera are *Cyclothone*, *Diplophos*, *Vinciguerria*, and *Ichthyococcus*. The last approaches the *Sternoptychiidæ* in the telescopic eyes, the narrow interorbital region, etc., but is essentially *Gonostomatid* in structure.

Family 2. *Sternoptychiidæ*.

I have examined the skeleton of *Argyropelecus* (36 vertebræ). The other genera are *Sternoptyx* and *Polyipnus*.

Family 3. *Astronesthidæ*.

I have studied the skeleton of *Astronesthes* (47 vertebræ). The other genera are *Borostomias* (with spaced maxillary teeth) and *Bathilychnis* (without hyoid barbel).

Family 4. *Chauliodontidæ*.

Chauliodus, the only genus of this family, is remarkable for its formidable dentition. In *C. sloanii* the vertebræ number 58; the neural arch of the enlarged first vertebra is represented by long paired laminae.

Family 5. *Stomiatidæ*.

I have examined the skeleton of *Stomias boa* (78 vertebræ). Most of the other genera (e. g., *Macrostomias*, *Echiostoma*, *Photonectes*, etc.) agree with *Stomias* in having the body moderately elongate, and the dorsal and anal fins opposed and nearly equal in length, but in *Eustomias* the anal is longer. *Idiacanthus* differs from the rest in being very elongate, with the tail long and slender and the dorsal fin longer than the anal.

Family 6. *Malacosteidæ*.

Three genera—*Malacosteus*, *Photostomias*, and *Thaumatostomias*.

LXX.—*On the Colours of the Sea Anemone, Tealia crassicornis.* By RICHARD ELMHIRST and JOHN SMITH SHARPE.

(From the Marine Biological Station, Millport.)

IN a previous paper (1920) we detailed an attempt to interpret something of the colour-variations of *Actinia equina*, and showed that the lipochrome pigments of that species act as "optical sensitisers producing active oxygen for the use of the animal through the medium of the respiratory pigment." This study has been extended to the species of *Tealia crassicornis* with similar results so far as the littoral forms are concerned.

Part I.—ENVIRONMENTAL. By RICHARD ELMHIRST.

Habitat, etc.—*Tealia crassicornis* is a well-known Anemone "distributed everywhere on the British coasts" (Gosse, p. 216) from the *Fucus serratus* level of the intertidal zone to moderate depths. Considerable changes are noticeable in the general characters and habits of the species as it is followed from littoral to benthic habitat. Taking (1) proportions, (2) texture of the skin, (3) occurrence of the wart-like suckers on the column, (4) habit of dressing in shell-débris etc., (5) pigmentation, and (6) exposure sought at various depths in tabular form:—

LITTORAL.	SUB-LITTORAL, including caves and large rock-pools.	DEEP-WATER.
1. Small and low, up to 3" broad × 1" high.	Larger, height about equal to width.	Large, 6" or more, usually higher than broad.
2. "Firm and even cartilaginous" (Gosse).	Less firm.	Soft.
3. Column thickly covered with wart-like suckers.	Less warty.	Warts absent, or of irregular occurrence.
4. Generally dressed in fragments of shell etc., closed during ebb, often half-buried in substratum.	Dressing not usual, always expanded, except when feeding.	.....
5. Heavy pigmentation of green, red, and brown; opaque.	Brighter reds, less dull green and brown.	Red and paler; pellucid.
6. In shelter under stones and in crevices, often several together.	Sides of caves, exposed on boulders, often numerous.	Single, on stones or large shells.

We find that as we go from the shore to deep-water :

- (1) The firm tough skin of the littoral forms disappears.
- (2) Individuals become larger.
- (3) The wart-like suckers disappear.
- (4) The habit of dressing correlated with 3 also disappears.
- (5) Intensity of pigmentation and tendency to close up decrease.
- (6) Exposure to tidal currents is sought rather than shelter in crevices.

Details confirming these conclusions may be found in the pages of Gosse (1860), Newbigin (1901), and various faunistic works too numerous to list. Examination of specimens from various localities and depths confirms Gosse's view that the shore *Tealia* (species *coriacea*, Cuvier) and the deep-water *Tealia* (species *crassicornis*, Müller) are forms of one variable species, and indicates that intermediate gradations occur in habitats of intermediate depth, light-conditions, etc. Some of the Clyde *Tealiae* are very near *T. tuberculata* (Cocks), which Gosse (p. 217) suggests is a synonym of *crassicornis*, but Dr. Cunningham (1890) inclined to regard them as separate. More recently Prof. Gemmill (1920) has studied the development of these shore and deep-water forms, and writes (p. 453):—"On general grounds I would have judged that the shore and the submerged forms were varieties of the same species had my account (see below) of the development of the mesenteries in the latter agreed with that of Faurot for the former." Later, he adds, "Material is being collected for a revisal of his work on this point"—viz., the order of occurrence of the primary mesenteries. I think it is well to add here that Faurot had no opportunity of examining very young specimens in which the primary mesenteries and tentacles were being formed.

Colour Significance.—The colour-schemes of littoral *Tealiae* are innumerable and extraordinarily variable, but the general prevalence, particularly on the column, of heavy red, green, and brown lipochromes suggests that the pigmentation has a physiological function as in *Actinia*. Spectroscopically and in certain chemical characters these red, green, and brown pigments are identical with the similar pigments in *Actinia* (McMunn, 1885), and we presume, therefore, have similar functions. In the case of *Actinia*, Mr. Sharpe showed "experimentally by Wager's method that these red and brown substances produce photo-chemical action with the release of active oxygen" (1920, p. 53), but in the case of *Talia* he has been unable to get a definite result, owing to the vast

quantities of mucus which pour from the tissues of *Tealia* when handled for the purpose. However, we still hope for a definite result, when a suitable modification of method and apparatus has been devised.

Besides any physiological function of the body-pigments, the general colour-schemes of contrasting patches of colour are to be regarded as protective in virtue of their "obliterative" value. Further, the habit of dressing seems to have a double protective function—firstly, as concealment and, secondly, as a check against dessication during ebb-tide. Similarly, the uniform brownish-olive tint of certain shore *Tealies* serves well for concealment, but it is impossible to detail every type of colour-pattern adopted by this protean species.

The varied colour-schemes of the tentacles and disc, together with the indefinite outline produced by the markings and disposition of the expanded tentacles, would seem to be a camouflage of still greater "aggressive" value. Confirmation of this is obtained by the following experiment:—Paint an expanded *Tealia* on a cardboard disc, shading in the natural background between the tentacles; cut out the coloured part of the disc and fix it on the top of the spindle of a hand-driven centrifuge, and spin comparatively slowly, when it will usually be found that the colours of the painting complement each other, giving the appearance of a white or faintly bluish disc. Sometimes when the primary disc-bands are strongly marked they form, when being spun, a reddish ring. The conclusion drawn from this experiment is that the camouflage-value of the general colour-scheme of the oral surface is very great, and is such that animals of imperfect powers of vision (*e. g.*, Amphipods) would fail to detect, visually, any danger from the presence of an anemone and swim straight into its clutches, which is exactly what normally happens. In the case of *Tealies* with very strong red markings on the disc, such markings might be "warning-coloration," and any creature seeing them and reacting would probably go straight into the outspread tentacles, in which case the final effect is to be regarded as, primarily, aggressive and, possibly, secondarily, warning (*cf.* Fleure and Walton, 1907, p. 218).

The facts that *Tealies* frequent sheltered crevices and expose the oral surface chiefly during flood-tide, when even the few feet of sea-water covering them cut off some light, tend to enhance the camouflage-value of the oral colour-schemes. Innumerable as the colour-patterns of the oral

surface of this species are, they may be grouped more or less as follows :—

Type 1. Colours complementary.

Type 2. Red of the primary disc-bands outstanding.

Type 3. Uniform sombre tint.

Type 4. Disc as any of the above associated with white tentacles.

Tealix in captivity are usually expanded at night, and I can confirm the observations of Fleure and Walton that they react to strong light by closing, which surely indicates that the pigmentation of the oral surface is adapted for use in weak light, whilst the denser pigmentation of the body-wall serves in strong light.

The lighter lipochrome pigmentation, brighter colours, and almost continual exposure of the oral surface of cave-dwelling and sublittoral specimens living in less brilliant light-conditions illustrates the reduction of pigment in reduced light, which is still further confirmed by the delicate colouring, absence of heavy lipochromes, and pellucid nature of specimens from depths of 30 fms. and more. The abundance of lipochromes, presumably with the power of producing active oxygen, in shore-forms and the comparative absence of them in specimens from totally submerged habitat, suggests a provision for some respiratory requirement during ebb in the former, which is not necessary to the latter.

Experimental.—When *Tealix* are kept in captivity they often lose much of their natural brightness and delicacy of colouring—as has been noted in the case of other species ; in such changes the general tendency is towards the assumption of a uniform sombre tint, such as is found locally in some shore *Tealix*. Deep-water *Tealix* also when kept in strong light lose brilliance and assume a more or less uniform brick-red shade. To test the relation between pigmentation and daylight, some shore *Tealix* were kept in complete darkness for six months in a tank with a good water-supply (well aerated and plankton available as food, more solid food being given fortnightly). At the end of the experiment, the pigmentation of the column, disc, and tentacles was found to have markedly decreased. The disappearance of pigment was most marked in the lower part of the column, and least marked in the tentacles. A rich red deep-water *Tealia* in the same experiment paled noticeably, except in the oral surface, and tended to assume a dull olivaceous shade from below upwards. In *Actinia*, similarly, paling took place ; in *Actinoloba* both orange and white varieties were tried, but

showed no change. A reverse result has been obtained in the case of two lightly pigmented *Tealix*, of the shore-type, taken in 25 fms. near the Eddystone Light, and kindly sent me by the courtesy of the Director of the Plymouth Laboratory. These specimens were kept in fairly strong daylight, in a good circulation, and in the course of two months showed a marked increase in the intensity of their pigmentation.

In deep water off the Cumbraes very large *Tealix* are obtained, some of which show a distinct and beautiful lavender shade in all parts of the animal. This peculiar shade disappears entirely in a few weeks if the specimen possessing it is exposed to experimental tidal conditions (about 5 hours dry in each 24 hours), but remains fairly constant in those possessing it if they are kept continually submerged in well-aërated water. This seems to be a colour-character occurring only in a small percentage of the deep-water specimens.

Summary.

(1) A comparison of various characters, physiological and structural, shows that the shore, deep-water, and intermediate forms of *Tealia* are adaptational varieties of one species, *crassicornis*.

(2) The intricate colour-scheme of the disc and tentacles is a camouflage of great aggressive value, with evidence of warning coloration in some forms. The body-colouring is oblitative.

(3) The occurrence of strong pigmentation (functioning as a light-screen) in littoral forms grading to the pellucid nature of deep-water forms suggests a relation between intensity of light and depth of pigment, which is confirmed by experiment.

(4) The prevalence of red in deep-water forms is dependent on the twilight conditions obtaining in depths of over 30 fms. in this latitude.

(5) Some deep-water *Tealix* have a distinctive lavender shade, probably due to a definite pigment.

Part II.—CHEMICAL. By JOHN SMITH SHARPE.

In continuation of the previous work on *Actinia*, the shore and deep-water varieties of *Tealia crassicornis* were investigated. By contrasting these it may be possible to throw further light on the physiological action of the pigments.

The methods used were similar to those recorded in the previous paper (1920).

In the shore variety a very marked amount of hæmoglobin derivative (respiratory pigment) was found, but in the deep-water variety, even in red specimens, a much smaller quantity was demonstrated; in some cases only the less refrangible band of the reduced alkaline solution was seen. Similarly, the ether-alcohol soluble lipochromes were abundant in shore-forms and scarce in deep-water forms. The positions of their screens were but little different from those found in *Actinia*.

The above-mentioned lavender-tinted deep-water colour-variety gave evidence of what seems to be new pigment, which was extracted in an aqueous-alcohol layer underlying the ether-alcohol extract. It was of a heliotrope-blue colour, and found both in the tentacles and body-wall. This pigment gave two well-marked bands, one in the yellow and one in the blue. The band in the yellow almost corresponded to the less refrangible band of oxyhæmoglobin, but the band in the blue was further to the right than that of the blood-pigment (see figure). Treatment with either acid or alkali, even when very dilute, caused the disappearance of the colour and these bands. Ordinary pigment solvents—chloroform, ether, benzol, etc.—did not take up this blue pigment, which does not seem to agree with any previously recorded. Lankester has described (1873) stentorine a blue pigment from the cortical substance of a *Stentoria* which gave two strong absorption-bands, one in the red and one in the green, similar to phycocyan, the blue colouring-matter from *Oscillaria*. The action of dilute acids (acetic, sulphuric, hydrochloric) did not appear to effect any change, but the colour was intensified by the addition of caustic potash, when the band in the red became darker and the more refrangible band disappeared.

M'Kendrick (1881) found that by macerating *Cyanea* in sea-water a sky-blue fluid was obtained, showing two distinct absorption-bands, one in the red and one in the orange. The addition of ammonia produced a copious precipitate soluble in acids, when the colouring-matter again goes into solution.

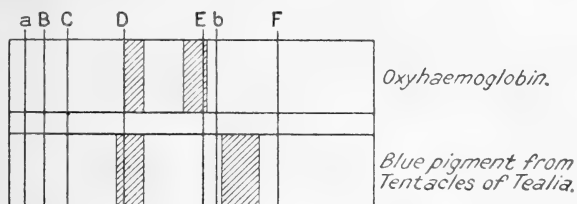
Further, Blanchard (1882) extracted a blue pigment from *Rhizostoma cuvieri* in 90 per cent. alcohol, which gave three bands, in the red, yellow, and green respectively—that in the yellow being almost coincident with the D-line.

Summary.

- (1) The shore-forms of *Tealia* are richer in both lipochrome

colouring-matter and hæmoglobin derivative (respiratory pigment) than the deep-water forms. As in *Actinia* the lipochrome-screen presumably acts as an optical sensitiser.

(2) A distinctive new hæmoglobin derivative occurs in a certain lavender-tinted deep-water colour-variety of *Tealia crassicornis*.



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LXXI.—*On some Butterflies from New Guinea and Tenimber.* By the Rev. G. HULSTAERT, M.S.C. (Heverlee, Louvain).

TWO new races of butterflies are described in the following pages, and a note is added on a form described in a former paper.

The types of the new races are in our collection at Heverlee.

Pieridæ.

Delias argenthona balli, Hulst.

Under this name I described, in the Ann. & Mag. Nat. Hist. (9) xi. p. 180 (1923), as a ♀ form a specimen in our

collection which, unfortunately, was unlabelled. Although there was some probability that this specimen came from Merauke (Southern Dutch New Guinea), I did not give any locality, as I was uncertain, especially as *D. argenthona*, F., was not then known from New Guinea. Considering, however, the history of our collection, it is very probable that this female came from Merauke. This has been confirmed by a letter from Mr. G. Talbot, who was about to publish the description of a female specimen of *D. argenthona* in the Fruhstorfer collection coming from this locality. This description, which the well-known lepidopterologist kindly communicated to me, agreed with the specimen described by me as ♀ f. *balli*, and Mr. Talbot also considers them the same. Thus the New-Guinean origin of ♀ f. *balli* is sufficiently certain, and this form is to be considered as a good local race.

In addition to this female, our collection contains an unlabelled *D. argenthona* ♂, which probably also came from Merauke for the same reason as indicated for the female, and which I think to be the ♂ of *D. a. balli*, although it differs but slightly from the typical Australian race.

In accordance with these considerations, I now describe this ♂ specimen, adding a more complete description of the ♀ than that given originally in this Magazine.

♂. *Above*.—Almost completely like true *argenthona*. Fore wing: subapical markings smaller, shorter; black border rather far from cell, regularly rounded and narrowed proximally, only 3–4 mm. on vein 4, 1 mm. below vein 3; black costal border closely irrorated with white to beyond middle. Hind wing: black border hardly dentate on veins, which are not black at their extremity, except vein 6.

Below.—Fore wing: black costal border entering 2 mm. into cell, covering the upper discocellular. Apical black, reaching the extremity of the cell, but leaving a proximally open white spot on middle discocellulars; subapical white spots smaller than in typical *argenthona*, but larger below than above; the spot between veins 4–3 touching discal white; black border dentate on vein 3 and a little on vein 2, covering vein 4 almost completely, regularly rounded, 2 mm. broad above vein 3, 1 mm. between veins 3 and 2. Hind wing: basal part yellow, white beyond origin of vein 7 and at extremity of cell between origin of veins 6 and 3. Outer black area regularly rounded-incurved, touching cell only at origin of vein 4; a small red discocellular spot, separated from the black area; red submarginal patches smaller than

n *D. a. argenthona*, longer than broad, defined by whitish; black marginal border broader, especially towards tornus.

♀. *Above*.—Ground-colour dead-white; base of both wings irrorated with black and yellow. Fore wing: differs from forma *seminigra*, Fruhst., in discocellular white spot being very small, subapical markings also smaller; black border covering extremity of cell, origin of vein 4, and outer half of vein 3. Hind wing: black terminal area diffusely limited by a rather broad area of grey suffusion; no discocellular nor submarginal markings, the transparent red patches of the underside taking their place.

Below.—Fore wing dead-white, base yellow; black border similar to above, discocellular and subapical white patches somewhat larger than above. Hind wing: basal half yellow, except a little white on costal part before black terminal area, which is distinctly limited, but not regularly rounded, passing through the extremity of the cell from beyond origin of vein 6 to that of vein 3. Red discocellular patch rather large, occupying the whole lower discocellular; submarginal patches somewhat broader than in the ♂, less distinctly surrounded with white, the band regularly rounded distally; black terminal border broad.

1 ♂, 1 ♀, Merauke, Southern Dutch New Guinea.

Note.—No doubt, many of the characteristics given above will prove simply individual when large series are examined. The racial character certainly in the ♂ is the larger extent of the apical black on the underside of the fore wing; the ♀ characters are given in *Ann. & Mag. Nat. Hist. l. c.*

Terias libythea dionysia, subsp. n.

♂. *Above*.—Darker yellow than in *T. l. zoraide*, Feld., dusted with black scales at the base. Black border of fore wing broader, extending to the point of separation of veins 6 and 7, narrowing regularly towards inner margin. Hind wing: border broader, 2 mm. under vein 6, dentate on veins 6 and 7, narrowing regularly and not so abruptly as in *T. l. zoraide*, Feld., and *drona*, Horsf.

Below.—Rather closely dusted with black scales, especially on hind wing, but no traces of cloudy bands; black terminal dots on veins. Fore wing: a stripe on discocellulars, a small dot in the cell. Hind wing: a small dot under vein 8 and one on lower discocellular.

Genitalia (text-fig.).—Claspers somewhat broader than in *T. l. zoraide*, more abruptly narrowed; no dorsal hook nor

tooth at middle; extremity a little more rounded, its dorsal angle right, not acute; hook of harpes not so long as in *zoraide*, more inwardly curved. Penis similar to that of *T. l. zoraide*, but not so acutely truncate at extremity, the truncation not sinuous, but straight.

Expanse.—35 mm.

1 ♂, Olilit (Jamdena), Tenimber, 1918 (*Rev. D. van Roessel, M.S.C.*).

This race differs from the allied *zoraide* and *drona*, in addition to the characters given above, by the shape of the wings, which are rounder, especially the posterior pair, and by the black border of the hind wing narrowing less abruptly, but remaining of nearly equal breadth up to the tornus. On account of the genitalia, however, this form seems to constitute only a local race.

The discovery of *T. libythea* in the Tenimber group is very



Genitalia of *Terias libythea dionysia*, subsp. n.

a, profile view of extremity of penis of *T. l. zoraide*; *b*, ditto of *T. l. dionysia*, subsp. n.

interesting, three species of the genus *Terias* being already known from there—*T. apatosa*, Hulst., *T. hecabe brevicostalis*, Butl., and *T. libythea dionysia*, Hulst. It would not be surprising if still further species, such as *T. candida*, Cr., and some Australian ones, should be found on these islands, on account of their known relationship with Australia and New Guinea on the one hand, and with the Timor group and the Lesser Sunda Islands on the other.

Danaidæ.

Euplœa confusa marinda, subsp. n.

Near *E. c. catana*, Fruhst.

♂. Fore wing rounder than in this race.

Above.—Much darker, almost completely black; discal pale area entirely brownish yellow, not lighter distally, not so large as in *catana* and in *iapudia*, Fruhst., not extending into cell nor above half interspace 3, remaining some mm. from outer margin, just passing vein 1, not reaching base of wing, its costal edge rounded, sharply limited above, diffusely

towards termen and inner margin; the ground-colour between it and the inner margin brownish, paler than the rest of wing. Hind wing similar to that of *catana*, but uniformly blackish, except a narrow brown anal area.

Below.—Still darker than above. Fore wing: discal pale area similar to that of *catana*, but not so large, scarcely entering into cell, reaching proximal half of vein 3, rounded costally, remaining some 3 mm. from termen, reaching inner margin. Hind wing: faint traces of the blue circuncellular spots.

1 ♂, Merauke, 1912 (*Rev. J. Viegen, M.S.C.*).

It is interesting to note the resemblance in the darkening process which exists between this new form and the Merauke race of *Euplæa alecto*, Butl. (*cf. Ann. & Mag. Nat. Hist.* (9) xi. p. 182, 1923).

LXXII.—*New Species of Crane-flies collected by Mr. G. V. Hudson in New Zealand.* By F. W. EDWARDS.

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THE seven new crane-flies described below were included in a very interesting collection received from Mr. Hudson in the spring of 1922, and form a very valuable addition to the already extensive series previously presented by him to the National Collection, besides furnishing additional evidence of the extensive and varied crane-fly fauna of New Zealand. The forms here described appear distinct from all those recently made known by Alexander, and bring the total number of New Zealand species to just about 300.

Tanyderus marginatus, sp. n.

Head heavily dusted with light ochreous, and clothed with long brown hair. Proboscis and palpi dark brown, the former nearly twice as long as the head and rather longer than the neck. Eyes almost but not quite touching above the antennæ. Antennæ with the scape dark brown; flagellum light brown, the segments all cylindrical, practically equal in length, and with rather inconspicuous pubescence, which is scarcely as long as the diameter of the segments (in *T. annuliferus* it is distinctly longer). Neck long and slender, dark brown. *Thorax*: pronotum dark brown in the middle, ochreous at the sides. Mesonotum with the ground-colour light grey, the three brown stripes just separated, long but inconspicuous brown hair along the interspaces. Scutellum

darkened in the middle. Pleura with obscure brown mottling, a rather conspicuous dark spot on the sternopleura. *Abdomen* dark brown dorsally, each of tergites 2-6 with a rather narrow oblique white mark on each side, commencing from the basal corner and extending a little over half the length of the segment; tergites 1 and 7 with a somewhat similar but more ochreous mark. Hypopygium dark brown, constructed as in the other New Zealand species. *Legs* yellowish, the tips of the femora, tibiæ, and tarsal segments dark brown, most conspicuous on the femora. Hair rather long and conspicuous, about twice as long as the diameter of the segments. *Wings* with the ground-colour whitish, except in cells *C* and *Sc*, where it is more ochreous, the greater part of the surface covered by the dark brown markings; veins yellowish, darker in most of the dark areas, all except *Sc*, *An*, and the cross-veins clothed with rather conspicuous macrotrichia. Markings much as in *T. forcipatus*, O.-S., but the borders of all the large spots are darkened, and in many places traces of the white ground-colour show between the spots and the dark borders.

Venation: the two accessory cross-veins separated by less than the length of one of them, both placed well beyond the fork of R_{2+3} . Cross-vein *m* angulated, each half about as long as the basal section of M_2 . Cell M_2 not much wider at the margin than cell M_3 . Halteres pale basally, knob dark brown.

Length of body 15 mm.; wing 17×5 mm.; front leg 33 mm.

North Island: in dense forest, ravine below reservoir, Wainui-o-mata, Wellington, 15. xii. 1920 (*G. V. Hudson*).

Type ♂ (unique) in Mr. Hudson's collection.

Amphineurus subglaber, sp. n.

Closely related to *A. horni*, Edw., differing as follows:—Wings rather broader and with a slight yellowish tinge; macrotrichia on membrane very few and scattered, quite absent from the greater part of the wing. Hypopygium: ninth tergite with the apical lobes short, divergent, not blackened. Side-pieces with two pairs of terminal processes (apart from the appendages), which are equal in length and about twice as long as the side-piece itself; the outer process hairy, of the usual form, the inner one (produced from the ventro-apical angle) bare, blade-like, somewhat expanded before the tip, which is acuminate. One pair of appendages short, bent inwards at the middle, the outer half blackened; the other pair long, basal half swollen, black, the outer third

or half slender, pale. Parameres long and black, with a small outward-facing tooth some distance before the tip. Penis long and sinuous.

Length of body about 4 mm.; antenna about 6.5 mm.; wing 6×1.5 mm.

North Island: Wilton's Bush, Wellington, xi. 1921 (*G. V. Hudson*, no. 378).

Type ♂ and one paratype ♂ in the British Museum.

Amphineurus niveinervis, sp. n.

Nearly allied to *A. fatuus*, Hutton, and *A. subfatuus*, Alex., but differing as follows:—Front and mid-femora without any trace of a pale ring; the ring on the hind femora broad, well defined on its inner edge, but gradually fading outwardly. Wing-markings as in *A. subfatuus*, but very indistinct. Veins all dark except round the tip of cell *R*, where they are snow-white. Venation as in *A. fatuus*, except that *Cu*₁ is less oblique and is equal in length to the stem of cell *M*₃.

Length of body 5 mm.; wing 6 mm.

North Island: Wilton's Bush, Wellington, xi. 1921 (*G. V. Hudson*, no. 351).

Type ♀ in the British Museum.

Limnophila strigimacula, sp. n.

Nearly allied to *L. marshalli*, Hutton, differing as follows:—Antennæ distinctly shorter, the flagellar segments barely four times as long as their greatest breadth; first flagellar segment ochreous, slightly darkened at the base, the remainder with the basal half blackish, the apical half ochreous, rather obscurely so on the terminal segments. Postnotum without the black median patch characteristic of *L. marshalli*. Hypopygium much as in *L. marshalli*, particularly as regards the form of the ninth tergite and claspers, but the horny dorso-basal appendage of the side-pieces is stouter and simple (not forked), the membranous flap on the inner ventral face of the side-piece is much larger, and there are, in addition, a pair of straight, pubescent, square-ended, strap-shaped, ventral appendages, which are absent in *L. marshalli*, though present in a very similar form in *L. cyatheti*, Edw. Wings with markings on much the same plan as in *L. marshalli*, but the spots smaller and the ground-colour of the wings more clouded, especially in the male; spot over base of *R*s irregular in shape, those over the tip of *An* and *Ax* in the form of hollow rings; the spot in cell *M* in the form of an elongate

dark streak; another shorter dark streak in cell *R*. Sc_2 scarcely three times its length distant from the tip of R_1 and beyond the base of R_2 ; basal section of R_{4+5} oblique; Cu_{1r} well before middle of discal cell.

North Island: Karori, Wellington (*G. V. Hudson*, no. 346).

Type ♂ and allotype ♀ in the British Museum.

This species is of interest, since it obviously connects *L. marshalli* with *L. cyatheti*. The venation, except for the position of Cu_{1a} , is practically as in the latter species, and the relationship is also shown by the coloration of the antennæ.

Gynoplistia orophila, sp. n.

♂. *Head* black, somewhat shining, but very distinctly dusted over with grey. Front broad, slightly broader than one eye. *Antennæ* black, 16-segmented, last five segments simple, the appendages of the intermediate segments about six times as long as the segments. *Palpi* black. *Thorax* shining black, the pronotum, the front of the præscutum, and the posterior lateral corners of the scutum reddish. *Pleura* with some rather inconspicuous grey hair. *Abdomen* shining black, the hypopygium bright orange. Ninth tergite with a rather long median projection, provided with a small tooth on each side at the base. Side-pieces with a rather long ventro-basal thumb and a broad ventro-apical plate-like expansion, and on the inner face with some rather dense orange hair. Inner clasper with the broad tip bent and twisted. *Parameres* bifid, the longer branch reaching tip of side-piece. *Legs* black; coxæ, trochanters, and about the basal halves of the femora orange. Hind femora rather strongly clubbed. *Tibial spurs* normal. *Wings* much resembling *G. nigronitida*, Edw.; in venation and pattern, but the spot at the base of the basal cells is only faintly indicated, while the wing-tip is much more conspicuously darkened. Halteres with ochreous stem and black knob.

♀. *Antennæ* 16-segmented; the ventral enlargement of the first eight flagellar segments about equal in length to the diameter of the segment. *Præscutum*, *scutum*, and *scutellum* mainly reddish, also the sternopleura. *Femora* rather more extensively orange; *tibiæ* brownish, with black tips; *tarsi* largely brown. Otherwise as in the male.

Length of body, ♂ 6, ♀ 8.5 mm.; wing, ♂ 7, ♀ 8 mm.

North Island: Whakapapa, Mt. Ruapehu, 4000 ft., Jan. 1922 (*G. V. Hudson*, no. 406).

Type ♂, allotype ♀, and paratype ♀ in the British Museum.

This seems nearly allied to *G. aurantiopyga*, Alex., differing in the orange coxæ and details of hypopygial structure.

Macromastix bivittata, sp. n.

♂. *Head* mostly clear light ochreous, but with a rather broad dark brown band on the vertex, connecting the eyes, and angularly produced forwards in the middle, where it is interrupted by a narrow pale longitudinal line. Front at its narrowest part equal in breadth to one eye. Frontal tubercle moderately large and rather deeply bifid. Rostrum ochreous, scarcely as long as the vertical diameter of the head; nasus hardly distinguishable. Antennæ short, hardly more than half as long as the thorax. First scapal segment ochreous, second a little darkened; flagellum wholly black, the ten distinct segments all approximately cylindrical and equal in length. Palpi black. *Thorax* practically bare, the integument dull, except the middle and posterior part of the præscutum, which is somewhat shining. Prothorax entirely ochreous. Præscutum with the ground-colour greyish ochreous in the middle, brownish at the sides, but mostly occupied by *four* distinct blackish-brown stripes, the outer pair a little more intense and continued across the scutum. Scutellum dull ochreous. Postnotum ochreous, the lateral and posterior margins rather broadly dark brown. Pleura ochreous; an ill-defined dark stripe along the anterior border of the mesepisternum, and another much fainter stripe along the posterior border of this part. *Abdomen* short, deep ochreous, almost orange; a pair of irregular sublateral blackish stripes extending the whole length; seventh tergite greyish, eighth black; hypopygium small, inverted, dull ochreous. *Legs* almost uniformly brownish, except for the ochreous coxæ and trochanters. *Wings* clear; stigma and subcostal (not costal) cell dark brown; veins dark. *Rs* almost as long as *R* and more than twice as long as R_{2+3} , which is rather strongly arched at the base; *r* present, joining R_2 near its base; petiole of cell M_1 about one-third as long as the cell; cell *Ax* rather broad (as in *M. tenera*). Halteres dark.

♀. Resembles the ♂, except that the apical flagellar segments are thinner and less distinctly separated and the tarsi are a little shorter.

Length of body 7-8 mm.; wing 12-13 mm.; hind tarsus, ♂ 18, ♀ 13 mm.

North Island: Waimarino and Kaitoke (*G. V. Hudson*, no. 374).

Type ♂, allotype ♀, and paratypes ♂ ♀ in the British Museum.

The only other New Zealand species with the type of abdominal markings found in this interesting new form are *M. tenera* (Hutton) and *M. pseudotenera*, Alex. With the latter of these *M. bivittata* agrees in most respects, but differs in its shorter antennæ and longer *Rs*. From *tenera* it differs obviously in the dark marking on the head, four præscutal stripes, markings of postnotum, etc.

Macromastix elongata, sp. n.

Head almost uniformly orange-brown, slightly dusted with grey at the sides behind the eyes. Pubescence fine and pale. Front not much more than half as broad as one eye. Frontal tubercle rather large, slightly but distinctly bifid at the tip. Rostrum about as long as the head, orange-brown, somewhat darker beneath. Nasus long, clothed with conspicuous long golden hair. Antennæ with the scape ochreous, flagellum black; first six flagellar segments distinct and equal in length, though decreasing slightly in diameter, the terminal four segments very slender and indistinctly separated. *Thorax*: pronotum dark brown at the sides, greenish brown in the middle, pale posteriorly. Mesonotum with scarcely perceptible pubescence, ground-colour dull greenish. Præscutum with four brown stripes, the margins of which are darkened, middle pair of stripes almost contiguous. Scutum with two broad brown stripes. A blackish spot in the middle of the suture. Scutellum brown, sides narrowly greenish. Postnotum and pleura dark brown, heavily dusted with grey, the pleura with two ill-defined almost black spots. *Abdomen* rather elongate, dark brown, somewhat shining, the posterior and lateral margins of the tergites narrowly pale. Ovipositor long, but fleshy and hairy as in the genus. *Legs* very long, coxæ coloured as pleura, remainder of legs uniformly rather dark ochreous. *Wings* very slightly milky, cells *C* and *Sc* orange-brown, stigma rather elongate, blackish, with a very small pale spot at each end, veins brown. Venation: *Rs* short and straight, a little shorter than R_{2+3} . R_2 oblique, almost continuing the direction of R_{2+3} and nearly half as long as this vein. Petiole of cell M_1 rather shorter than *m*; *m-cu* obliterated; cell *Ax* rather broad. Halteres with dark stem and greenish knob.

Length of body 25 mm.; wing 25×5.5 mm.; hind femur 13.5 mm.; hind tibia 15 mm.; hind tarsus 22 mm.

Type ♀ (unique) in Mr. Hudson's collection.

North Island: Mt. Ruapehu, in swamp at edge of forest

near Whakapapa Cottage, 3700 ft., 9. i. 1922 (*Miss S. Hudson*).

Although this differs in general appearance from most species of *Macromastix*, and rather strongly suggests a species of *Holorusia*, the fleshy ovipositor and the absence of a spur in cell *M* show that it has no close connection with *H. novaræ* and allied species. On the other hand, it shows considerable affinity with the species of the *viridis* group of *Macromastix*, and seems to have a near ally in *M. angusticosta*, Alex., which has no nasus, femora with black tips, etc.

LXXIII.—*On the Larva, Pupa, and Systematic Position of Orphnephila testacea, Macq. (Diptera Nematocera).* By L. G. SAUNDERS, M.Sc. (McGill), 1851 Research Student*.

[Plates VII. & VIII.]

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HISTORY.

THE adults of *Orphnephila* have long been known in Europe, from Lappland and Norway to Italy; one species, *O. testacea*, occurs sparingly in the United States, and very recently a number of species have been discovered in New Zealand and Tasmania. Prior to the discovery of the early stages, a special family, Orphnephilidæ, was erected to accommodate this embarrassing genus, which would not conform to the specifications of any family among the Nematocera; Macquart, Meigen, and Kieffer agreed in placing it between the Mycetophilids and the Cecidomyids.

In 1909 Thienemann found the larvæ and pupæ of *O. testacea* living in small streams and brooks, where the water runs very thinly over smooth rocks. When appealed to, Kieffer at once pronounced that this was a Chironomid, and the group was made the first subfamily of the Chironomidæ, with the Ceratopogoninæ second. This information was published by Thienemann (1909) with a brief description

* From the Moltano Institute for Research in Parasitology, University of Cambridge.

of the early stages, accompanied by a discussion of the other insect-larvæ which live under similar conditions.

Bezzi (1913) is still of the opinion that *Orphnephila* represents a distinct family, related on one side to the Blepharoceridæ and on the other to the Psychodidæ-Culicidæ and the Chironomidæ, but not to be joined to them, being of earlier origin than any of these groups. He based his opinion on a critical study of the adults and his own interpretation of the larva apparently from Thienemann's description, since he furnishes no additional morphological characters.

In 1914 Thienemann sent material of the immature stages to Dr. D. Keilin at the Laboratoire d'Évolution des Êtres Organisés, Paris. Unfortunately, pressure of work prevented Dr. Keilin from studying the characteristics of the larva, and he has now very generously permitted me the use of the original material.

HABITS OF LARVA AND PUPA.

For the benefit of those who may wish to search for this interesting species, the details of the life-history as far as known are here reproduced from Theinemann's paper.

The eggs and oviposition are unknown.

In habitat the larvæ are very specialised, being found only in small brooks and streams where clear clean water flows very thinly (about 1 mm. deep) over rocks, so that the back of the larva is always exposed above the surface. The food of the larva consists of vegetable detritus and diatoms. When searching for food a creeping motion is employed, using the prothoracic pseudopod and mandibles after the manner of Chironomids. Faster progression is achieved by a special method which Theinemann states from his very wide experience to be different from that of any other dipterous larva; the fore part of the body is bent sideways in an inverted U drawing the posterior end of the body as far forward as possible, and then straightened out again suddenly, the venter always remaining in contact with the substratum. A consecutive series of such motions performed rapidly enables the larva to proceed at a good pace.

Pupation and emergence occur from summer to late autumn (November). The pupæ lie on the bottom between stones and aquatic plants, and are not seen as frequently as the larvæ.

DESCRIPTION OF LARVA.

The following description of the colour and appearance of

the living larva is translated from Thienemann's paper, since only preserved material is available for this study:—

“Length of full-grown larva 14 mm., width about 1 mm. Number of segments, head + 12 segments. General appearance that of a Chironomid larva. Colour: venter white. Dorsum and pleuræ whitish green, marbled with dark grey-green. In the young larvæ the light tones predominate; those about to pupate are much darker. Segments 1 and 2 are darker than the rest; the light marbling first develops in segment 3. Chætæ black. Head light reddish brown, bent strongly downwards.”

Head.—Complete; well chitinised; bent ventrally at a sharp angle, resembling in this respect *Forcipomyia* and *Atrichopogon*, *Ceratopogonines* (Malloch, 1915). A unique condition exists in the presence of three pairs of cone-like protuberances and a median, unpaired, trilobed protuberance of the chitinous capsule of the head (text-fig. 1, I. & II., *A, B, C, D*). These all point in an antero-ventral direction. The protuberance *C* contains the pigment of the *eye-spot*, and its surface is slightly modified to form a rudimentary lens. The *antennæ* consist each of a sensory ring accompanied by a group of three minute finger-like processes situated in a membranous area on the top of a cylindrical, obliquely truncated protuberance (Pl. VII. fig. 5, and *an*, text-fig. 1) on either side of the frons, in practically the same position as in *Forcipomyia*.

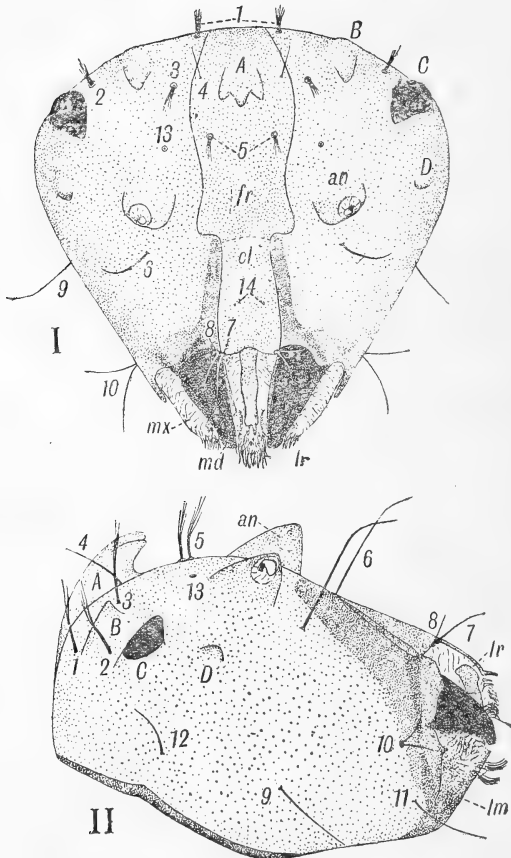
Chætotaxy: twelve pairs of chætæ occur upon the head, arbitrarily numbered 1–12, and two pairs of sensory pits, 13 and 14. Chætæ numbers 1, 2, 3, and 5 are stout and strong at the base, but at a point rather less than half their length they flatten and split into a number of hairs, usually four. The other chætæ of the head are simple; at 10, two hairs arise from a common opening in the chitin.

The *frontal* and *clypeal sutures* are distinct throughout their length, and, though no actual transverse suture divides the frons from the clypeus, the latter separates very readily during dissection at the point indicated by a dotted line in text-fig. 1, I., and Pl. VIII. fig. 11. From this point, just outside the clypeal suture, a very strong inner thickening of the wall of the head extends forward to fuse with the thickened ring surrounding the mouth-parts, and to send off a strong inner projection which serves as fulcrum for the mandible.

Mouth-parts.—*Labrum* (Pl. VIII. figs. 11, 12): the form of the labrum is quite distinct from that of any other Nematocerous larva. A narrow band of chitin passes along the dorsum from the anterior margin of the clypeus, and

terminates in two tapering conical processes (*cp*); the end of the labrum is membranous, bearing several sensory processes (*snp*) and a lateral fringe of short hairs (*fh*). From the end of the median dorsal strip of chitin, the labrum, as seen from the side, curves gradually downward

Fig. 1.



I. Head of larva, front view, $\times 70$. II. The same, lateral view, $\times 70$. A-D, protuberances of head; 1-14, chaetae and sensory pits; *an*, antenna; *cl*, clypeus; *fr*, frons; *lm*, labium; *lr*, labrum; *md*, mandible; *mx*, maxilla.

until it recurves to form the roof of the mouth; the ventral side of this anterior portion consists of a single curved chitinous plate (*vp*), above which on the anterior surface are two divided sensory processes. The remainder of the ventral

surface leading back to the mouth is membranous, and exhibits at one point a setaceous area. The sides of the labrum are membranous except for one chitinous plate (*lp*), at the anterior end of which are two comb-like groups of long curving hairs (*ch*). Premandibular structures of any kind are completely lacking.

The *mandibles* (*md*, Pl. VIII. figs. 14 & 15) are roughly triangular, strongly chitinised, somewhat flattened laterally, and coarsely denticulate. A large stiff brush of setæ occurs on the inner ventral margin, directed into the mouth; three slender sensory hairs are situated on the dorsal outer surface.

The *maxillæ* (*mx*, Pl. VIII. figs. 14, 15) are fairly well developed. A basal chitinous ring or band encircles the maxilla almost completely; the remainder of the walls are membranous. Two groups of sensory papillæ (*spp*) occur upon the upper portion, and two dense rows of serrated setæ (*ss*) are situated on the anterior surface. The maxillæ are attached by their dorsal margin to the mandibles much more strongly than to the head, and for this reason the two organs have been figured together.

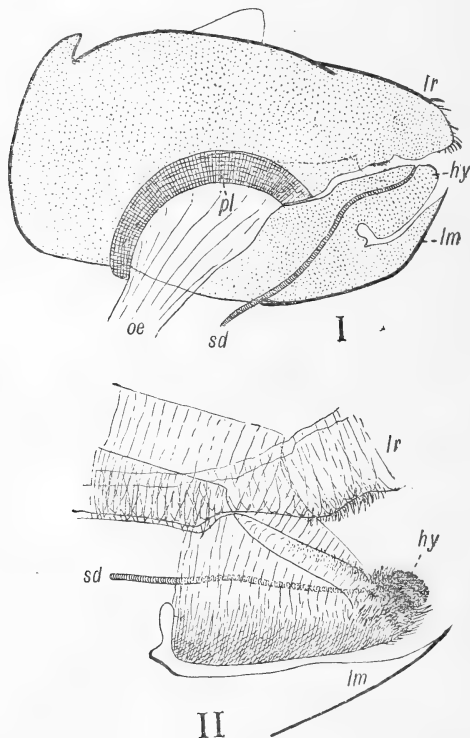
The *labium* (Pl. VIII. fig. 13): the terminology of the ventral and inner mouth-parts is so confused and uncertain that I prefer to retain this name for the chitinous underlip when it occurs as simply and distinctly as in the present case, and "hypopharynx" for the inner portion. The labium is a nearly triangular plate of thick chitin with a row of blunt terminal teeth; it is directed upwards from the ventral side of the head at a sharp angle (text-fig. 2), and is fixed and immovable. A membrane from its inner surface proceeds back into the head, and returns as the hypopharynx.

The *hypopharynx* (text-fig. 2) is a fleshy organ lying just above the labrum; its anterior portion is bilobed, with curious serrated chitinous thickenings and membranous areas bearing sensory papillæ. The *salivary duct* opens just behind this anterior portion on the dorsal surface. The remainder of the surface of the organ forms the floor of the mouth-cavity, and is continuous with the pharynx.

The *pharynx* is strengthened above on either side by a pair of large, sickle-shaped, striated lamellæ (text-fig. 2, I., *pl*). The members of each pair are closely appressed, the outer being connected with the hypopharynx, and the inner with the labrum. A similar condition exists in the larvæ of Ptychopteridæ, Rhyphidæ (Keilin, 1912), and Culicidæ (Johannsen, 1903), but the two pairs are always more or less widely separated in the middle, remaining joined at their extremities.

Body.—The body of the larva consists of three thoracic and eight abdominal segments, the eighth being divided into two apparent segments, as is so often the case in the Nematoceros Diptera (de Meijere, 1919). Each segment bears a peculiar dorsal “saddle” of reticulated chitin; histological preparations of fresh material are necessary to reveal the true nature of this structure.

Fig. 2.



- I. Graphic saggital section of head to show relation of internal mouthparts, $\times 70$. II. Hypopharynx, lateral view, $\times 200$. *hy*, hypopharynx; *lm*, labium; *lr*, labrum; *æ*, oesophagus; *pl*, pharyngeal lamellæ; *sd*, salivary duct.

The prothoracic segment bears an antero-ventral pseudopod in the form of an undivided retractile evagination of the wall of the venter, surmounted by a row of long, closely-set hooks (Pl. VII. fig. 2). Several rows of hooks of varying sizes beneath the anus function as a posterior pseudopod (Pl. VII. fig. 10).

The larva is amphipneustic: a pair of *spiracles* occur on the upper sides of the prothorax at the lower margin of the "saddle"; these are in the form of a short black cylinder (Pl. VII. fig. 7) with an extended lip studded with minute points, the ends of very fine canals. Functional spiracles also occur upon the dorsum of the eighth abdominal segment (*usp*, Pl. VII. fig. 9) on the anterior half between two large, conical, fleshy protuberances. The two tracheæ unite just below the cuticle and share a common elliptical spiracle. The structure of these spiracles will be discussed in detail by Dr. Keilin in a forthcoming paper on respiration in insects.

The extremity of the abdomen bears two pairs of slender, digitate, *anal blood-gills* above the anus (*ag*, Pl. VII. fig. 10).

Chætotaxy: the macrochætæ have a tendency to go in pairs and to be split at the end into two, three, or four. On the first seven abdominal segments there are two pairs of chætæ at the ventral margin of the dorsal "saddle," the anterior pair simple, the posterior split (Pl. VII. fig. 1). The three thoracic and eighth abdominal segments show a slight modification of this arrangement. The latter bears a dorsal split pair just above the anus, and behind the posterior spiracle a pair of processes more like slender chitinous tubercles surmounted by four chætæ (Pl. VII. fig. 10).

Numerous microchætæ are present on the sides and venter, but these do not exhibit any regular arrangement. The ventro-lateral thoracic groups representing the rudimentary sense-organs of the absent legs (*sl*, Pl. VII. fig. 1) consist of two pairs of hairs each, the ventral pair long and slender, the dorsal very short (Pl. VII. fig. 4).

DESCRIPTION OF PUPA.

The pupa (Pl. VII. fig. 3) presents a curious angular appearance occasioned by the prominent dorsal and lateral shields or plates with which the first seven abdominal segments are furnished. The thorax is corrugated into numerous ridges and hollows. The *prothoracic horns* are large, approximately vase-shaped, flattened laterally, with a row of spiracular papillæ (de Meijere, 1902) encircling the truncated extremity (Pl. VII. fig. 6).

The most important characteristic of the pupa is that it is *peripneustic*, having spiracles (Pl. VII. fig. 8) on all the abdominal segments but the first and last. Thienemann overlooked these, but figured a structure on the metathorax which he thought might be a spiracle; my two specimens, being rather poorly preserved, do not show this structure, but no doubt spiracles could be found here in fresh material.

SYSTEMATIC POSITION.

It will be seen from the foregoing description that the resemblance of *Orphnephila* larvæ to the Chironomids is merely superficial, being based on the long slender body with anterior and posterior pseudopods—characters which may readily be acquired by convergence. The more fundamental characters, such as the mouth-parts and respiratory apparatus, show no such relation. The fact that the larva is amphipneustic and the pupa peripneustic is alone sufficient to exclude *Orphnephila* from the Chironomidæ, for, despite Brauer's (1883) specification "amphipneustisch oder mit Tracheenblasen oder Kiemen," no Chironomid larva has ever been found with functional spiracles. Minute non-functional spiracles occur on the abdomen of probably all Chironomid pupæ (Bause 1915, Potthast 1915, Rieth 1915), for it is by means of these that the tracheal exuvixæ of the adult are withdrawn at emergence, but only in some Tanypinæ do they assume a condition which might possibly be functional (Thienemann and Zavrel, 1916), and even these are not to be compared with the well-developed spiracles of *Orphnephila*. Thienemann placed the group as the first subfamily of the Chironomidæ, with the Ceratopogoninæ second, chiefly on account of the abdominal armature and anal hooks of the pupa; he hoped that a comparison of the larval mouth-parts would confirm this relationship. There is, however, practically nothing in common between the two; true, the labrum is elongated and flattened laterally as in Ceratopogonines, but it has no premandibles, structures which are pronounced throughout the Ceratopogoninæ (Goetghebuer, 1914) and Chironominæ*, and its dorsal, lateral, and ventral sclerites are peculiar to itself. The mandibles and maxillæ show no relation to one group more than another, and the narrow upturned labium is particularly distinctive. Ceratopogonines have a complicated chitinous hypopharynx within the head, which serves to grind up the food of those terrestrial forms living on solid matter (*Forcipomyia*, *Atrichopogon*) and possibly acts as a pump in those that take liquid food, while other Chironomids have a less involved but constant structure. *Orphnephila* has no such chitinous structure, but the fleshy hypopharynx and sickle-shaped pharyngeal lamellæ point to a relationship with Rhyphidæ, Ptychopteridæ, and, less closely, Culicidæ.

Other characters which set the genus apart are the saddle-like dorsal coverings of the larval body-segments, the antennæ, the protuberances of the head, the stout spl t

* Tanypinæ have a pustule or fleshy lobe, which Thienemann and Zavrel homologise with the basal part of the premandibles.

macrochætæ of the head and body, and the larval method of progression. Add to this the inability of systematists to establish any relationship by means of the adult, and it will be obvious that the genus must revert to its original family status.

I refrain from listing the larval and pupal family-characters, or suggesting the systematic position among the Nematocera, since the early stages of several new species have just been discovered in New Zealand and Tasmania by A. Tonnoir, and it is advisable to see first how they compare with *O. testacea*.

SUMMARY.

Orphnephila has been placed by Kieffer and Thienemann as the first subfamily of Chironomidæ on the strength of the general appearance of the larva, the presence of pseudopods, the abdominal cuticular armature and anal hooks of the pupa, and the spiracular papillæ of the prothoracic horns.

Not one of these characters is peculiar to the Chironomidæ, while the following incontestably prohibit the inclusion of *Orphnephila* in that family:—

- (1) The amphipneustic tracheal system of the larva.
- (2) The peripneustic tracheal system of the pupa.
- (3) The structure of the larval mouth-parts.

Further characters of less importance are the structure of the antennæ, the dorsal "saddles," the protuberances of the head, the split macrochætæ of the head and body, and the method of rapid progression.

ACKNOWLEDGEMENTS.

I desire to extend my grateful thanks to Dr. D. Keilin of the Molteno Institute for the loan of the preserved material sent him by Thienemann in 1914, and for his helpful suggestions and encouragement throughout the work. I am also indebted to Mr. F. W. Edwards of the British Museum for some larvæ, part of the same lot, given him by Dr. Keilin some years ago.

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EXPLANATION OF THE PLATES.

Key to Lettering.

<i>ag.</i> Anal blood-gill.	<i>mx.</i> Maxilla.
<i>ch.</i> Curved hairs.	<i>ph.</i> Prothoracic horn.
<i>cl.</i> Clypeus.	<i>sl.</i> Sensory hairs of legs.
<i>cp.</i> Conical processes.	<i>snp.</i> Sensory processes.
<i>ds.</i> Dorsal "saddle."	<i>sp.</i> Spiracle.
<i>fc.</i> Felt chamber.	<i>spp.</i> Spiracular papillæ.
<i>fh.</i> Fringe of hairs.	<i>ss.</i> Striated setæ.
<i>lp.</i> Lateral plate.	<i>tr.</i> Trachea.
<i>md.</i> Mandible.	<i>usp.</i> United posterior spiracles.
	<i>vp.</i> Ventral plate.

PLATE VII.

- Fig.* 1. Entire full-grown larva, lateral view. $\times 12$.
- Fig.* 2. Prothoracic pseudopod. $\times 70$.
- Fig.* 3. Pupa, dorsal view. $\times 12$.
- Fig.* 4. One of the lateral thoracic groups of microchætæ, *sl* of fig. 1.
- Fig.* 5. Larval antenna.
- Fig.* 6. Distal end of prothoracic horn.
- Fig.* 7. Larval prothoracic spiracle.
- Fig.* 8. Pupal abdominal spiracle.
- Fig.* 9. Posterior spiracle, dorsal view.
- Fig.* 10. Extremity of larva, dorsal view.

PLATE VIII.

- Fig.* 11. Labrum of larva, dorsal view. $\times 200$.
- Fig.* 12. The same, lateral view. $\times 200$.
- Fig.* 13. Labium, ventral view.
- Fig.* 14. Left mandible and maxilla, inside view. $\times 200$.
- Fig.* 15. The same, outside view. $\times 200$.

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THE ANNALS

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MAGAZINE OF NATURAL HISTORY.

[NINTH SERIES.]

No. 66. JUNE 1923.

LXXIV.—*On the Blow-holes and Nasal Passages of the Cachalot* (*Physeter macrocephalus*). By FRANK E. BEDDARD, D.Sc., M.A., F.R.S.

WE are well acquainted with the characters of the blow-hole of this Cetacean through the observations of several persons, and the structure of the nasal passages has been described comparatively recently by Pouchet and Beau-regard*, who sum up previous knowledge. But less is known of the condition of these in the fœtus. I have myself contributed something to the external characters of the blow-hole in several fœtuses of different ages in two recent communications to the 'Annals of the Durban Museum' †. Since then the youngest of these fœtuses has furnished me with the opportunity of discovering something of the development of the organs in question. The material

* "Recherches sur le Cachalot," *Nouv. Arch. Mus.* (3) vol. iv. (1889).

† "Contributions to the Knowledge of the Anatomy of the Sperm-Whale (*Physeter macrocephalus*), based upon the Examination of a young Fœtus," vol. i. pt. 2 (1915), and vol. ii. pt. 4 (1919). It had been arranged that this series of contributions should be continued; but, unfortunately, the Government found themselves unable to continue the grant of money, and the Journal has had to cease publication for the present.

I owe to the kindness of Mr. Chubb, the Curator of the Durban Museum. The authorities of the College of Surgeons were so good as to allow their skilled assistant Mr. Steward to prepare for my use (and for other persons in the future) a complete series of sections of the head. My thanks are tendered to these gentlemen.

§ *The Communication of the Nasal Passages with the Blow-hole.*

In drawings of the blow-holes of this foetus*, and in the accompanying letterpress, I have indicated a practically continuous furrow, forming the right and left blow-holes laterally, and consisting in front of a much shallower connecting region, concerning the actual existence of which I was unable, indeed, to be perfectly certain. There was no doubt, however, about the quite deep right and left blow-holes. I find on examination of my sections that the median region of what is therefore at this stage a single blow-hole is by no means missing; and that the impression which it gave me—on examining it merely with a lens—as a shallower connecting furrow was correct. For, as a matter of fact, the two nasal tubes, quite distinct from each other until the very edge (in front) of the nasal region of the head, open into and form a perfectly continuous groove extending right round the anterior convexity of the nasal portion of the head—imperfectly shown in the drawings to which I have just referred. The reason why there appeared to me to be a doubt about the matter, when describing the external characters of this foetus, is at once explained by an examination of the sections. There it will be seen that the detached epithelial lining of this region of the blow-holes, which has a rod-like form (as will be explained later), partially blocks the linear orifice and gives it the appearance of a shallow, and even in parts non-existent, groove.

It will be seen from the series of transverse sections, which are arranged in order from in front backwards, that the two nasal passages, right and left, both open into what obviously represents a common chamber, which itself in this young foetus has a single median anterior aperture corresponding exactly to the median part of the combined single blow-hole. As I have partly indicated in the external figures referred to, two furrows lead from the left- and right-hand corners of this median orifice, which are the right and

* *Loc. cit.* vol. ii. pt. 4, Oct. 1919, p. 135, text-figs. 1-4.

left blow-holes respectively. One of these, the right, continues to be connected with the common chamber, as we may term it; but as it passes backwards, *i. e.*, along the longitudinal axis of the body—and therefore at right angles to the anterior orifice of the chamber,—it opens along the *side* of that chamber. On the other hand, the orifice of the left nasal tube has a different course as we trace it backwards from its opening into the conjoint anterior furrow. It becomes freed at once from its connection with the anterior furrow, and is seen in the transverse sections as a perfectly independent groove.

I have directed attention in my earlier communication on this fœtus, in the paper referred to below*, to the fact that the left blow-hole is longer than the right—or, rather, than that part of the right blow-hole which is distinctly lateral in position; for it is impossible, as I have just shown, to draw an absolute line of demarcation as to where the lateral region is to be distinguished from the anterior furrow. This is not quite so clear in the figures which I then gave as it might have been; this, however, is due to the curvature of the sides of the head and the consequent view of the furrow partly in profile. I have been able in my microscopical examination of the fœtus to compare the lengths more accurately by counting the actual sections, and comparing the numbers which contain, with those that do not contain, the grooves of the two blow-holes. I have found that the right blow-hole runs back through 20 sections, while the left is prolonged backwards for another 44 sections, being thus about three times its length. The actual measurements work out at 1·6 mm. in the case of the left furrow and ·5 mm. in the case of the right-hand one. The disparity, however, must be rectified by the extension round the corner—so to speak—of the right blow-hole. But, in any case, the left blow-hole furrow does reach further back than its fellow of the right side. The asymmetry of the head is already well established in this fœtus, as will be pointed out in the case of other structures as well as the blow-holes.

§ *The Course of the Two Nasal Passages to the Point where they unite to form the Nasal Pharynx.*

It will have been gathered from the foregoing account of

* *Loc. cit.* Ann. Durban Mus.

the external orifices of the nasal passages that the right-hand passage ends anteriorly in a funnel-shaped dilatation, while that of the left side is tubular throughout this region, and for the rest of its course is represented merely by the external groove. The large chamber forming the funnel of the right nasal passage gradually narrows into a "stem," and the left-hand nasal passage passes inwards from the external groove, in which it ends externally. The two come close together. It is to be noted that their position within the head is not symmetrical. The right-hand tube occupies as nearly as possible the centre of the cross-diameter of the head, while the left nasal tube is therefore necessarily on the left-hand side. Furthermore, both tubes lie nearer to the dorsal surface of the head, being at the end of the first one-sixth of the vertical diameter. With them, both above and between, are certain cartilages which will be dealt with later. The two nasal passages are by no means circular in outline. Their exact form differs in different regions. In the first section they are much flattened from above downwards, and are thus even slit-like. In this region they also lie obliquely to the longitudinal axis of the head, the tilt being upwards on the left side. The two passages are not quite in the same plane, the left being rather dorsal to the right. They are, however, at any rate, roughly of the same length. A little later on, the left nasal passage becomes smaller than the right and alters its angle of position. The right tube maintains its obliquity in reference to the axis of the head, while the left becomes entirely parallel to the horizontal axis.

Both these changes are accomplished at a distance of some 4.9 mm. from the end of the snout. A little later there is a further change. The left-hand tube grows smaller than the right, and its long axis is now bent downwards, as is that of the right, and the angle between them gradually diminishes. This state of affairs goes on developing, and at last the two nasal passages lie completely parallel with each other, but with the long axes of both parallel with the vertical axis of the head. At the same time the size of the tubes becomes again equal. All this is accomplished at a further distance of about 3.3 mm. from the last point which was measured.

As we follow the series of sections away from the blow-holes, the two nasal passages retain their vertical position, but, instead of remaining of equal size, the left becomes

bigger—a state of affairs quite the reverse of that which we have just seen to occur. A little later they again become equal, though still remaining parallel and vertical in position with reference to the head. This point is 2·1 mm. further on.

Very soon, indeed, the axis of the two nasal passages, though themselves remaining quite equal in size, come to lie at an angle with each other; but that angle is exactly the reverse of what it has been, and they bend away from each other at their *upper* and *not* at their *lower* ends. There is no further alteration of moment until the two tubes fuse to form one—the nasal pharynx,—which point is at the distance of another 2 mm.

It will be obvious, of course, that on a lateral view the nasal passages would be seen to slope gradually downwards from their original position on a level with the blow-holes. The various changes in the position of the two nasal canals with reference to each other—*i. e.* the mutual and continually differing angles—indicate that the left canal, at any rate, is spirally arranged, and, in fact, turns upon itself along the whole length half a turn. The right canal is very nearly the same, but a slight complication is introduced by the huge size of its terminal chamber.

The symmetry of the two tubes is another matter of interest. As has been pointed out, they are not at first symmetrical with the axis of the head. Later on, however, they come to lie pretty exactly one on either side of the vertical median line. This rectification of the asymmetry visible in the anterior part of the head is visible about 2·7 mm. from the end of the snout or possibly a trifle earlier.

A third matter worthy of attention is that the two canals fluctuate in size at more than one place. Each tube, seen foreshortened, would appear moniliform. This change of size, however, is limited to the area in front of the final arrangement of the two tubes at an angle diverging from the ventral side. They are thereafter exactly of the same size. Nor is their opening into the nasal pharynx associated with any increase or diminution of size in one or the other. They simply fuse.

§ *Comparison of the Nasal Passages in the Fœtus with those of the Adult Whale.*

The chief authorities known to me on the structure of

these parts in the Cachalot are Pouchet and Beauregard*, to whose memoir I have had to refer so often in this series of contributions. It would seem that the right nostril undergoes a further differentiation of the large terminal chamber. This clearly closes up in front, except for where it communicates with the exterior in common with the left nostril, in the way in which I pointed out as probable in my account of the external characters of this fœtus †. The authors mentioned speak of the "Développement exagéré de la narine droite avec son sinus." The sinus is a diverticulum of the following tract of the right nasal passage, the anterior dilatation being a specialised pouch opening into the "sac de l'évent," which is the common chamber of both nostrils.

Posteriorly the two nasal passages open into a larger terminal portion, which is the nasal pharynx. Of these the authors remark that the right nostril is "beaucoup plus étroit que la gauche." But in the figure the smaller of the two ("g") ‡ is lettered as the left! It seems to me to be quite likely that variations occur, and that the authors saw examples of both conditions. At any rate, they are equal in my much younger fœtus. It is to be noted that this terminal region of the nasal canals presents the appearance in the fully-developed animal of a distinct and large chamber, into which open—as if they were ducts—the two separate nasal passages. Its origin as a mere fusion of these two tubes is not exactly indicated in the adult.

The left nasal passage has no such specialisation. It is, however, different from the same passage in the young fœtus described above, in that it possesses "dans toute son étendue . . . intérieurement un bourrelet saillant." This structure is suggestive of the typhlosole of the earthworm's intestine. It also occurs in the lesser Sperm-Whale, *Cogia*, where it has been described by Benham §, and later by Danois || and Kernan and Shulte ¶, whose accounts are not in exact harmony as to several points. It is to be noted, however, that the right nasal passage is dilated along its

* "Recherches sur le Cachalot," Nouv. Arch. Mus. (3) iv. pp. 1-30.

† Ann. Durban Mus. vol. ii. pt. 4, p. 134 et seq.

‡ *Loc. cit.* pl. vi. fig. 3.

§ "On the Anatomy of *Cogia breviceps*," Proc. Zool. Soc. 1901, vol. ii. p. 107.

|| "Recherches de l'Anatomie . . . de *Kogia*," Arch. Zool. Exp. (5) vi. (1910).

¶ "Memoranda upon . . . foetal *Kogia*," Bull. Amer. Nat. Hist. Mus. xxxviii. (1918).

length, and opens anteriorly in common with left much in the same way as these tubes are related in *Physeter*. It is unnecessary to go into further details of comparison, as the object of this paper is the description of the structure of a fœtus of *Physeter*. And I have not noted that this fœtus presents a closer likeness to the adult *Cogia* than it does to the adult *Physeter*.

Messrs. Pouchet and Beauregard supply in their memoir a very useful sketch of a transverse section*, which throws some light upon the different proportions of the regions of the blow-hole in their specimen and in that which I describe here. The section in question is of a young male animal with a head of 1.30 M. in length. It shows the much greater extent in this, of course, practically adult whale of the dilated region of the right nasal passage, which their measurements allow me to compare with the corresponding ones of my fœtus. The section is taken at a distance of 40 cm. from the snout, *i. e.*, occupying a position at about the end of the first third of the head. The dilated chamber in the fœtus is very much shorter. It ceases to be dilated at about the 24th slide, out of a total, which embrace the head, of 180 odd slides. Thus the two nasal passages are not very different in size after the first seventh or eighth of the total length of the head. It is clear, therefore, that a great deal of growth takes place anteriorly to this point as the fœtus advances towards maturity. I shall have to refer to this figure again in considering the internasal cartilage and the position of the spermaceti mass in the young whale.

§ *Cartilages of Blow-holes and Nasal Passages.*

The anterior median cartilage of the head—ethmoid, rostral, fused trabeculæ cranii, or whatever we may term it—has anteriorly, in this fœtus, no connection at all with the cartilages which partly envelop the nasal tubes. It is a rounded rod (in transverse section) which terminates anteriorly in quite close connection with the epidermis, being prolonged there in a straight line from the basicranial axis of which it is, of course, the anterior part. Posteriorly, however—and we shall come to this matter presently,—a ridge arises from the dorsal surface of this rod of cartilage, and is connected (indeed, quite fused) with the median rod of the nasal cartilages. It is interesting to note that

* *Loc. cit.* pl. vi. fig. 2.

this lack of connection between the rostrum throughout its length with the nasal cartilages persists into the adult state (or practically so), since Messrs. Pouchet and Beauregard figure no connection between the two so far back as a distance of 40 cm. from the snout in a head of a "young male," which is itself (the head) 1.30 M. long*. The connection of the two would appear, therefore, to be quite secondary, and there are other facts which support this view. These concern the development of the cartilages in question. The rod-like rostral cartilage seems to be growing from before backwards, and the growth seems to be taking place in the formed cartilage and not in the surrounding tissues of the head. It is quite otherwise with the cartilages of the nasal tubes.

Here the first beginnings of the nasal cartilages are seen to be—as is, of course, well known in the development of cartilage—a condensation of the nuclei of the mesoblast in the neighbourhood of the nasal grooves.

The actual condensation of the tissue to form the "procartilage" begins very early in the head, immediately behind the anterior groove into which the two nasal tubes open. Actual cartilage is not formed until later, about .75 mm. behind the said groove. The first cartilage to be formed is that which lies on the dorsal surface of the right nasal cavity; a very short way further back the median internasal cartilage puts in an appearance, and a little later still that of the left nostril. These cartilages are everywhere independent from each other as cartilages in the present region of the snout; but they are all connected by the dense tissue with crowded nuclei which is the forerunner of the cartilage. It will be noted, therefore, that the asymmetry of the blow-holes is seen also in their cartilages. I could find no trace whatever here, or in the hinder region of the nasal cartilages, of any extension on to the ventral surface of the nasal tube, such as is represented by Kükenthal to occur in *Phocæna* †. They are here purely dorsal. Early in the series of sections the cartilage of the right nostril extends more or less right along it. But as we pass backwards in the series this transversely elongated cartilage becomes divided into two, of which the outermost extends back for a very short way and then ends. The other reaches much further towards the skull.

* *Loc. cit.* pl. vi. fig. 2.

† "Die Walthiere," *Denkschr. Nat.-Med. Ges. Jena*, Bd. iii. Theil 2, p. 322 &c., pl. xxiii. figs. 4, 5, 6.

It may be further pointed out that at the beginning of the cartilage covering the right nasal tube—where it is wide, completely separated here from the groove on the surface of the head, and lying in a direction at right angles to the vertical axis of the head—the cartilage considerably overlaps the nasal tube; it extends beyond it towards the lateral surface of the head, but also slightly upwards for a distance of perhaps half the length of the tube itself. Later on what has been the dorsal surface of the nasal tube becomes its outer lateral side, and ultimately there are other changes, as we have already described in considering the course of the nasal tubes. In fact, what is originally the dorsal surface of the nasal tube becomes ultimately—after the two tubes are fused to become the nasal pharynx—the ventral surface, owing to the gradual twist, already described, in the course of the tube. We cannot therefore insist upon an exact comparison between the cartilages associated with it and those associated with the very different nasal passages of *Phocæna* referred to above.

On the left side this narrow cartilage ultimately fuses with the median piece, but I could not detect a similar fusion on the right side. It is finally overwhelmed by the growth of a second outgrowth of the median cartilage, which I take to be the ali-ethmoid. The anterior cartilages are presumably to be regarded as the ali-nasals*. The fusion of ali-nasals and ali-ethmoids is accomplished at a distance of about 9 mm. from the extremity of the head. There is no connection between the median internasal septum and the upgrowth of the basal portion of the ethmoid until a point at about 6 mm. from the anterior end of the head. And, moreover, this point is quite easy to detect. The median nasal cartilage, lying between the two blow-holes, up to a point about 6 mm. from the anterior end of the snout, is perfectly symmetrical. But the incompletely or wholly unchondrified tissue surrounding it bends to the right at its end. In the next section this is seen to contain a cartilaginous rod which is the median dorsal growth of the ethmoid, and thus would seem to have fused with the median nasal cartilage rather than to have arisen as an outgrowth from it. It will be noted also that from this point the median septum of the head acquires a symmetrical position and is no longer on the left side as in the anterior

* See, *e. g.*, W. K. Parker, "On the Structure and Development of the Skull in the Mammalia. Part II. Edentata; Part III. Insectivora," *Phil. Trans. Roy. Soc.* 1885.

nasal region. It comes, so to speak, under the influence of the mesethmoid, which is from the first to the end quite median. The oblique course of the nasal section of the cartilage gradually straightens to the median position.

§ *Lining Epithelium of Nasal Passages.*

The anterior section of the two nasal passages is lined with a continuous epithelium, which in all—or, rather, the much greater part of—my sections has become detached from the muscular and connective-tissue walls of these passages. This has also led, as I imagine, to the disappearance of some of the sections of the lining epithelium. For during the process of cutting the sections the whole head of the animal had to be unmounted, dealt with further, and re-embedded in the paraffin. Thus it is difficult to be absolutely certain how far the epithelium, with the characters which I shall immediately describe, extends along those tubes towards the posterior opening into the pharynx. They extend, at any rate, a long way behind the dilatation of the right blow-hole. At first the detached epithelial lining forms a solid rod-like structure in the sections with a slight swelling at each end, giving to it here a club-like form. It is solid throughout and has no central cavity. There is, however, a differentiation into a cortical layer, so to speak, and a medullary layer. The former is more densely stained, and is composed of columnar cells. The central part is formed of non-columnar cells less stained. Later on a vacuity appears in the two club-shaped extremities referred to above, and later still the epithelium clings to the actual wall of the nasal passage, and the central layer of the fused epithelium of the whole periphery has disappeared.

The state of affairs visible in this foetus evidently leads to the complete occlusion of the nostrils in the anterior part, and is precisely what is to be found in the developing *Apteryx*, according to the late Prof. T. J. Parker*.

§ *Dilator and Occlusor Muscles of Nasal Passages.*

These muscles are very distinct, especially those which dilate the passages; this conspicuous appearance of the dilator fibres is due to the fact that in transverse section they are seen throughout their whole length radiating out

* "Observations on the Anatomy and Development of *Apteryx*," Phil. Trans. vol. 182 B, 1891, p. 25.

from the margins of the passages in question. The constricting muscles are by no means so obvious, since they are seen as transversely-cut fibres lying between the former, which in the same way are hardly massed into bundles, a state of affairs which doubtless will be seen later in development. The dilator muscles extend throughout the whole course of the nasal passages while they lie outside the bones of the skull. They are less developed, however, in the later sections. The muscles are particularly conspicuous for a distance of nearly 4 mm. They are not only attached to the margins of the blow-tubes, but to the cartilages associated with these. I could see no striation in these fibres*.

§ *Nasal Pharynx.*

After the fusion of the two nasal canals into one, the respiratory passage may be termed the pharynx—or, better, perhaps, as it has been called, the naso-pharynx. This region occupies altogether twenty slides of the series upon which I have worked; and its length in millimetres will be, therefore, as near as may be, 6·5. It is thus a trifle more than half of the length of the double region of the nasal passages which precedes it. Clearly, therefore, it is notable for its length, when compared proportionately with other mammals. It is also actually very long in relation to whole head of the whale.

For a considerable distance no particular change occurs in the shape of the tube; the two halves do not become more intimately connected, and continue to lie at an angle with each other—the two limbs representing the two separate blow-hole passages joining below and diverging above. Later the angle becomes greater and the whole acquires a more flattened aspect from above downwards. It is in this region that the Eustachian tube arises, which I deal with later. Later still—at any rate, within 6 mm.,—the tube gets to have a triangular section, the flat side being dorsal, and ridges appear which run longitudinally. Almost directly the whole tube becomes much more elongated from above downwards and narrow from side to side, and has a series of ridges along both sides, appearing, of course, in the sections as short ingrowths into the lumen. Later still it again acquires a triangular form in section; but this time

* For the matter of that, I could find no striation of any of the voluntary muscles of that region of the body of this fœtus which I have hitherto studied, viz. the head.

the apex of the triangle is above and the base below, and the walls are but little plicated. It is in this stage when the oropharynx communicates with it from below.

§ *Spermaceti Organ.*

I have not been able to ascertain the presence of a regularly defined spermaceti organ in this young fœtus. The organ is figured by Pouchet and Beaugerard* in their often-quoted memoir as lying on the right side above and to the right of the right nasal passage, which is here inclined obliquely downwards from the middle line of the head towards the right. It is also represented as lying within a distinctly marked fibrous sheath. This animal is, however, a young male, of which the head is 1·30 M. Messrs. Kernan and Shulte† deal with the same organ in a fœtal Pygmy Sperm-Whale, which is large, measuring in total length 109·7 cm. Contrary to the statements of Pouchet and his colleague, these two authors find no connection between the spermaceti sac and the nasal passage. But (they add) "we may indeed think of the spermaceti chambers as belonging embryologically to the nasal tract." As the embryo examined by these authors is, as I have already pointed out, a large one, it became a matter of great interest to myself to endeavour to follow out this matter in a much younger fœtus. In searching for the spermaceti organ it was obviously unnecessary to go further back than the dorsal upgrowths of the maxillary bones which in the adult bound posteriorly the "case" which contains the oil.

The space, therefore, where only the spermaceti organ can lie in the fœtus is limited to that part of the whole snout which is relatively small in the fœtus, *i. e.*, about 6·5 mm., but which expands enormously in the adult. The other organs lying in this part of the snout, *i. e.*, nasal passages, muscles, &c., bring it about that the organ, if present, must lie medianly in position. And, as a matter of fact, the middle region here is filled with a lax tissue with branched cells; this is undoubtedly, as I think, the beginning of the organ sought for. But it has in this stage no trace that I could discover of a sheath, fibrous or otherwise. And, moreover, there is at the same time no indication

* *Loc. cit.* pl. vi. fig. 2.

† "Memoranda upon the Anatomy of the Respiratory Tract . . . of the fœtal *Kogia breviceps*," Bull. Amer. Mus. Nat. Hist. xxxviii. 1918, p. 231. See also Danois, "Recherches de l'Anatomie de la Tête de *Kogia breviceps*, Blainv.," Arch. Zool. Exp. (5) vi. 1910, p. 149, etc.

of a metamorphosis of the right nor, for the matter of that, the left nasal passage, which suggests a commencing modification in the direction of the formation of the spermaceti organ. Nor, on the other hand, is there any diverticulum which might suggest the same. Evidently, therefore, if the connection alleged by Pouchet and Beaugard actually exists, it must be in a later fœtus. I am disposed, therefore, to think that the positive statements as to the absence of any such relation between the nasal passage and the spermaceti organ made by Kernan and Shulte are at the moment more likely. Nor does it to my mind seem the kind of connection that might be expected. An early outgrowth might be a different matter; but that, as I believe, is not to be found.

§ *Oropharynx and Tonsils.*

The tonsils have not been, as far as I am aware, described in the adult Sperm-Whale; they occur, however, in the fœtus under consideration. They have also been studied in the Pygmy Sperm-Whale, *Euphysetes*, by Kernan and Shulte*. They are represented in the latter by "two crypts . . . dorsally placed." And each crypt consists of a slit-like orifice leading into a little pocket. There are, say these authors, "no conspicuous lymph follicles." In the embryo Sperm-Whale examined by myself the tonsils do not occupy a large space; they are to be seen for a space of about 1.2 mm., perhaps a very little more, for it is difficult to fix accurately the end of the outgrowths which form the canal of the tonsil, so gradually does it fade away on each side. In the series of sections examined by me, the tonsil of the left side first came into view; and, moreover, it persisted after the appearance and disappearance of the right tonsil. I may here point out that the first appearance of the Eustachian tubes is also on the left side. There would, therefore, appear to be a precise agreement in the nature of the asymmetry of these organs in the whale's head. But it is important to bear in mind that it is not easy to orient exactly so large an object as the head of this fœtus in the imbedding material, so that the sections shall be precisely at right angles to the longitudinal axis of the head. There is clearly scope for error. But, in any case—even if the apparent agreement of the asymmetry of the two organs is so far accidental,—there is no doubt whatever

* *Loc. cit.*

that the tonsils are asymmetrical. For the left gland not only appears first but ends last.

There is a further asymmetry between the two tonsils. It is only that of the left side which possesses a coating of lymphoid tissue upon the canal of the tonsil. This seems to be completely absent in the case of the tonsil of the right side. The canal is quite dorsal in position, and runs upwards for its greater length, and then bends quite—or nearly so—at right angles to run backwards for a little way. In the series of transverse sections, therefore, the canal is for the greater part of its extent cut longitudinally, and then the extreme distal end is cut at right angles. The opening into the oropharynx is really rather slit-like, only the median part of this slit being prolonged into the tube. The particular form which the tonsils of this animal show are interesting in view of the general state of affairs as to the tonsils in the Mammalia—a subject which has lately been reviewed with many additions.

In the paper referred to* the authors regard a long tubular tonsil as “the starting-point of the series,” and this condition, occurring in the tiger and the leopard, is to be seen in the early fœtal condition of man. It is to this type that the tonsils are to be referred in the Sperm-Whale, as it appears to me. But the conditions are much exaggerated in the whale. Its independence of the walls of the pharynx, and the length to which it projects outside of those walls in a fœtus, which, though small, is in some respects very advanced, are highly remarkable. This is so obvious that it need not further be commented upon.

The comparison of this tonsil with a rudimentary gill-cleft is also obvious. But the position might at first appear to militate against this generally-accepted view. In the case of the Eustachian tube, the origin of the tube is distinctly ventral, but the tonsil is as distinctly a dorsal outgrowth of the lining epithelium of the oropharynx. There is, as I think, no possibility of denying their essential similarity. If it be held that the posterior part of the nasal passage or passages is not a part of the primitive ingrowth of the olfactory organ, but a longitudinal division of one tube, then the differing position of two, probably serially homologous, outgrowths becomes intelligible. For if we, so to speak, rejoin the two tubes oral and respiratory, the two pairs of diverticula will both be relegated to, and

* Secombe Hett and Butterfield, “The Anatomy of the Palatine Tonsils,” *Journ. Anat. Phys.* xliv. p. 35.

be outgrowths from, the middle region of this tube, which is precisely what a gill-slit is in other animals.

A final matter of interest in connection with the tonsils of the Sperm-Whale is the variable occurrence of these organs among the Cetacea. Shulte*, in a foetus of a Rorqual, "found no trace of a tonsil." This is, however, not a question of whalebone-whales differing from the Odontocetes, for Macalister † also "found no trace of a tonsil" in *Globicephalus melas*, while Murie ‡, in his elaborate account of the same whale, does not mention that organ.

LXXV.—On Mammals from the Li-kiang Range, Yunnan, being a further Collection obtained by Mr. George Forrest. By OLDFIELD THOMAS.

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THANKS again to the generosity of Col. Stephenson Clarke, C.B., the British Museum has received as a donation a further series of mammals from the highlands of Yunnan, additional to those described by Mr. Hinton and myself in previous numbers of the 'Annals.' The present series, which numbers about 300 specimens, were all obtained in the Li-kiang Range (27° N., 100° 30' E.), and on this account I have repeated here the names of the only species from that range obtained in the first collection but not in the second; so that the present paper forms a complete list of all the mammals as yet known to occur there.

Naturally the great majority of the species now received were included in the first collection, but, none the less, this supplementary collection is a most valuable addition to the Museum, especially as the specimens were for the most part collected at a different time of the year, so that seasonal changes, previously unknown to us, are now generally represented.

Some new forms do occur, however, notably a flying squirrel of the rare genus *Trogopterus*, the new species being

* "Anatomy of a Foetus of *Balenoptera borealis*," Mem. Amer. Mus. Nat. Hist. (n.s.) i. pt. vi. 1916, p. 432.

† "On some Points in the Anatomy of *Globicephalus siveival* (Gray)," Proc. Zool. Soc. 1867, p. 450.

‡ "Organisation of the Ca'ing Whale, *Globicephalus melas*," Trans. Zool. Soc. vol. viii. 1874, p. 252 *et seq.*

named *T. edithæ*, in honour of Mrs. Stephenson Clarke. And there is a very distinct new species of Pika—*Ochotona forresti*.

1. *Rhinolophus pearsoni*, Horsf.

♀. 2744. Li-kiang Range. 10,000'.

2. *Myotis* sp. (near *M. mystacinus*, Leisl.).

♀. 2713. 10,000'.

3. *Tupaia belangeri chinensis*, And.

♂. 2671, 2766, 2770, 2773, 2784; ♀. 2685, 2771, 2781. 9000–10,000'.

4. *Soriculus sacratus*, Thos.

2753.

Type-locality. Mt. Omi, Sze-chwan.

5. *Crocidura prcedax*, sp. n.

♂. 2627, 2653, 2654, 2666; ♀. 2675, 2690. 9500'.

Most nearly allied to *C. dracula*, Thos., from Southern Yunnan, with which it shares the general proportions and the dull bluey-grey colour. But the size is still larger (*dracula* differing from *attenuata*, M.-Edw., by greater size), and the colour is less suffused and shaded by the blackish ends of the hairs. General colour of upper surface nearest to "deep neutral grey," of lower surface scarcely paler. Hands and feet dull whitish. Tail slender, with but very few bristle-hairs, sometimes white, as it nearly always is in *dracula*.

Skull longer than in *dracula*, and markedly broader across the brain-case. Teeth larger.

Dimensions of the type (measured in flesh):—

Head and body 14 mm.; tail 70; hind foot 17.

Skull: condylo-incisive length 24.1; greatest breadth 11; upper tooth-series 10.8.

Hab. Li-kiang Valley. 9500'.

Type. Adult male. B.M. no. 23. 4. 1. 13. Original number 2653. Collected 21st September, 1922.

"Trapped in wheat-fields."—*G. F.*

No doubt the representative in the Li-kiang Range of the *C. dracula* of S. Yunnan, but distinguished by larger size. The type-skull of *dracula* was accidentally said to be 24 mm. in condylo-incisive length, but is really only 23.3.

6. *Crocidura* sp.

♂. 2574. 11,000'.

A small species of the *russula* group.7. *Paguma larvata yunalis*, Thos.

♂. 2784. 12,000'.

8. *Nyctereutes procyonoides orestes*, subsp. n

♀. 2796. N.W. Flank. 10,000-12,000'.

"Shot in forest."

A highland race of *procyonoides*.

General colour as in Central China specimens of *procyonoides*, a specimen from S.E. Sze-chwan, probably representing "*stegmani*," quite similar in colour and character of fur. Tail, however, whiter than in that animal, its wool-hairs only tinged with grey at their extreme bases, the longer hairs white for about 45 mm., black for their terminal 30 mm. Throat, forearms, and feet black, not merely brown.

Skull small, short and dumpy, its surface roughened. A well-marked sagittal crest commencing to form, though the specimen is not old. Zygomatic arches quite unusual in being comparatively parallel, scarcely expanded posteriorly, the greatest zygomatic breadth (56.5 mm.), opposite the front edge of the glenoid fossa, very little more than it is opposite the inferior postorbital processes (53 mm.), while in the ordinary *Nyctereutes* the zygomata are widely expanded behind, an average female specimen having these two numbers 63.5 and 53 mm. This latter proportion is invariable throughout all the other available *Nyctereutes* skulls, and equally corresponds with the Berlin series measured by Dr. Matschie.

Teeth as usual, though the type has the abnormality of an additional molar (m^3) on the right side above.

Dimensions of the type:—

Head and body 550 mm.; tail 170; hind foot 95; ear 47.

Skull: greatest length to lateral occipital protuberance 105; zygomatic breadth 56.5; nasals, length 37, median breadth 7; interorbital breadth 19; breadth of brain-case 40; mastoid breadth 39; palate length 54. Cheek-tooth series 37; length of p^4 on outer edge 9.

Type. Adult female. B.M. no. 23. 4. 1. 20. Original number 2796. Collected 10th November, 1922.

This is the first specimen received by the Museum from the highlands of Western China, nor are any recorded from

there by Prof. Matschie, whose nearest locality is Chung-king, on the middle Yang-tse, whence he has described *N. stegmani*.

This animal appears to be distinguishable from the other members of the genus by its parallel instead of widely expanded zygomata.

9. *Ailurus styani*, Thos.

♂. 2786 ; ♀. 2787, 2788 (yg.). 11,000'.

10. *Charronia flavigula*, Bodd.

Not represented in the second collection.

11. *Lutreola sibirica moupinensis*, M.-Edw.

♂. 2683 ; ♀. 2682. N.W. Flank. 11,000-14,000'.

12. *Arctonyx obscurus*, M.-Edw.

♂. 2785. N.W. Flank. 9000-10,000'.

13. *Petaurista xanthotis*, M.-Edw.

♂. 2794, 2795 ; ♀. 2793. 10,000-11,000'.

This fine animal, which is distinguishable from Mr. Forrest's previous discovery, *P. clarkei*, by its larger size and blackish feet, was supposed by Milne-Edwards to be "only a variety" of his *P. melanopterus*, and he did not apparently realize that in stating that the animal "had been placed in the public gallery under the name of *P. xanthotis*" he was founding a new name for it. The name, however, clearly stands, and would certainly seem to be referable to the present species, which forms a new and striking addition to our collections. The original locality of *xanthotis* was only recorded as "Tibet," but was in all probability Mu-pin, Sze-chwan, as with other mammals obtained by Père David.

14. *Hylopetes alboniger*, Hodgs.

♂. 2790 ; ♀. 2791. N.W. Flank. 11,000'.

15. *Trogopterus edithae*, sp. n.

♂. 2792. N.W. Flank. 11,000'.

A grey species, less yellow than in the other forms, with comparatively dark-coloured hands and feet.

Size rather less than in *T. mordax*. Fur about as in *T. mordax*, not so long as in *himalaicus*, the hairs of the back (February) about 24 mm. in length. General colour above greyish brown, the fine tickings on the hairs buffy drab, not ochraceous. Under surface dull whitish, with no buffy wash on the belly, and scarcely any trace of it on the undersides of the parachute; bases of the hairs deep slaty grey. Ears with less of the usual tufts of elongated hairs round and on them; one small tuft at the base of their outer margin; the ears themselves only with very fine black hairs. Arms becoming more buffy, even slightly ochraceous, on the wrists, but far less than in *mordax* and *xanthipes*. Anterior edge of parachute dark ochraceous. Hands grizzled buffy brown on the metacarpals, becoming black on the digits. Sides of parachute blackish above. Front of legs washed with buffy. Feet blackish ticked with tawny, the digits deeper tawny. Tail dark greyish, with many of the longer hairs tipped with buffy; dull greyish below.

Skull of about the size of that of *xanthipes*, smaller than in *mordax*. Bullæ comparatively small, much less inflated than in *mordax*, lower even than in *xanthipes* and *himalaicus*.

P^4 not so excessively hypertrophied as in *mordax*, slightly narrower even than in *xanthipes* and *himalaicus*; its length in the type 5.0 mm., its breadth 4.2, the corresponding measures in *mordax* being 6.2 and 5.0 mm.

Dimensions of the type:—

Head and body 268 mm.; tail 260; hind foot 56; ear 30.

Skull: greatest length 55.5; condylo-incisive length 51.5; zygomatic breadth 35; nasals 18×10 ; palatine foramina 5.4; length of bulla 11.2. Upper cheek-teeth 14.8, molars only 9.7.

Type. Young adult male (the basilar suture perceptible, but not definitely open). B.M. no. 23. 4. 1. 32. Original number 2792. Collected February 1922.

This pretty flying-squirrel I have named in honour of Mrs. Stephenson Clarke. It is distinguished from the *Trogopterus* of Central China, *T. mordax*, by its less buffy colour and its smaller p^4 . In the absence of the buffy colour below, especially on the parachute, it is distinguishable from all the members of the genus.

In working out Mr. Forrest's Li-kiang *Trogopterus*, I have re-examined the two specimens from the Upper Min River referred to *T. mordax* in the original description of the latter, and now think that they are referable to yet another highland species, which may be termed

Trogopterus minax, sp. n.

P^4 hypertrophied, as in *T. mordax*, but the bullæ comparatively small.

Size about as in *T. mordax*. Fur long and soft, hairs of back about 32 mm. in length. General colour above about as in *edithæ*, not of the warmer and more buffy tone of *mordax*. Under surface, on the other hand, broadly washed with bright buffy, which extends on to the underside of the parachute, not, however, so vividly as in *mordax*. Ears black, without any suffusion of buffy, their tufts less than in *mordax*, about as in *edithæ*. Forearms and legs washed with buffy, hands and feet rich ochraceous buffy, as in *T. mordax*. Tail greyish, with drabby ends to the hairs.

Skull, as judged by that of the immature paratype, with far smaller bullæ than in *mordax*, more inflated than in *edithæ*.

P^4 hypertrophied, as in *mordax*, enormously large and broad, that of the type 6.4×5.3 mm.; milk p^4 4.7×4.2 .

Dimensions of the type:—

Hind foot 54 mm.; ear (wetted) 32.

Skull of type: tip of nasals to back of postorbital process 33.3; nasals 20.4×10 ; palatilar length 31; upper cheek-teeth 17.2; molars only 11.1. Length of bullæ in the young paratype 11.4.

Hab. Upper Min River, Sze-chwan. Type from Wonn Chuen.

Type. Old male. B.M. no. 9. 7. 21. 4. Collected and presented by the late Mr. J. W. Brooke.

That this is not *edithæ* is shown by its hypertrophied p^4 , while from *mordax* it is distinguishable by its smaller bullæ and less buffy colour.

16. *Callosciurus erythræus michianus*, Rob. & Wr.

♂. 2700, 2763, 2774, 2778, 2778*. 10,000'.

17. *Rupestes forresti*, Thos.

♂. 2783. 11,000'.

♀. 2767. N.W. Flank of range. 9000–10,000',

This—the special zoological prize of the first collection—now turns up in the Li-kiang Range. The previous specimens were from the Mekong–Yangtze divide, some 60 miles distant.

18. *Tamiops clarkei*, Thos.

♂. 2761, 2781; ♀. 2702, 2776. 10,000-11,000'.

19. *Tamiops maritimus forresti*, Thos.

♀. 2703, 2705. 10,000'.

20. *Dremomys pernyi lichiensis*, Thos.

Twenty-five specimens.

Uniformly similar to the typical series.

21. *Rattus* sp. (cf. *nitidus*, Hodgs.).

♂. 2667, 2707; ♀. 2659. 13,000-14,000'.

22. *Rattus confucianus*, M.-Edw.

♂. 2660, 2664; ♀. 2647, 2684. N.W. Flank. 13,000-14,000'.

23. *Apodemus ilex*, Thos.

Six specimens. 10,000-12,000'.

24. *Apodemus speciosus latronum*, Thos.

Six specimens. 10,000-12,000'.

25. *Apodemus chevrieri*, M.-Edw.

Sixteen specimens.

26. *Eothenomys fidelis*, Hint.

Sixteen specimens. 11,000-14,000'.

27. *Eothenomys proditor*, Hint.

Sixty-nine specimens. 12,000-15,000'.

So far as we know at present, these two species of *Eothenomys* are peculiar to the Li-kiang Range, while, on the other hand, there is no *Neodon* there, its place being, perhaps, taken by one or other of them.

28. *Microtus clarkei*, Hint.

♂. 2603. 13,000'.

This specimen is indistinguishable from the typical series described from the Kiu-kiang-Salween divide.

29. *Rhizomys wardi*, Thos.

♀. 2789. N.W. Flank. 12,000-13,000'.

Evidently widely distributed through the Yunnan highlands. Mr. C. J. Gregory recently obtained a specimen at Lanpinghsien, 26° 27' N., 99° 28' E.

30. *Ochotona forresti*, sp. n.

♂. 2597, 2598. N.W. Flank. 13,000'.

A large species allied to *thibetana*.

Size considerably larger than in any described species of the *thibetana* group. Fur medium, hairs of back about 15 mm. in length. General colour above of the same heavily lined brown as in *thibetana* and *sikimaria*. Under surface dark soiled greyish, the hairs slaty at base, whitish or buffy at tip. Nape dark hoary greyish, this colour extending more or less on to the face, but the forehead is brown. Ears like those of *thibetana*, of similar length, with the same black or blackish proectote, dark grey-brown metentote, and well-defined white edge. Arms buffy or tawny brown, the shoulders and sides of neck also more or less washed with tawny. Hands buffy whitish; fore-claws very long, much longer than those of any of the species of the *thibetana* group, and equalling those of the large *O. roylei*. Feet dull whitish, the metatarsals buffy; brushes of soles blackish.

Skull of the general shape of that of *thibetana*, but larger, and not so flattened. Nasals proportionally narrower. Palatine foramina only slightly and evenly expanded behind, quite without the conspicuous posterior broadening found in *thibetana*. Bullæ about as in that species.

Dimensions of the type:—

Head and body 185 mm.; hind foot 27; ear 19.

Skull: greatest length 39; condylo-incisive length 37; zygomatic breadth 19.4; nasals 12.6 × 6; interorbital breadth 5; breadth of brain-case 15.8; palatal foramina 9.6 × 3.3; length of bulla 9; upper tooth-series (alveoli) 7.3.

Type. Adult male. B.M. no. 23. 4. 1. 91. Original number 2597. Collected in August 1922.

Among the several closely allied species of the *thibetana* group this Pika stands out by its comparatively large size, its grey nape, convex skull, and the absence of the posterior broadening of the palatal foramina so marked in the other forms. In all probability it does not occur exactly on the same ground as *O. thibetana*, although living at about the same altitude on the same range.

Named in honour of Mr. George Forrest, to whose abilities the two valuable Yunnan collections are due, and who has taken great interest in his mammal work.

While naming this Pika, I have again examined the Omi-san specimen obtained by Mr. Malcolm Anderson in 1910, and then referred to *O. thibetana*. It is, however, so different in colour to the ordinary *thibetana* that, now we have seen a much larger number of specimens of the latter, I may venture to give it a special subspecific name:—

Ochotona thibetana sacraria, subsp. n.

General characters of *thibetana*, but the back of a reddish-brown colour, between cinnamon and cinnamon-brown, this colour being apparently due to the light rings on the hairs being dark ochraceous instead of drabby. On the sides the tone is more uniform and more cinnamon. Nape with no evident nuchal mantle or patch.

Skull as in *thibetana*, but rather flatter, and there is no trace of the minute postorbital projections usually present in that animal.

Dimensions of the type (measured in flesh):—

Head and body 149 mm. ; hind foot 28 ; ear 18·5.

Skull: greatest length 36·7 ; condylo-incisive length 34 ; nasals 11·6 ; palatal foramina 9·8 × 4·8 ; length of bulla 8 ; upper tooth-series 7·2.

Hab. Mt. Omi-san, Omi-hsien, S. Sze-chwan. Alt. 9500'.

Type. Adult male. B.M. no. 11. 2. 1. 258. Original number 2525. Collected 17th August, 1910, by M. P. Anderson. Presented by the Duke of Bedford, K.G.

31. *Ochotona thibetana*, M.-Edw.

♂. 2644, 2709 ; ♀. 2592, 2599, 2640. 13,000–16,000'.

LXXVI.—*Exotic Muscaridæ (Diptera)*.—IX.* By J. R. MALLOCH, Bureau of Biological Survey, Washington, D.C.

Subfamily *PHAONINÆ*.

Genus *OPHYRA*, R.-D.

The members of this genus are very widely distributed, and there is some doubt in my mind as to the distinctness of some of the described species. I suspect that several that are now listed as distinct will ultimately fall as synonymous with some of the older species. In this paper I present a key to the species in the British Museum material now before me, with some records of their distribution.

Key to Males.

1. Palpi rufous-yellow; hind tibia with short fine setulose hairs on antero-dorsal surface, one long postero-dorsal bristle beyond middle, and two short antero-ventral bristles; calyptræ yellow..... *ænescens*, Wied.
- Palpi black..... 2.
2. Hind tibia very conspicuously curved, furnished on ventral surfaces with soft, erect, black hairs which are longest at base of series, just before middle of tibia; mid-femur with two series of short spines near base on ventral surface; calyptræ fuscous..... *leucostoma*, Wied.
- Hind tibia straight or very slightly curved, and without hairs as above described; mid-femur with at most one series of short spines of bristles near base on ventral surface..... 3.
3. Apices of segments of fore tarsi narrowly yellowish or whitish; mid-femur with some very fine hairs near base on postero-ventral surface, without short spines; hind tibia straight, usually with one antero-dorsal and three postero-dorsal bristles, and some long setulose hairs on apical half of antero-ventral and postero-ventral surfaces, more bristle-like on the former..... *chalcogaster*, Wied.
- Fore tarsi black; mid-femur with one or more short spines or bristles on ventral surface near base; eye with a slight but distinct rounded emargination at or near middle of posterior margin..... 4.

* For Part VIII., see Ann. & Mag. Nat. Hist. (9) x., December 1922, pp. 573-587.

4. Hind tibia curved and with two series of long fine outstanding bristles, one on the apical two-thirds of antero-ventral and the other on the apical two-thirds of postero-ventral surface; hind femur with three or four of the bristles on the apical third of antero-ventral surface much longer than its diameter and a fine hair near base on ventral surface *anthrax*, Meig.
- Hind tibia straight, with a few long sub-decumbent setulose hairs on apical half of antero-ventral and postero-ventral surfaces; none of the bristles on apical fourth of antero-ventral surface of hind femur noticeably longer than the femoral diameter, one or two short straight bristles near base below *nigra*, Wied.

Key to Females.

1. Palpi rufous-yellow; frontal triangle extending broadly to anterior margin of interfrontalia, truncate or broadly rounded at anterior extremity; postero-dorsal bristle on hind tibia much longer than the other median bristles, situated well beyond middle; thorax without outstanding presutural acrostichal bristles *ænescens*, Wied.
- Palpi black; frontal triangle not extending to anterior margin, if so then its anterior extremity is acutely pointed; postero-dorsal bristle on hind tibia not longer than the other median bristles and situated at or very close to middle 2.
2. Frontal triangle extending to anterior margin of interfrontalia, heavily chitinised to apex; hind tibia with three or four antero-ventral bristles; anterior sterno-pleural bristle minute or absent *anthrax*, Meig.
- Frontal triangle not extending to anterior margin of interfrontalia, if almost so its anterior extremity is very poorly chitinised and subopaque; anterior sterno-pleural bristle distinct though smaller than the posterior one 3.
3. Frontal triangle broad, at the point of insertion of the cruciate bristles well over three times as wide as orbits at insertion of the forwardly-directed supraorbital, the latter minute; hind femur with three very short preapical antero-ventral bristles; hind tibia without an antero-dorsal median bristle; margins of lower calyptra white. *nigra*, Wied.
- Frontal triangle less than three times as wide as orbits at insertion of lower supraorbital bristle, the latter strong but short; hind

- femur with more than three antero-ventral preapical bristles, which are also stronger; hind tibia with an antero-dorsal median bristle..... 4.
4. Arista black; hind tibia with two antero-ventral bristles; lower calyptra brownish yellow, with brown margins *leucostoma*, Wied.
- Arista yellow basally; hind tibia with one antero-ventral bristle; lower calyptra white, with whitish margins *chalcogaster*, Wied.

Ophyra ænescens, Wiedemann.

A common species throughout South and Central America, extending its range into the southern United States. Evidently a strictly New World form up to this time.

In the larval stages it is found in human excrement and manure, as are most of its congeners, so far as I know.

Represented in material before me from Monte Video, Uruguay.

Ophyra leucostoma, Wiedemann.

The genotype. Common throughout Europe, Canada, and the United States. One female specimen from Illinois sent to British Museum.

I have found this species very abundant around chicken-houses in Medicine Hat, Alberta, Canada. It soars like species of the genus *Fannia* and the Syrphidæ.

Ophyra chalcogaster, Wiedemann.

Distributed throughout the Orient and extending into Australia.

Specimens before me are from Southern China, Philippine Islands, India, Ceylon, Siam, Seychelles Islands, Mauritius, and Australia.

Ophyra anthrax, Meigen.

A moderately common European species which ranges into Africa and Asia.

Localities represented in material before me are Estcourt and Durban, Natal, and Hsikow, near Tientsin, China.

Ophyra nigra, Wiedemann.

I suspect that this species has been redescribed as *spinigera*, Stein.

I have seen specimens from Stanuary Hills, Queensland.

Genus AUSTRALOPHYRA, nov.

Generic Characters.—Differs from *Ophyra* in having the hypopleura with moderately long black hairs on upper margin below and in front of the spiracle, the ocellar triangle very short, with the cruciate bristles well in front of its anterior extremity in female, and the orbits not polished in that sex. The ptilinum in neither sex has silvery pubescence.

Genotype, *Ophyra analis*, Macquart.

This species appears to be of Australasian origin, and differs in the above characters from the species of *Ophyra* from any other region, and also from the two species of *Ophyra* that occur in Australia.

I have before me specimens of *analis* from South Queensland and New South Wales.

Genus HYDROTÆA, R.-D.

Hydrotæa australis, sp. n.

Male.—Black. Thorax shining, with very faint grey pruinescence that is only distinct laterally, no distinct vittæ. Abdomen subopaque, basal tergite black, apical three densely pale grey-pruinescent, with a black dorso-central vitta which is much tapered posteriorly. Legs black. Wings slightly brownish basally. Calyptræ brownish. Halteres with black knobs.

Eyes bare, subcontiguous below ocelli; parafacials not visible from side; cheek almost linear; arista subnude. Thorax with four pairs of postsutural dorso-centrals, and four pairs of moderately long presutural acrostichals; hypopleura bare. Abdomen ovate. Fore femur with two spines at base of apical concavity, the apical one slender, the second one much swollen basally; mid-femur with four or five fine straight bristles on basal half of postero-ventral surface and rather numerous long setulose hairs on basal half of antero-ventral surface; mid-tibia and tarsi normal, the former with two posterior bristles; hind femur normal, with two or three short preapical antero-ventral bristles; hind tibia normal, with very fine short erect hairs along antero-dorsal surface, two fine antero-ventral bristles, a few erect setulose posterior hairs, and the postero-dorsal bristle practically indistinguishable. Outer cross-vein almost straight; penultimate section of fourth vein not longer than outer cross-vein and barely one-third as long as last section.

Female.—Differs from the male in being rather densely

brownish-grey pruinescent on thorax and abdomen, the latter lacking the dorso-central vitta; the legs are normal, the hind tibia has one antero-dorsal and two antero-ventral bristles, and the outer cross-vein is not as long as penultimate section of fourth vein.

Length 3-4 mm.

Type, male, allotype, and three paratypes, South Queensland (*T. L. Bancroft*). Paratypes, two males and four females, Kendall, New South Wales; one male and six females without locality but labelled "about cows," sent by Department of Public Health, Sydney, New South Wales.

Like *occulta*, Meigen, of Europe and North America, which it greatly resembles in the female sex, this species will probably be found in the larval and pupal stages in cowdung.

The only Australian species of this genus previously described is *fuscocalyptrata*, Macquart. This differs in being over 6 mm. in length, and in colour, as well as in the venation and the armature of the fore femur, judging from the original description. I have not seen the species.

Hydrotaea nubilicosta, sp. n.

Female.—Black, distinctly shining. Ocellar triangle, orbits, and parafacials glossy black, interfrontalia brown when viewed from in front. Thorax with slight grey pruinescence and very faintly vittate. Abdomen unmarked. Legs black. Wings very noticeably browned on front half, most conspicuously so from apex of costal cell to apex of wing. Calyptræ white. Knobs of halteres black.

Eyes bare; frons normal, the triangle short, not extending to the cruciate bristles; arista with very short pubescence. Thorax with numerous fine hairs on the presutural acrostichal area, one or two pairs of the hairs near margins posteriorly stronger but not conspicuously so. Fore tibia without a posterior median bristle; mid-tibia with two posterior bristles; hind femur with a long fine hair near base on ventral surface and a series of fine bristles on antero-ventral surface, the longest one about one-fourth from apex; hind tibia with one postero-dorsal, one antero-dorsal, and one or two antero-ventral bristles. Outer cross-vein almost straight; first posterior cell slightly narrowed apically.

Length 6.5 mm.

Type, Villavicencio, Quatiquia River, Columbia, 400 feet, xi.-xii. 1914 (*Dr. A. Balfour*).

Hydrotæa cyaneiventris, Macquart.

The female of this species closely resembles an *Ophyra*, the frontal triangle being very large and glossy, extending almost to anterior margin and having the cruciate bristles situated in its lateral margins; the orbits and upper part of parafacials are also glossy black. The entire body is glossy blue-black in the female. The armature of the legs is similar to that of last species, but the wings are clear, slightly darker at bases, and the calyptreæ are brownish with darker margins.

One female, same locality as last species.

On the strength of this female I should not hesitate to place the species in *Ophyra*, but have not seen the male, and as Stein has examined this sex and retains it in *Hydrotæa* I cannot do otherwise than follow him, though I doubt the propriety of the course. It may be distinguished from the females of *Ophyra* listed on a preceding page, which have black palpi, by its having the hind tibia bristled as in *ænescens*.

Hydrotæa villosa, Stein.

A black species with similar habitus to that of *dentipes*, F., but the parafacials are broader and densely, almost golden-pollinose, the line of demarcation between this part and the glossy black part being very sharply drawn above; the eyes are hairy; and the male has the hind femur with several series of long fine setulose hairs below, the preapical ventral bristles being hardly stronger than the others. The hind tibia of male is normal, and has a long postero-dorsal bristle, a series of setulose hairs along the antero-dorsal surface, amongst which are some that are much stronger, and the antero-ventral and postero-ventral surfaces with some fine hairs.

Originally described from Bogota, Colombia. One male and two females from the same region as last two species.

Hydrotæa houghi, Malloch.

One female from Vernon, British Columbia, 1300 feet, 12. vi. 1902 (*Miss G. Ricardo*).

Helina australasiæ, sp. n.

Male.—Similar in colour to *reginæ*, Malloch, but the thorax is blackish blue instead of black, the abdomen is

lightly and evenly grey-pruinescent, with a faint dorso-central black vitta and no checkerings, the margins of the calyptræ are fuscous, and the parafacials white, not yellowish, pruinescent.

Eyes hairy; narrowest part of frons fully twice as wide as third antennal segment, orbits narrow, setulose on their entire length; triangle shining in front of ocelli. Thorax as in *reginæ*, but with at least one pair of strong presutural acrostichals. Legs as in *reginæ*, the hind femur with the antero-ventral bristles short and closely placed, extending from near middle to apex, and a few short setulæ at apex on postero-ventral surface.

Length 7 mm.

Type, Victoria, Australia (*C. French*), in British Museum. Paratypes, one male, Coaleston, Allyn River, New South Wales, 26. ii. 1921; one male, Sydney, New South Wales, 30. x. 1921 (Dept. Public Health, N.S.W.).

This species runs to Caption 3 in the key to Australian *Helinæ* in Part VI. of this series of papers, but is readily separable from the two species thereunder by the presence of at least one strong pair of presutural acrostichal bristles.

Helina nigrescens, Stein.

Male.—Entirely black, slightly shining. Thorax grey-pruinescent, rather indistinctly quadrivittate, and with a faint bluish tinge. Abdomen with grey pruinescence, each tergite with a pair of large, shining, subtriangular, poorly-defined, black spots and the bases of bristles set in black dots. Wings slightly smoky, inner cross-vein distinctly, outer indistinctly, infuscated. Calyptræ grey, margins fuscous. Halteres with black knobs.

Eyes long-haired; frons about as wide as third antennal segment; arista almost bare, except on basal half, where the hairs are a little longer than its basal diameter. Thorax with four pairs of postsutural dorso-centrals, and two or three pairs of well-developed presutural acrostichals; hypopleura bare. Abdomen ovate, the dorsal bristles rather strong apically. Fore tibia without a median posterior bristle; mid-tibia with three posterior bristles; hind femur with an almost complete series of antero-ventral bristles which are short basally, and some setulose hairs at base on postero-ventral surface; hind tibia with two antero-dorsal, and three or four antero-ventral bristles, and a few setulæ on posterior surface at middle.

Length 5.5 mm.

Locality, Blue Mountains, New South Wales, 15. i. 1922 (Dept. Health, N.S.W.).

This species runs to Caption 6 in the key already referred to, but differs from all species in the key that fall in the same segregate by having the halteres black, margins of calyptreæ fuscous, fore tibia without a posterior median bristle, the arista pubescent, and the thorax with distinct presutural acrostichals.

Helina howei, sp. n.

Female.—Metallic greenish blue. Thorax densely grey-pruinescent, with rather conspicuous vittæ anteriorly. Abdomen faintly, evenly grey-pruinescent. Head black, interfrontalia opaque, facial orbits and cheeks whitish pruinescent. Wings slightly brownish, darker along costa, the cross-veins and apex of first vein with very distinct clouding. Legs black. Calyptreæ and their fringes white. Knobs of halteres black.

Frons about one-third of the head-width; triangle narrow, extending almost to anterior margin of frons; eyes very indistinctly haired; arista plumose. Thorax with three pairs of postsutural dorso-centrals; prealar very small; presutural acrostichals not differentiated from the hairs. Abdomen ovate. Fore tibia missing; mid-tibia with two posterior bristles; hind femur with one or two preapical antero-ventral bristles; hind tibia with one antero-ventral and two antero-dorsal bristles. Outer cross-vein curved, less than its own length from apex of fifth; veins 3 and 4 divergent apically.

Length 5 mm.

Type, Lord Howe Island, New South Wales, 11. iii. 1910 (Dept. Public Health, N.S.W.).

In the key already referred to this species runs out at the first Caption, differing from both segregates in several characters, thus necessitating another segregate under number 1 as follows:—

Thorax and abdomen greenish blue; knobs of halteres black; arista with very long hairs, plumose; cross-veins of wings distinctly infusate; calyptreæ white; thorax with three pairs of postsutural dorso-centrals. *howei*, sp. n.

Helina hirtibasis, sp. n.

Male.—Very similar to *whitei*, Malloch, differing in having the frons narrower, less than twice as wide as third antennal segment, while in *whitei* it is at least twice as wide;

the basal abdominal sternite hairy, bare in *whitei*; hind femur with more widely-spaced antero-ventral bristles, which are comparatively longer apically than in *whitei*, the postero-ventral surface with more distinct setulose hairs apically and less noticeable hairs basally; and the hind tibia with an antero-ventral bristle, which is absent in *whitei*. The facial ridges are also not haired so far up as in that species.

Female.—This I erroneously listed as the allotype of *whitei* in Part VI. of this series of papers. Similar to the male, except in having a wide frons.

Length 8–9 mm.

Type, male, allotype, and one male paratype, Barrington Top, New South Wales, 13–17. xii. 1921 (*G. Goldfinch*). Paratype female, Mangalore, Tasmania, 22. ii. 1913 (*A. White*).

I have also before me two females from Sydney, N.S.W., and two from Gisborne, Victoria, that apparently belong to this species, though they are a little smaller.

A peculiar fact is that all the females have some hairs on the hypopleura below the spiracle, while the males have the hypopleura bare, or with one or two hairs near the posterior lower angle.

Ruus to *whitei* in the key already referred to, but is distinguished by the hairy basal abdominal sternite in both sexes and the narrower frons in the male.

Type returned to Department of Public Health, Sydney; paratype in British Museum.

Helina vandiemeni, sp. n.

Female.—Very similar to *antarctica*, Macquart. Differs from it in having the second antennal segment, base of third, and the palpi rufous-yellow instead of black. Fore coxæ rufous-yellow, with a fuscous spot at base in front, not black as in *antarctica*.

Structurally and in chaetotaxy similar to *antarctica*. The arista is plumose in both, there are no well-developed pre-sutural acrostichals, the prealar is of moderate length, and there are four pairs of postsutural dorso-centrals. The hind femur in the new species has fewer and shorter bristles on antero-ventral surface, and they do not extend over more than the apical half. The halteres in *antarctica* are brownish, while in the new species they are pale yellow. The eyes are slightly hairy in both sexes.

Length 8 mm.

Type, and two paratypes, Hobart, Tasmania (*A. M. Lea*).

This species runs to *antarctica* in the key already referred to, but is distinguished at once by the colour of the antennæ and palpi, which in the former are entirely black, only the palpi being rarely paler at bases.

Melanocheilia tenuicornis, sp. n.

Female.—Very similar to *ordinata*, Hutton, in the structure of the head and antennæ. Differs very strikingly in colour, the pruinescence on thorax and abdomen being bluish grey instead of brownish grey, the abdomen especially appearing bluish. The pruinescence on orbits and parafacials is brown except at base of antennæ where it is white, whereas in *ordinata* it is entirely yellow, and the upper half of the cheeks is rufous instead of yellow. The thoracic vittæ are narrowly fused in front of suture, just behind suture, and again beyond middle, the median spot on scutellum is as large as the lateral spots and covers most of the disc basally instead of being very small. Each abdominal tergite from 1 to 3 has a pair of moderate-sized subtriangular brown spots, and the fourth has sometimes a brown spot in centre at base. The tibiæ are rufous and the mid-pair have an antero-dorsal bristle. Third antennal segment at least four times as long as second; the longest hairs on arista are noticeably longer than its basal diameter, whereas in *ordinata* they are not as long, the eyes are hairy, and the frons is at least three times as wide as the slender third antennal segment. The lower calyptera and the knobs of halteres are fuscous, not yellow. Chætotaxy as in *ordinata*.

Length 8–9 mm.

Type and one paratype, Crofton, New Zealand, 28. x. 1906 (*W. Wesché*).

This species was compared with the type-specimen of *ordinata*, Hutton.

Genus *EXSUL*, Hutton.

This genus was erected for the reception of one species, *singularis*, Hutton. Stein omitted it from his 'Catalogue of the Genera of Anthomyiidæ of the World' in 1919, probably because he had some doubt as to its relationships. I have seen the genotype and type-specimen, as well as three other males from New Zealand, and find that it is closely related to *Lispodes*, Malloch. The basal abdominal sternite is bare, the fore and mid femora and tibiæ are armed on their ventral surfaces with short stout spines, and the wings are abnormally broad, being about as wide as long.

The wing-characters alone serve to separate *singularis*

from another species which I have before me, and, believing as I do that either a difference in a structure of more fundamental importance than the wing, or the existence of several characters in common distinguishing the species of a group from their allies are essential to relegate the forms to distinct generic status, I cannot reasonably debar this new form from *Exsul*, though the habitus of the two species is entirely different. It is also pertinent to state that I have seen only the male of *singularis*; the female may have more normal wings. I would therefore amend the generic description by eliminating reference to the shape of the wings.

Exsul tenuis, sp. n.

Male.—Black, densely opaque pale grey pruinescent. Head whitish pruinescent, the parafacials almost silvery, parts showing blackish in some lights. Dorsum of thorax with two narrow black vittæ in front of suture between the dorso-centrals, and a broader one on each side beyond the dorso-centrals, all of which are continued beyond suture but not to hind margin, and a brown central vitta posteriorly; scutellum with a blackish spot on each side at base; mesopleura with a faint brown spot on upper hind margin. Abdomen with a pair of subtriangular brown spots near hind margin of the first three tergites. Legs black. Wings whitish, with a brown suffusion along sides of all longitudinal and cross veins. Calyptræ white. Knobs of halteres brown.

Eyes hairy; frons much widened anteriorly, at narrowest part, in front of anterior ocellus, fully twice as wide as third antennal segment; orbits with bristles to above middle, and fine hairs above and laterad of them; parafacials haired on upper half; antennæ half as long as face, third segment 1.5 as long as second; arista almost bare, second segment thick, slightly longer than wide, third much thickened at base, rapidly tapered; facial ridges setulose on lower half; parafacials about 1.5 as wide as third antennal segment, and half as wide as height of cheek; palpi slightly dilated apically, bristly; proboscis thick and glossy, with very strong apical teeth. Thorax with four pairs of postsutural dorso-centrals; both intra-alars strong; presutural acrostichal hairs sparse; sterno-pleurals 1:1; hypopleura bare. Abdomen cylindrical, very slender, about twice as long as thorax, with sparse long setulose hairs; basal sternite bare; seventh tergite cleft longitudinally in centre, with long setulose hairs on sides of cleft; fifth sternite with a deep V-shaped notch.

Ventral spines on all femora covering ventral surface, except apically; fore and mid tibiæ with one or two posterior setulose hairs; antero-ventral and postero-ventral spines on all femora stout; hind tibia with one postero-dorsal and two antero-dorsal setulæ; tarsal claws long and strong. Wings narrow; veins 3 and 4 divergent apically; outer cross-vein at about its own length from inner and one-third of its own length from apex of fifth vein.

Female.—Differs from the male in having the thorax and abdomen more robust, the latter being ovate; the abdominal spots much larger, extending along the entire hind margin, except in centre; the longitudinal wing-veins not noticeably browned; and the tibial bristles stronger, with one antero-dorsal bristle on mid-tibia.

Length 9–12 mm.

Type, male, allotype, and two male paratypes, Milford, New Zealand, 24. xii. 1920 (*C. Fenwick*).

It is remarkable that all the specimens of *Exsul* that I have seen, including the genotype, are from Milford Sound. The genus probably occurs elsewhere on the sea-coast of at least the southern island.

LXXVII.—*Some new Short-horned Grasshoppers from East Africa*. By B. P. UVAROV, F.E.S., Assistant Entomologist, Imperial Bureau of Entomology.

THE present paper is based on the collections sent to the Imperial Bureau of Entomology by the Government Entomologists in Uganda and Kenya Colony. All the actual types are preserved in the British Museum; a few paratypes of the species represented by sufficiently long series of specimens have been returned to the Government Entomologists.

1. *Gastrimargus mirabilis*, sp. n.

♂. Much more compressed laterally than any known species of the genus. Antennæ reaching halfway between the front and middle coxæ. Face callosely rugulose. Frontal ridge in profile distinctly convex, forming a very wide curve with the vertex; its surface slightly convex, punctured, and callosely rugulose; its margins not raised, subcallous, almost reaching the clypeus, very feebly approximated below the ocellum. Lateral facial keels distinctly arched. Cheeks

rugulose, except in their middle part. Head above smooth, but not shining, and the fastigium of vertex, therefore, distinctly separated from the rugulose and shining frontal ridge. The median and lateral keels of the fastigium well developed. Distance between the eyes subequal to the vertical diameter of an eye. Pronotum very long and with an unusually high and thin, transparent crest; its surface distinctly granulose, except on the lateral lobes, which are coarsely rugulose; transverse sulci feeble, obliterated on the crest; sides of the metazona depressed and forming distinct rounded angles with the lateral lobes; the length of the lobes not more than half the length of the crest. Pleuræ coarsely rugose. Elytra extending well beyond the hind knees; discoidal false vein straight; the ulnar furcus with two rows of cells and a straight false vein. Hind femora very narrow and slender; hind tibiæ with 14-17 spines on each side.

Head green, with the lower part of the frontal ridge reddish brown; middle portion of the cheeks pale; lateral facial keels and oblique streaks before and behind the pale part of the cheeks blackish; upper median fascia and postocular fasciæ pale buff in the middle, margined with castaneous. Pronotum green, with the typical pattern of the genus in black and buff; the crest reddish buff. Elytra uniformly reddish brown in the basal half and smoky hyaline elsewhere. Wings pale yellow basally, hyaline elsewhere, with a narrow fascia, subobliterated in the fore part, not touching the outer margin and not reaching the inner margin. Hind femora with a row of very distinct black dots along the carinæ of both outer and inner median areas. Hind tibiæ and tarsi sanguineous.

	♂ (type).	♀ (paratype).
	mm.	mm.
Length of body	25.5	43
" pronotum	11	16
" elytra	25	38
" hind femora ..	16.5	26

Two males and one female from Entebbe, Uganda (*C. C. Gowdey*).

A very remarkable species, easily distinguished by the uncommonly high and thin pronotal crest, such as may be seen in the genus *Pyrgodera* or in some Pamphaginæ. The genus *Oreacris*, Bol. (*Ann. Soc. Ent. Belg.* lv. 1911, p. 298), is also characterised by a very high crest, but it differs from *Gastrimargus* in many important characters.

2. *Tristria cæruleipes*, sp. n.

♂. Slender. Antennæ not reaching to the hind margin of the pronotum. Frontal ridge in profile slightly convex; its surface flat, only at the fastigium feebly convex, with scattered puncturation; the margins not raised, very feebly approximated at the fastigium. Lateral facial keels obtus-angulately broken in the middle. Vertex feebly impressed, rugulose, tricarinate, the lateral keels disappearing behind the eyes and the middle one reaching the pronotum. Eyes narrowly oval, very oblique, with the lower margin rounded; distance between them less than their horizontal diameter. Pronotum indistinctly rugosely punctured; metazona about two-thirds of the prozona, longitudinally rugulose; median keel very distinct, thick, smooth; transverse sulci feeble; lateral keels distinct in prozona and subobliterate in the hind part of metazona; lateral lobes about half again as long as high; their upper third is smooth, minutely punctured and separated from the lower part, which is more densely punctured, by a subcallose longitudinal carinula; lower margin callous, obtusely angulate just behind the middle. Mesosternal suture long. Pleuræ rugosely punctured. Elytra not reaching the hind knees. Hind femora slender. Hind tibiæ with 12-13 spines on each side. First joint of the hind tarsi twice as long as the second; third one half as long again as the second. Cerci elongate, conical, slightly longer than the supra-anal plate. Subgenital plate long, pointed.

General coloration testaceous. Antennæ pale basally, somewhat reddish elsewhere. Face, frontal ridge, vertex, and occiput punctured with black; sides of the frontal ridge above the antennæ and of the fastigium black; an indefinite blackish-castaneous fascia runs along the vertex and occiput; a chocolate-brown postocular fascia margined from below with a narrow pale line is prolonged on the lateral lobes of the pronotum, where it occupies the upper third, the pale line becoming there somewhat callous, but not reaching the hind margin; the lower callous margin of the lobes pale, with an irregular, narrow, reddish-brown fascia separating it from the upper part; the disc of the pronotum with blackish and brown puncturation, with a pair of round black dots in the middle of the prozona, and another pair between the first and second sulci. Elytra with the pre-radial part paler than the rest; the radial veins in the basal half black; other veins brownish with darker streaks; anal area with a few scarcely distinct darker spots. Front and middle legs testaceous,

striated longitudinally with black. Hind femora with the externo-median area very narrowly marginated with black along the basal half of the upper carina, and a series of minute black dots along the outer margin of the upper outer area; the knees black on the inner side, except the apex of the lobes, and with a semilunar black spot on the outer side. Hind tibiæ with the base very narrowly black, the rest dirty blue; their spines white with black tips. Hind tarsi reddish brown below, blackened above.

♀ (paratype). The postocular fascia of the head prolonged along the upper third of the lateral pronotal lobes and the discoidal field of the elytra, where it gradually disappears halfway to the apex, not blackish castaneous, as in the male type, but olivaceous green. The puncturation of the head and pronotum brownish, indistinct. The knees on the inner side with but a basal fascia and a semilunar spot black.

	♂ (type).	♀ (paratype).
	mm.	mm.
Length of body	26.5	34
„ pronotum	5	6
„ elytra	19	23
„ hind femora	16.5	20

Described from two males and six females from Entebbe, Kivuvu, and Mabira Forest, Uganda (*C. C. Gowdey*).

Easily recognised by the numerous colour-characters, especially by the coloration of the hind femora and tibiæ, as well as by the lateral fascia, which is not known in any of the previously described species. The species occurs in two colour-forms, and the type and paratype described represent both of them; the difference is not sexual, but individual.

With regard to the synonymy of the genus *Tristria*, Stål, I should mention that both *Metapula* of Giglio-Tos (Boll. Mus. Torino, xxii. 1907, p. 10) and my *Tapinophyma* (Ann. & Mag. Nat. Hist. ser. 9, vol. vii. 1921, p. 496) are pure synonyms of *Tristria*.

3. *Eucoptacra gowdeyi*, sp. n.

♂. Antennæ reaching a little beyond the hind coxæ, compressed at the base, the rest distinctly incrassate. Face very coarsely and densely punctured; frontal ridge flat, coarsely punctured, with the margins smooth, parallel-sided below the ocellum, regularly elliptically dilated above the latter, narrowing again at the fastigium; widest between the antennæ and there about twice as broad as the subocellar part; its width at the fastigium slightly more than the subocellar

width. Fastigium practically horizontal, forming a perceptible, though rounded angle with the frontal ridge, somewhat impressed, indistinctly carinate in front. Vertex between the eyes tricarinate. Eyes prominent, but less so than in *E. anguliflava*, Karsch; their vertical diameter less than twice the horizontal one. Pronotum more cylindrical and less compressed laterally than in the other species, rugosely punctured; median keel very low; transverse sulci quite distinct; metazona subequal to the prozona; hind angle somewhat more than 90°, rounded apically. Prosternal tubercle obtusely conical. Mesosternal interspace a little broader than long. Metasternal lobes distinctly separated. Elytra just reaching the hind knees, with the apex obliquely rounded, scarcely truncate. The last tergite with two long, depressed, spine-like projections in the middle. Supra-anal plate with the apex somewhat attenuate and rotundato-truncate, and with two small teeth behind the middle. Cerci much longer than the supra-anal plate; the basal part, occupying more than half the whole length, compressed laterally, parallel-sided, slightly incurved; the apical part narrow, rounded, suddenly deflexed, forming an obtuse angle with the basal part, and again recurved, in the shape of a broad hook.

General coloration pale reddish olivaceous. Antennæ black, with the base brown. Clypeus and labrum blackish. Head bright yellow; the upper half of the face and of the frontal ridge olivaceous; eyes brown, but the orbits yellow all round; occiput with a narrow dark median fascia. Pronotum reddish brown, with the median keel and the lateral lobes of a darker shade, almost blackish; the hind angle of the lateral lobes broadly yellow. Elytra pale olivaceous. Wings pale golden-yellow. Hind femora pale testaceous all over, except the outer lower sulcus, which is blackish blue; the upper carina of the externo-median area with 7-8 small black dots. Hind tibiæ pale testaceous basally, merging gradually into the bright red of the apical half. Hind tarsi red.

♀ (paratype). Differs from the male as follows:—Antennæ reaching halfway between the middle and hind coxæ; fastigium of vertex distinctly marginated; mesosternal interspace transverse; elytra not reaching the hind knees; general coloration darker, and all parts which are yellow in the male are testaceous; hind femora with greenish-grey transverse sulci, and with the dots of the upper external carina also greenish grey.

	♂ (type).	♀ (paratype).
	mm.	mm.
Length of body	13	17.5
" pronotum	3	4
" elytra	10	12.5
" hind femora	8.5	10

Described from four females and eleven females from Entebbe, Bweya, and Mwera, Uganda (*C. C. Gowdey*).

This new species seems to be closely related to *E. exigua*, Bol., and *E. pallida*, Bol. (Mem. Soc. Ent. Belg. xix. 1911, p. 92), described from Katanga, but differs from them in the coloration of the head and the hind femora and tibiæ. It is not impossible that *E. gowdeyi* may prove to be but a geographical race of one of those species, but this cannot be decided without comparing the types; in the meantime, I prefer to separate it specifically. A somewhat aberrant shape of the pronotum, as well as the horizontal and marginated fastigium of the vertex, together with the apically rounded elytra, may be characters of generic value, but the genera in this group are not yet sufficiently known, and I refrain from describing a new genus.

The coloration of *E. gowdeyi* is somewhat variable, and the described type and paratype represent the two extreme colour-forms; the females are, as a rule, less conspicuously marked than the males.

4. *Cardenius guttatus*, sp. n.

♀. Of medium size. Face moderately reclinate; frontal ridge feebly widened above the ocellum, somewhat constricted at the fastigium, with the surface punctured throughout and impressed in the vicinity of the ocellum; margins of the ridge callous, reaching the clypeus. Fastigium of the vertex distinctly broader than long, with two lateral impressions, punctured throughout, but more distinctly in the median portion, which is not impressed; vertex between the eyes as broad as the frontal ridge above the ocellum, slightly concave, smooth, with the lateral margins distinctly raised, but irregular, with a low, but regular median carinula running right across the occiput. Pronotum conical, not densely but very distinctly punctured; its disc distinctly convex in the prozona and less so in the metazona, which is slightly shorter than the prozona and more densely, though less coarsely, punctured; no distinct lateral keels, the lateral lobes forming widely rounded angles with the disc; the lower margin of the lobes callous, obtusely angulate in the

middle. Prosternal tubercle with the base slightly transverse, obtusely conical. Mesosternal interspace scarcely longer than broad. Metasternal interspace trapezoidal, as long as the basal width. Elytra extending scarcely beyond the hind knees.

General coloration flavescens. The margins of the frontal ridge, the lateral facial carinæ, the median keel of the pronotum, the lower margin of the lateral lobes, two oblique stripes on the pleuræ, and all carinæ of the hind femora are yellow, shining. The sides of the fastigium, the three typical fasciæ on the head and pronotum, a black fascia along the interulnar area of the elytra, a row of 5-6 spots along their middle, and the hind tibiæ below, black. Two round spots on the face below the antennæ, a broad oblique fascia adjoining the lateral facial keel, a narrow postocular fascia running below the black one and more obliquely than the latter, several round spots in the hind part of the cheeks, a pair of spots on the pronotal disc between the second and third sulcus, two more spots between the same sulci on the lateral lobes, two or three spots along the hind margin of the latter, transverse rows of spots along the hind margins of all tergites, as well as less regular spots and dots on all the legs, and the underside, dark violaceous. Wings faintly violaceous.

♂ (paratype). Cerci scarcely longer than the supra-anal plate, distinctly laterally compressed at the base, narrowed and distinctly incurved towards the apex.

	♀ (type). mm.	♂ (paratype). mm.
Length of body	28	20
„ pronotum	7.5	5
„ elytra	22	18
„ hind femora	15	11

Described from 4 ♀ ♀ and 1 ♂ taken at Kagugema, Kisumu, Kenya Colony, i. 1919 (*F. W. Dry*).

The new species seems to be similar to *C. regalis*, Karny, from the Zanzibar coast, known to me only by the meagre description, but is undoubtedly different from it, since *C. regalis* is said to have the prosternal tubercle subacuminate, while it is very obtuse in *C. guttatus*; the male cerci of *C. regalis* are described as straight; and no mention is made in the description of the violaceous spotting, which is very characteristic of *C. guttatus*; and the carinæ of the externo-median area of the hind femora are black in *C. regalis*, while they are pale yellow in the new species.

Genus *STAUROCLEIS*, nov.

Similar to *Cardenius* in the general facies, but the strongly reclinate and conical head gives it a striking superficial resemblance to a member of the subfamily Pyrgomorphenæ.

Antennæ thick, somewhat flattened. Head obtusely conical; face strongly oblique; frontal ridge above the ocellum strongly prominent, dilated and deeply sulcate; below the ocellum it becomes narrow, very low, subobliterate. Fastigium of the vertex strongly prominent forwards, practically horizontal, flat, with the margins obtuse. Distance between the eyes somewhat broader than the frontal ridge at its widest. Eyes oblique, oval, their vertical diameter about twice the horizontal one. The lateral facial keels obliterate. Pronotum conical, with the disc only feebly convex, but the lateral keels wanting; the median keel nearly obliterated by the puncturation; transverse sulci pronounced; prozona subequal to the metazona; the hind angle of the latter obtuse, scarcely rounded apically. Prosternal tubercle subcylindrical, somewhat compressed laterally, perfectly straight, with the apex truncate or rounded. Mesosternal interspace X-shaped; the lobes almost touching each other in the middle in the male and narrowly separated in the female. Metasternal lobes not separated. Elytra practically parallel-sided, with the apex somewhat obliquely truncate. Hind femora broad and short; the upper and lower external areas coarsely and densely punctured; the externo-median area smooth, with the transverse sulci regularly arched, not angulate; the lower carina strongly wavy. Hind tibiæ somewhat shorter than the femora, with nine external and ten internal spines, with an apical external spine.

Genotype: *Staurocleis magnifica*, sp. n.

This curious insect may be easily mistaken for a member of the Pyrgomorphenæ, close to *Ochrophlebia*, which it resembles both in general facies and in the type of coloration; it is, however, a Catantopine and undoubtedly related to *Cardenius*. From the latter it differs in the peculiar shape of the frontal ridge, in the subobliterate median keel of the pronotum, in the prosternal tubercle being not conical and somewhat compressed laterally, in the mesosternal interspace being strongly constricted in its middle, and in the very peculiarly formed hind femora.

5. *Staurocleis magnifica*, sp. n.

♂. Head, pronotum, and pleuræ strongly rugosely punctured. Perfectly black all over, with the exception of the

following parts:—A well-defined orange-red fascia across the lower half of the face and cheeks, along the lower third of the lateral pronotal lobes, and obliquely across the mesopleuræ. The head and pronotum above of the same colour, but somewhat less bright; a narrow black fascia along the median keel of the pronotum, extending also a very short way on to the occiput. Mesopleuræ with an oblique, bright orange-red fascia. Abdominal tergites bluish in their hind parts. The underside with a row of large orange-yellow spots, the first one occupying the apex of the prosternal tubercle, two on the sternum, and seven more on the hind margins of the abdominal tergites. Hind femora with the base of the upper outer carina orange-red and the transverse sulci testaceous. Hind tibiæ greenish below. Elytra brownish black, with the marginal membrane at the apex whitish. Wings black, with a bluish sheen; the inner margin blue; hind margin in its hind half narrowly bluish; the outer membrane of the apex whitish. The cerci somewhat longer than the supra-anal plate, subcylindrical, slightly incurved, blunt apically.

♀ (paratype). Differs from the male type in its lighter general coloration. All the parts that are described as orange-red in the male are in this female reddish ochraceous or yellow; abdominal tergites fasciated not with bluish, but with yellow; elytra with the veins pale; hind femora with all outer carinæ, as well as transverse sulci, pale; hind tibiæ with pale spots along the upper outer margin, between the spines.

	♂ (type). mm.	♀ (paratype). mm.
Length of body	31	35
" pronotum	7	8
" elytra	27	29
" hind femora	15.5	16.5

The type is from Eutebbe, Uganda, 5.iii.1913 (*C. C. Gowdey*); the series of paratypic specimens includes 112 examples of both sexes, taken mostly at the same locality, partly in Chagwe, the Mabira Forest, Mbale, and Tero—all in Uganda.

The unusually long series of paratypes enables me to state that the described specific characters are very constant, and the described type and paratype represent the two extremes in the variation of the coloration, that of the male type being much more common than the less striking coloration of the female paratype; some specimens show a somewhat greenish shade on the metazona of the pronotum, but I am

not sure whether it is natural and not due to discoloration after death.

The British Museum collection contains also three specimens of a very closely related insect from West Africa, which differ from the Uganda ones only in the median fascia of the pronotum being reduced to an elongated spot between the first and third sulci; as that fascia is perfectly constant in the whole Uganda series, I take this character as a subspecific one and propose the name subsp. *occidentalis*, nov., for the West African race. The type of the latter is a male from Yapi, Gold Coast (*Dr. J. J. Simpson*); the paratypes are one female from the same locality as the type and one male from Lagos (*Dr. H. Strachan*).

6. *Stenocrobylus rhodopterus*, sp. n.

♀. Antennæ slightly flattened, reaching the hind coxæ. Face strongly reclinate, very coarsely punctured. Frontal ridge in profile distinctly convex in its upper part, which forms a scarcely perceptible rounded angle with the straight lower part; its surface slightly convex above the ocellum, scarcely impressed close around it, flat elsewhere, punctured throughout, but more densely in the lower half; its margins parallel throughout, not at all raised, smooth, subobliterate, near the clypeus. Fastigium of the vertex distinctly sloping, evidently longer than broad, rotundato-truncate in front, scarcely impressed, with only the lateral margins slightly raised. Eyes oval, strongly prominent; the distance between the eyes distinctly narrower than the frontal ridge. Pronotum coarsely and densely punctured all over, but more so on the lateral lobes; the prozona distinctly longer than the metazona, feebly convex; metazona almost flat, forming distinct, though rounded angles with the lateral lobes; transverse sulci not deep; median keel obliterated by the puncturation on the prozona, faintly perceptible on the metazona; front margin slightly emarginate; hind margin obtusely angulate, rounded; lateral lobes with two smooth spots in the upper part of the prozona. Prosternal tubercle transversely compressed, with the apex truncate. Mesosternal lobes transverse; the interspace somewhat constricted before the middle, about twice as long as its width at the constriction. Metasternal interspace subequal to the distance between the eyes. Elytra extending somewhat beyond the hind knees and reaching the apex of the abdomen. The whole body and legs hairy.

General coloration dirty olivaceous. Antennæ greyish

green, with the apices of the joints pale. Head with a broad black postocular fascia; lateral lobes of the pronotum also with a black fascia along the upper margin, but narrower and not sharply defined. Elytra reddish brown, except the anal area, which is reddish olivaceous. Wings red, transparent. Hind femora olivaceous, except on the inner side, where they are brownish black. Hind tibiae olivaceous; the spines paler, black-tipped.

♂ (paratype). Differs from the female in the following characters: fastigium between the eyes very narrow and sulcate; metasternal interspace correspondingly narrower; prosternal tubercle somewhat narrowed apically; cerci slightly longer than the supra-anal plate, distinctly incurved in the apical third.

	♀ (type). mm.	♂ ♂ (paratype). mm.
Length of body	35	20-24
" pronotum	7.5	4-5
" elytra	26	17-19
" hind femora	17	11.5-13

Described from one female and three males from Entebbe, Uganda (*C. C. Gowdey*).

Easily recognised by the uniform general coloration and red wings.

7. *Stenocrobylus diversicornis*, sp. n.

♂. Antennæ scarcely compressed, extending well beyond the hind coxæ. Face strongly reclinate, very coarsely punctured. Frontal ridge straight in profile, subobliterate below the ocellum, slightly impressed close around the latter, convex and feebly punctured above it. Fastigium of the vertex feebly sloping, strongly prominent forwards, somewhat impressed, punctured. Vertex between the eyes sulcate, much narrower than the frontal ridge. Eyes strongly prominent. Pronotum very coarsely and uniformly punctured all over; feebly convex in the prozona and practically flat in the metazona, which does not form, however, any angles with the lateral lobes; transverse sulci feeble, the hind one being placed distinctly behind the middle; median keel almost obliterated by the puncturation, faintly perceptible in the metazona. Prosternal tubercle distinctly transverse, with the apex somewhat emarginate. Mesosternal interspace scarcely constricted in the middle, about as long as broad. Metasternal interspace subequal to the distance between the eyes. Elytra reaching well beyond both apex of the abdomen and the hind knees. Hind femora incrassate. Cerci

reaching to the apex of the subgenital plate, compressed laterally, incurved, with the apex acute and somewhat decurved.

General coloration blackish olivaceous, variegated with yellow and black. Antennæ with the base yellowish, the first joint bearing a blackish-green streak, the rest, beginning with the fourth joint, red. Head black, except the fastigium of vertex and the cheeks, which are yellow. Pronotum black, somewhat olivaceous on the disc, with a triangular spot on the front margin of each lateral lobe, and more than the lower half of the metazona, yellow. Pleuræ olivaceous black. Elytra olivaceous basally, gradually merging into vinous red towards the apex. Wings pale vinous red. Front and middle legs olivaceous. Hind femora greenish yellow, with the extreme base, a fairly broad fascia just before the middle, another narrow fascia in the apical third, the knee, and almost the whole of the lower surface black. Hind tibiæ dark vinous red, with the base black and with a yellow subbasal ring; the spines unicolorous with tibia, black-tipped. Hind tarsi vinous red, with the apical ungues yellow, black-tipped. The underside yellow. The whole body and legs covered with yellowish hairs.

♀ (paratype). Differs from the male, apart from the larger size, in the less dark general coloration. Its head is not black, but only blackened behind the eyes and on the clypeus; pronotum olivaceous brown on the upper side, with the lateral lobes dirty yellow, bearing an indistinct blackish-green fascia along the upper margin, the space between the sulci being also of that colour; hind femora as in the male, but with the underside not black. Antennæ with the basal joints as in the male, but the rest pitch-black, reaching only to the hind coxæ.

	♂ (type). mm.	♀ (paratype). mm.
Length of body	24	38
" pronotum	5	7
" elytra	21	28
" hind femora	12	16.5

Described from two males and one female from Entebbe, Uganda (*C. C. Gowdey*).

Seems to be clearly related to *S. roseus*, G.-Tos, from Congo, known to me by description only, but easily separated from it by some details of pattern and especially by the coloration of the hind femora and tibiæ. The difference

in the coloration of the antennæ of the two sexes is very remarkable, though I cannot be quite certain whether it is a case of sexual dimorphism or individual variability only; both males before me now have red antennæ.

8. *Catantopsis tæniolatus ugandanus*, subsp. n.

Differs from the typical West African specimens in the following characters only: distinctly more slenderly built; fastigium of the vertex more prominent; antennæ black (testaceous in the typical form); prosternal tubercle narrower at the base, but less pointed; mesosternal interspace more elongate and distinctly constricted; elytra reaching the hind knees (or slightly longer); hind femora more slender, with the inner side spotted as in the typical form, and also with a small black spot near the apex of the area externo-media, and 2-3 minor spots at its middle, near the apex of the basal half; hind tibiæ pale in the basal third and bright rose in the rest; hind tarsi rose.

	♂. mm.	♀ ♀. mm.
Length of body	19.5	25-28
„ pronotum	4	5-5.5
„ elytra	14	17-18.5
„ hind femora	11	12.5-13

Six males and eight females from Entebbe, Kivuvu, and Mabira Forest, in Uganda; one female from Bukoba, Tanganyika Territory (all taken by *C. C. Gowdey*). A female from Entebbe, 19. viii. 1911, designated as the type, the others being paratypes.

I think that I am right in referring *Catantopsis tæniolatus* of Karsch to the genus *Catantopsis*, Bol. (Mem. Soc. Ent. Belg. xix. 1911, p. 98), founded on a species from Katanga. As the Uganda specimens agree fairly well with the description by Karsch, but differ in some important and obviously constant characters from the specimens before me from the Gold Coast and Sierra Leone, which I take to represent the typical *tæniolatus* (described from Bismarckburg, Togo), I regard the Uganda insects as a distinct geographical race. Bolivar's species, *Catantopsis opomaliformis*, differs from both races of *C. tæniolatus* by its much larger dimensions and by the differently coloured hind femora.

9. *Catantops simplex*, sp. n.

♂. One of the smaller species of the genus. Antennæ thick, somewhat flattened, reaching to the middle coxæ.

Face strongly punctured; frontal ridge straight in profile, scarcely narrowed at the fastigium, very slightly narrowed downwards, almost parallel-sided, sulcate throughout, except at the fastigium, distinctly punctured, with the margins smooth. Fastigium of the vertex distinctly sloping, widened forwards, rotundato-truncate in front, much longer than broad, slightly impressed, punctured. Distance between the eyes slightly narrower than the antennæ. Pronotum distinctly punctured all over, except the callous lower portion of the lateral lobes on the prozona and two indefinite smooth spots at the upper margin of the lobes; transverse sulci not strong, but distinct, cutting the median keel, which is distinct throughout, though low and irregular owing to the puncturation; metazona subequal to the prozona, obtusely angulate behind; lateral lobes forming no angles with the disc. Prosternal tubercle subconical, distinctly inclined backwards, with the apex obtuse. Mesosternal interspace broader than the frontal ridge, longer than broad. Metasternal lobes contiguous. Elytra extending a little beyond the hind knees. Front and middle femora somewhat incrassate. Cerci extending beyond the apex of the supra-anal plate, somewhat compressed basally, gradually narrowed and incurved towards the apical part, which is rather suddenly bent inwards and upwards, so that its lower outer side forms a distinct angle with the rest of the cercus.

General coloration reddish testaceous. Antennæ dirty olivaceous, irregularly marmorated with reddish. Face and the lower part of the cheeks pale; some indistinct greenish-grey markings on the lateral facial carinæ; an indistinct brown fascia, widened posteriorly, on the occiput; a broad black postocular fascia, including a round pale spot below the middle. Pronotum reddish brown, somewhat darkened along the median keel; hind margin somewhat paler; lateral lobes with more than the lower third pale, callous on the prozona; the upper part very dark reddish brown between the front margin and the second sulcus, paler between the second and third sulcus, concolorous with the disc on the metazona. Elytra testaceous, reddish basally; the middle third of the marginal field somewhat blackened; some scarcely distinct small dark spots scattered elsewhere. Wings yellowish basally, somewhat infumate towards the apex. All legs very pale olivaceous; hind femora somewhat reddish above; the upper inner area with a small spot near the base, a second one of the same size just before the middle, both of them extending a little into the inner middle area, a third subobsolete spot beyond the middle, which

corresponds to the broad fascia of the inner middle area, and a fourth small spot just before the knee black; the base of the knee also black inside and below. Hind tibiae pale, with the spines black-tipped. The underside pale olivaceous.

	♂ (type). mm.	♀ (paratype). mm.
Length of body	18	25
" pronotum	4	5
" elytra	16	20
" hind femora ..	10	14

Described from 15 males and 23 females from Entebbe, Banda, Kampala, and Mabira Forest, in Uganda (*C. C. Gowdey*); two females, also from Entebbe (*T. J. Anderson*); one male from Kikandue, British East Africa (*W. L. Sclater*).

A very inconspicuously marked species, belonging to the group with the hind femora unicolorous outwardly. The general coloration and the markings on the inner side of the hind femora are very much the same as in *Catantopsis taniolatus*, Karsch, but the new insect is, though not larger, more robustly built, with the pronotum more conical, and the male cerci are not bifurcate apically. In some more darkly coloured specimens there is a pale oblique streak on the mesopleuræ.

LXXVIII.—*The Coleoptera of the Madeira Islands**.
By T. D. A. COCKERELL.

THE Coleoptera of Madeira have been famous ever since Darwin wrote ('Origin of Species,' chap. v.): "Mr. Wollaston has discovered the remarkable fact that 200 beetles, out of the 550 species (but more are now known) inhabiting Madeira, are so far deficient in wings that they cannot fly; and that, of the 29 endemic genera, no less than 23 have all

* I am greatly indebted to Dr. G. A. K. Marshall and Mr. K. G. Blair for the determination of Madeira Islands Coleoptera, and to the latter for assistance in making comparisons with the specimens in the British Museum. I also examined the Madeira collection at Oxford, purchased by Hope from Wollaston and presented in 1861. At Oxford, one Canary I. drawer had got into the Madeira cabinet—a possible source of confusion, as there are no locality-labels.

their species in this condition, . . . the proportion of wingless beetles is larger on the exposed Desertas than in Madeira itself." From these facts he inferred that there had been a survival of the fittest, those forms which were least inclined or able to fly had remained on the islands, while more active individuals had been blown to sea and lost. He also suggested that the effects of disuse might have had something to do with the production of wingless species, but this view is now generally discarded, and the case is quoted by authors as one of the best in support of natural selection.

Although I firmly believe in the potency of natural selection as a directive influence in evolution, I think we must reconsider the case of the Madeira beetles, if only because it is by no means so simple as it first appeared. The facts cited from Wollaston appear striking enough, especially in view of the character of the islands, which are apparently "oceanic," and not remnants of a former extension of the continent of Africa. I have discussed this matter, with special reference to the snails, in 'Nature,' April 8, 1922, p. 446; but it is proper to note that Scharff ('History of the European Fauna,' pp. 19, 25) takes quite a different view. Darwin notes that those Madeira insects which habitually fly are strong-winged (though I should say not exceptionally so), and states that this is not contrary to the view already indicated, for those insects which from their habits were compelled to fly would need to develop powerful wings in order to escape destruction.

At certain times of the year strong hot winds blow from the African deserts in a westerly direction, and no doubt part of the Madeira insect-fauna has reached the islands on the wing, aided by these powerful currents. Lowe (quoted by Darwin) mentions the arrival on the wing of swarms of locusts in 1844. They were in countless numbers, but after a short time disappeared, "and have not since visited the island." However, they doubtless gained a footing, as *Pachytylus danicus*, L. (which I myself took in Funchal), and *Schistocerca peregrina*, Oliv., are at present members of the Madeira fauna—at least the former, and I suppose the latter, a permanent resident. Among the Lepidoptera, *Colias edusa*, *Pyrameis cardui*, *Herse convolvuli*, *Celerio livornica*, *Macroglossa stellatarum*, *Leucania unipuncta*, *Heliothis obsoleta*, *Plusia aurifera*, *P. gamma* (which has also reached the very isolated Salvages), and others may be supposed to have arrived by flight. I cannot see, however, that they have in any respect larger or more powerful wings than represen-

tatives of the same species in Europe or elsewhere. If it were true that all the Madeira insects (excepting those introduced by man) had arrived by flight, we should have to assume that the many flightless beetles had descended from ancestors with unusually strong flying powers, the distance between the Madeiras and the mainland being nearly 400 miles. One has only to contemplate these beetles (*e. g.*, many of the characteristic Tenebrionidæ) to see that this cannot well be the case. In Porto Santo I found the large *Blaps gages*, L. (or *gigas*, supposing *gages* to have been a misprint), said to be the bulkiest of all the Madeira Is. beetles. It has the elytra fused together, and thus was chosen as a typical example to illustrate Darwin's theory, in the exhibit at the British Museum (Natural History), at the time of the Darwin Celebration in 1909. Its distribution on the Madeira and Canary Islands, and even the remote Grand Salvage, is remarkable enough, but the very same species occurs on the mainland, in Europe and Morocco. As a matter of fact, we must doubtless suppose that the ancestors of many of the endemic types of beetles reached the islands on floating trees and similar objects, a few perhaps on the bodies of birds. In this process there would be a strong selective influence; the sedentary or apterous insects would hold on, while more volatile forms would leave their support and perish in the sea. The total absence of Cicindelidæ could thus be explained. These animals are incapable of sustained flight, but also extremely restless. They could neither arrive on the wing nor remain on the most favourable raft. Natural selection might thus account for a preponderance of small and apterous species, in a manner not contemplated by Darwin's theory. Once such sedentary or flightless species had arrived, they would gradually spread, and because of their habits more easily break up into segregates, isolated in different districts or small islands. Thus the Madeira Islands present a long series of perfectly apterous *Helops*, some living only in Madeira, some confined to Porto Santo. In the Desertas, which appear to have been formerly united with Madeira, are three species of *Helops*, all common to Madeira, but not found in Porto Santo. But it is interesting to find that one of these species, *H. vulcanus*, Wollaston, is on the Desertas (Chão and Deserta Grande) slightly wider and larger, with the prothorax distinctly modified. As Wollaston calls this var. α , it must stand as typical *vulcanus* in nomenclature, and his var. δ , from Madeira, may be called var. or

subsp. *maderensis*. In the small Nordeste Island, off Porto Santo, *Helops lucifugus*, Wollaston, has been modified, forming a subspecies which I have described as *maritimus* *.

At this point it is of interest to compare the situation in the Hawaiian Islands, where the number of flightless beetles is also a striking feature. Thus Perkins remarks that of the endemic Carabidæ 184 species are flightless, only 20 fully winged; furthermore, "Nearly all the flightless endemic insects are inhabitants of the forest, or if they frequent exposed situations like some of the Carabidæ, they are closely related to species that frequent thick forests, and are equally flightless" †. Accordingly, Perkins is decidedly of opinion that Darwin's theory of selection, as given above, does not apply to these Hawaiian insects, but he offers the still less acceptable theory of the effects of disuse. If we discard both theories, there remains the selection by sea already suggested. To this may be added the general fact that mutations are more often in the direction of loss or reduction of parts than the reverse. Such mutations, occurring in the wings, would be much less inimical on remote islands than on continents, owing to the smaller number of natural enemies. They would also, by preventing active movement, tend to prevent free intercrossing between members of the species, so that the isolated colonies might exhibit recessive features with diminished danger of swamping by intercrossing. These are very general considerations, and we do not know their actual significance.

In the main island of Madeira, it is difficult to suppose that Coleoptera are in any particular danger of being blown into the sea. Gales are not infrequent, to be sure, but their force is usually felt as they come from the sea, blowing inland. The high precipitous mountains shelter the coasts from winds sweeping across the island. Thus the Bay of Funchal is an admirable shelter for ships when the wind blows from the north, but if (as sometimes happens) it suddenly veers round, they have the greatest difficulty in avoiding disaster. A wreck occurred in this manner while I was in Madeira. This would not apply to the small and barren islands, and it must be said that some of these are wind-swept in such a manner that flying insects might well get lost, unless strong on the wing. Observation shows that beetles abound on these islets, but practically all living

* Trans. Ent. Soc. London, 1921, Proc. pp. lvii-lix, where for *Itheo* read *Iltheo*, for *Nardeste*, *Nordeste*, and for *partosanctunus*, *portosanctanus*.

† 'Fauna Hawaiensis,' Introduction, vol. i. part vi. pl. 1.

under rocks. The absence of numerous groups is obligatory, since the plants on which they should feed are lacking. Darwin's theory may doubtless be accepted at least in partial explanation of the fauna on such islands as Baixo, Cima, Chão, and Nordeste. A singular apparent exception to the general character of these faunas—mainly of Carabidæ, Tenebrionidæ, and weevils—is afforded by the extraordinary Lamiid *Deucalion desertarum*, Wollaston, confined to the Deserta Islands. Wollaston took it on two of the islands (I saw one of his specimens in the Oxford Museum), Lowe on the precipitous summit of Bugio. A related species, *D. oceanicum*, Wollaston, was discovered by Leacock on the Salvages, and is found nowhere else. But even these Lamiids were found under stones and within fissures of rocks.

A striking feature of the Madeira Is. Coleopterous fauna is the absence or small representation of certain families prominent elsewhere. The reasons for these absences may be various; the case of the Cicindelidæ has already been discussed. To take another example, the Buprestidæ are represented only by the endemic *Agrius darwini*, Wollaston, and *A. laticornis*, Illig., the latter found since Wollaston's time, and presumably introduced. This is really astonishing, for Morocco has no less than 72 species of Buprestidæ, distributed in 17 genera. Of *Acmaeodera* alone there are 24 species, of *Anthaxia* 10. Probably the meagre flora of native woody plants in the Madeiras may explain why such types as these, even if reaching the islands, could not become established. Thus, the native trees (and near-trees) of the islands apparently consist of only the following genera:—*Catha*, *Cerasus*, *Clethra*, *Dracæna*, *Erica* (2 species), *Ardisia*, *Ilex* (2 species), *Juniperus*, *Laurus*, *Myrica*, *Myrtus*, *Olea*, *Ocotea*, *Apollonias*, *Persea*, *Pittosporum*, *Notelæa*, *Sorbus*, *Rhamnus*, *Salix*, *Sideroxylon*, and *Taxus*. Some of these even may have been introduced in early days; thus Lowe wondered whether the *Sorbus* was really native. Several represent genera not present on the nearest continental areas, so that the chances for any beetle feeding on a particularly woody plant of finding food before it perished would be very remote. Even *Pinus* was apparently absent, though now widely planted and abundant. The same may be said of *Quercus* and *Castanea*.

Albert Fauvel* published the most recent list of Madeira

* Revue d'Ent. 1897, pp. 45 *et seq.* In 'Annaes de Sciencias Naturaes,' 1897-98, Padre Ernesto Schmitz gives a list of the beetles of the Madeira Is., but it is merely a copy of Fauvel's.

Coleoptera. Wollaston had listed 664 species; Fauvel gives 683. The endemic genera, as recognized by Fauvel, with the number of species in each, are as follows. All were described by Wollaston :—

<i>Elliptosoma</i> , 1.	<i>Ellipsodes</i> , 1.
<i>Zargus</i> , 3 and var.	<i>Hadrus</i> , 4.
<i>Eurygnathus</i> , 1.	<i>Macrostethus</i> , 1.
<i>Xenomma</i> , 1.	<i>Cyphoscelis</i> , 1.
<i>Stereus</i> , 1.	<i>Anemophilus</i> , 3.
<i>Microstagetus</i> , 1.	<i>Echinosoma</i> , 1.
<i>Prostheca</i> , 1.	<i>Stenotis</i> , 1.
<i>Xenorchestes</i> , 1.	<i>Lipommata</i> , 1.
<i>Mniophilosoma</i> , 1.	<i>Caulophilus</i> , 1.

Thus 18 endemic genera, as at present recognized. Fauvel added another, which he intended to describe as *Anops*, a genus of Curculionidæ. For some reason, this *Anops* was apparently not described; in any event the name is pre-occupied. It will be observed that most of these endemic genera contain only a single species, and it is quite likely that they are in the majority of instances relicts of an ancient fauna. The one genus of this series which abounds in individuals and obtrudes itself on the collector is *Hadrus*. A related genus (*Exohadrus*, Broun) is found in New Zealand. There is some question whether *Hadrus* is really confined to the Madeiras. *H. europæus*, Motsch., 1858, was said to come from Corsica, and is so listed by H. Gebein (Col. Cat. 1910). R. Lucas also admits a Corsican *Hadrus*. But Fauvel gives this species as a pure synonym of *H. illotus*, Wollaston, which is certainly confined to Porto Santo.

Wollaston thought that about two-thirds of the Madeira species of beetles were endemic; Fauvel was inclined to cut this down to about one-third. However, he was able to list a number of species which almost certainly were not there in Wollaston's day, and, if we subtract all the species probably introduced by man, the original estimate of two-thirds endemics may be below the mark. I believe that students of the Madeira insect-fauna have never fully appreciated the very large percentage of introduced species. The islands have been occupied since the 15th century, and there has been abundant opportunity for many sorts of insects to arrive on plants and merchandise. Probably various members of the original fauna have been exterminated by these newcomers, and it is greatly to be desired that the islands should be searched for small and rare endemic insects, in order to record as many as possible before it is

too late. This applies especially to the orders other than Coleoptera, comparatively neglected by Wollaston. Lists which have been published, such as Noualhier's list of Hemiptera, Becker's Diptera, etc., represent mainly the species collected in or around Funchal, in cultivated areas, and do not do justice to the subject.

A good illustration of the introduction into Madeira of insects from remote regions was given by M. Cameron (Ent. Mo. Mag., Sept. 1901). Collecting for a few days about Funchal, he was surprised to come across *Oxytelus advena*, Sharp, a Staphylinid of striking appearance, described in 1880 from Oahu, Hawaiian Is.*.

An example of an insect which is widespread in Madeira and yet evidently not native is *Sitona latipennis*, Schönherr, which I took on broom (*Cytisus scoparius*) at Funchal, Feb. 25. Wollaston had already recorded that it fed on this plant, which Lowe says was doubtless introduced. But for the food-plant it would have been impossible to decide whether *S. latipennis* was native or not.

Wollaston remarks on the rarity of ant-nest beetles in Madeira. *Geostiba formicarum* (Woll.) is endemic, but, notwithstanding its name, appears not to be a Myrmecophile.

Thorictus westwoodi, Woll., found in Madeira and Porto Santo, is really attached to ants, but according to Fauvel it is not endemic. *Cossyphodes wollastonii*, Westwood, occurs in nests of the introduced *Pheidole megacephala* (Fab.), but it is not endemic.

This condition of affairs can readily be understood in view of the fact that so far as known the islands possess no native ant-fauna whatever. The eleven species known from Madeira (recorded by E. Saunders and Forel) have all been introduced; a twelfth is the Argentine ant, *Iridomyrmex humilis*, Mayr, which in more recent years has overrun both Madeira and Porto Santo. Forel recorded *Monomorium salomonis* (L.) from Porto Santo and the Salvages. I hunted assiduously for endemic ants in Porto Santo, but without success. In an isolated spot near the Pico do Facho I found a small nest

* I take this opportunity to record that I found *Periplaneta americana* (L.) in Funchal (1921). It is not listed in Burr's 'Catalogue of Madeira Orthoptera,' which includes only three Blattidæ. Also, as nothing has been recorded concerning the Orthoptera of Porto Santo, I may note that I collected three species, kindly determined for me by Mr. Caudell. These are *Liogryllus bimaculatus* (De Geer), which also occurs on Grand Salvage Island and in Madeira; *Aiolopus thalassinus* (Fabr.), also observed to be common at Funchal, Madeira; and *Sphinginotus rubescens* (Walker), which I took on the Pico d'Anna Ferreira.

of ants under a stone, but concluded that they were only *Monomorium carbonarium*, Smith, a determination later confirmed by Dr. Wheeler. On Baixo, the largest of the islands off Porto Santo, I could not find any ants at all.

The small islets off Porto Santo have long been famous for their snails, but Wollaston did not report from them any peculiar insects. I collected what I could, and was pleased to find some modified forms. On the small Ilheo de Nordeste occurs a race of *Helops lucifugus*, which I named *maritimus*, but the *Hadrus illotus*, Woll., from the same islet was so slightly modified that no special name was given to it.

On the I. de Cima was a very distinct large race (*cimensis*, Ckll.) of *Scarites abbreviatus*, Dej., but the *S. abbreviatus* on Baixo was like that of the main island. The weevils *Laparocerus morio*, Schön., from Cima and Baixo, and *L. (Atlantis) instabilis* (Woll.), from Cima, did not appear to present any special characters. *Calathus fimbriatus*, Woll., from Baixo (six specimens), are typical. *Harpalus gregarius*, Fauvel, from Cima, are racially different from the typical (Madeira) form, and have been described as subsp. *cimensis*, Ckll., but it is not clear that they can be separated from those on the main island of Porto Santo. Similarly, *Scarites abbreviatus portosanctanus*, Ckll., described from Baxio specimens, is really the Porto Santo form of the species. *Eurygnathus latreillii* (Laporte) was collected by Wollaston on Baixo, but was not different from the Porto Santo type. On Deserta Grande it is somewhat modified, larger and more parallel, opaque; prothorax rather wider, especially in front, with its edges more broadly recurved and its hind angles less distinctly punctured, while the elytral striæ are more perceptibly punctate. This Deserta race, made known by Wollaston, may be named subsp. *wollastoni*.

LXXIX.—On some Psyllidæ (Hem.-Hom.) from the
New World. By F. LAING, M.A., B.Sc.

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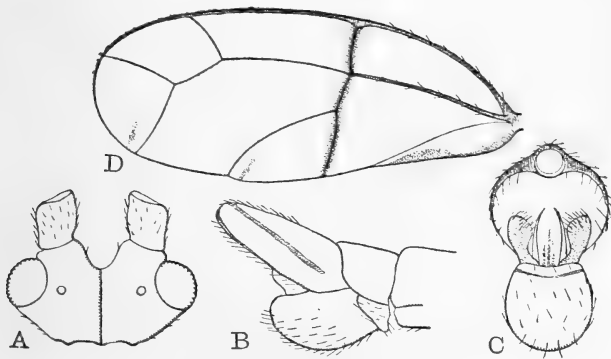
Synoza pulchra, sp. n. (Fig. 1.)

General colour very dark shining brown. Antennæ very dark brown to black, with narrow silvery rings at the base of

segments IV., V., and VI. Vertex flavous, pronotum darker, dorsulum and mesonotum flavous, remainder of body dark shining brown. Tegmen with a narrow dark brown or smoky stripe margining the radius and cubitus transversely across the whole wing, and another dark streak on clavus. Legs flavous.

Head strongly birostrate, somewhat concave between post-ocelli, which are situated on a ridge two-thirds the distance from median suture; margin behind eyes oblique; eyes not prominent; no frontal ocellus. Antennæ quite as long as the body, hairy. Dorsulum arched in front, running to margin in a bifid point; mesonotum broad, slightly concave

Fig. 1.



Synoza pulchra, sp. n.

A, head; B, ♂ genitalia, lateral view; C, ♂ genitalia, posterior view; D, tegmen.

in middle; pseudonotum with two large, conspicuous, broad-based protuberances, sliced obliquely at apex. Tegmen slightly more than twice as long as broad. Genitalia of ♂ with anal valve strongly developed, forming a hood inside which the claspers lie hid; an accessory pair of slender, sharp-pointed forceps lying interior to the principal pair.

Total length 3.6 mm.; length of tegmen 3.8 mm.

MEXICO: Chilpancingo, Guerrero, 4600 feet (*H. H. Smith*).

The genus *Synoza* was founded by Enderlein (*Zool. Jahrb.* xli. 1918, p. 479) for the Peruvian species *cornutiventris*, with which the Mexican species seems to be congeneric.

The tegminal characters are sufficient to separate the two species. Enderlein, in his generic diagnosis, omitted to classify his genus. The characters of the head clearly place it in the Carsidarinae.

Freysuila cedrelae, Schw.

PANAMA: Bugaba, 800-1500 feet (*G. C. Champion*).

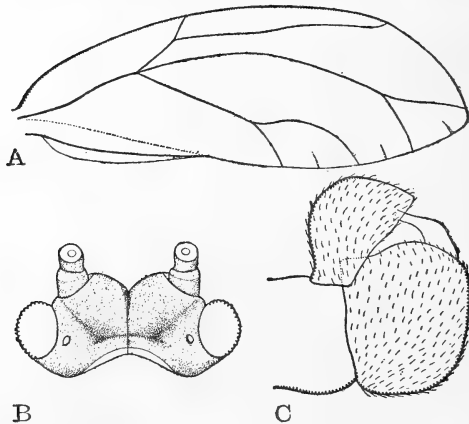
Carsidara gigantea, Crawford.

Mexico City (*H. H. Smith*), 1 ♂ and 2 ♂♂.

Carsidara dugesii, Lw.

MEXICO: Teapa, Tabasco (*H. H. Smith*), 2 ♂♂.

Fig. 2.



Rhinopsylla nigra, sp. n.

A, tegmen; B, head; C, ♂ genitalia.

Rhinopsylla nigra, sp. n. (Fig. 2.)

General colour dull black, with a little fulvous about the wing-insertions, on the tarsi, and thoracic sternites; ventral surface of abdomen dirty white, dorsal surface with a wide

white median longitudinal stripe on the last three or four segments.

Head, with eyes, not quite so wide as thorax, slightly birostrate, a deep sulcus starting from median line running for a short distance parallel with posterior margin and then widening out obliquely towards base of antennæ; lateral ocelli markedly elevated. Dorsulum longer than wide, mesonotum rather narrow, the whole dorsal surface from head to scutellum coarsely punctate. Tegmen hyaline, not quite three times as long as broad. Genitalia ♂, small, anal valve strongly arched, forceps small, thick at base, slender and black apically.

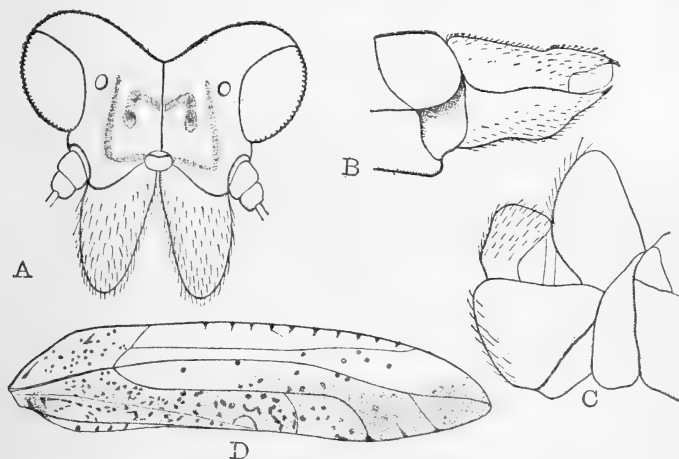
Length 1·8 mm.; length of tegmen 2·6 mm.

MEXICO: Vera Cruz, Orizaba (*F. DuCane Godman and H. H. Smith*).

Leuronota magna, sp. n. (Fig. 3.)

General colour pale green with sienna-brown on vertex

Fig. 3.



Leuronota magna, sp. n.

A, head; B, ♀ genitalia; C, ♂ genitalia; D, tegmen.

laterally, the dorsulum, the mesonotum laterally, and, to a less extent, on abdominal tergites. Legs greenish yellow,

except for the black spines at the tips of hind tibiæ. Antennæ yellow, with tip black. Tegmen maculated with brown, and a large, broad, pale brown fascia stretching from tip right back around posterior margin to the base.

Head (with eyes) quite as wide as thorax, scarcely deflexed; vertex punctate, with a deep fovea on each side of median line, arched, with many long white hairs; genal cones in same plane as vertex, almost as long as vertex, divergent, conical, rather sharply pointed, narrowed at base, the whole with many whitish hairs. Pronotum with a very strong median forward epiphysis and two smaller lateral ones; dorsulum slightly arched, punctate, shield-shaped, with a very small median epiphysis and two small lateral ones; whole of thorax with sparse white hairs. Tegmen very long and narrow, nearly $4\frac{1}{2}$ times longer than broad, roughly parallel-sided. Hind tibiæ with a spur at base. Female with genital segment of medium length, both dorsal and ventral margins parallel at base, with the ventral valve obtuse-angled at apex; both valves with numerous short, fine, whitish hairs. Male with anal valve large, obtuse, claspers about half the size, obtuse, truncate.

Length 4 mm.; length of tegmen 4.4 mm.

PANAMA: Bugaba, 800-1500 feet (*G. C. Champion*).

Near *L. longipennis*, Crawf., but differing in the more strongly developed pronotal epiphysis and in the maculation of the tegmen.

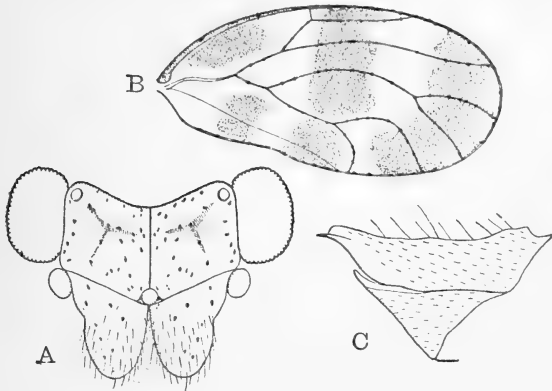
Euphalerus fasciatus, sp. n. (Fig. 4.)

Blue-green, with minute black spots; a pale fronto-median area on pronotum and dorsulum, and two broad, lateral, light brown areas on mesonotum. Tips of antennal segments fuscous. Tegmen with all the veins, including margin, spotted with black, with four broad light brown fasciæ, one in the first basal cell, one in the clavus, a long median one, and an apical.

Head not quite so wide as thorax; vertex depressed in the middle of each half, almost rectangular in shape, posterior margin not very deeply arcuate; genal cones almost as long and in same plane as vertex, slightly divergent, outer margin curving strongly outwards near antennal insertion so as to give the impression of a hollow, the whole covered with rather long whitish hairs. Antennæ $1\frac{1}{2}$ times the width of the head. Thorax strongly arched. The first abdominal

tergite with a marked median ridge and a lateral, posteriorly situated protuberance. Female genitalia with dorsal valve

Fig. 4.



Euphalerus fasciatus, sp. n.

A, head; B, tegmen; C, ♀ genitalia.

rather obtusely pointed, almost truncate, longer than the ventral. Tegmen about twice as long as broad.

Total length 2.2 mm.; length of tegmen 3 mm.

MEXICO: Vera Cruz, Atoyac (*H. H. Smith*).

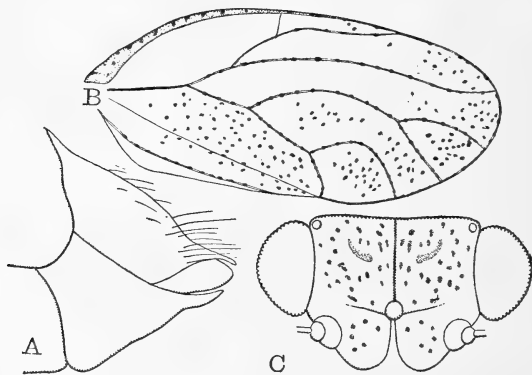
Euphalerus championi, sp. n. (Fig. 5.)

Robust, of a general pale greenish-yellow speckled with black spots, including femora. Tegmina with black spots on nervures and around margin, and brown maculæ on the membrane, the spots most numerous towards apex and on clavus. Legs a little darker in colour than the body.

Head deflexed, not as broad as thorax; vertex very slightly arcuate on posterior margin, flat except for slight hollow in centre of each half; genal cones slightly divergent on apical half, short, broadly rounded at apex, less than half length of vertex, continuing in plane of vertex, hirsute. Thorax broad, strongly arched; dorsulum with two faint medio-lateral points on hind margin. Tegmen subhyaline, with a very strongly developed subcosta; pterostigma open,

nervures raised from membrane, slightly more than twice as long as broad. Female with genital segment about one-third the length of the abdomen, swollen about one-third from the tip, with a row of long white hairs on the ridge.

Fig. 5.



Euphalerus championi, sp. n.

A, ♀ genitalia; B, tegmen; C, head.

Length 4 mm.; length of tegmen 3.5 mm.

GUATEMALA: San Isidro, 1600 feet (*G. C. Champion*).

Near *E. nidifex*, Schwarz, but distinguished by its larger and more robust size and shape of ♀ genitalia.

PARACOMECA, gen. nov.

Head slightly deflexed; vertex more or less quadrate, flat; genal cones slightly descending, well developed, subconical, slightly divergent. Thoracic segments long and narrow. Tegmen with radius, medius, and cubitus arising from one point, *R*s meeting the median and fusing with it for some little distance before curving towards the costa, the median curving well towards posterior margin so as to make the second marginal cell very long and narrow; apex pointed.

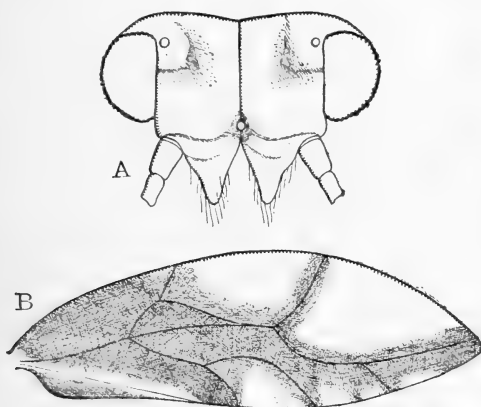
Genus belonging to the *Triozinae*.

Type, *P. fuscata*, sp. n.

Paracomeca fuscata, sp. n. (Fig. 6.)

Head dark brown, with a little paler brown on median line posteriorly, with eyes, about as wide as thorax, slightly deflexed, small; vertex quadrate, scarcely arcuate on posterior margin, a deep fovea near centre of each half; lateral ocelli scarcely elevated; genal cones slightly descending, short, not much more than half length of vertex, subconical, with numerous long whitish hairs. (Antennæ broken off on both specimens.) Pronotum rather broad, with a slight median frontal epiphysis; dorsulum long, narrow, a median pale brown longitudinal stripe continued from pronotum, remainder dark brown, faintly striated, a short, low, sharp,

Fig. 6.



Paracomeca fuscata, sp. n.

A, head; B, tegmen.

transverse ridge in the middle of lateral margin; mesonotum with 6-7 longitudinal pale brown striæ, remainder dark brown, very broad compared with length, rather deeply arcuate in front; scutellum trapezoidal, dark brown, with flavous margins. Wing-insertions pale brown to whitish. Tegmen with neuration as given for genus, with much black on base and centre and along the veins. Legs dark brown, with tarsi pale. Abdomen black-brown, rather shiny.

Length 2.4 mm.; length of tegmen 3.4 mm.

PARAGUAY: San Bernardino, on leaves on *Celtis* sp. (K. Fiebrig).

CARADOCIA, gen. nov.

Head deflexed, almost at right angles to body; lateral ocelli placed on the posterior margin of vertex, on low tubercles, situated some distance from lateral-posterior angles, almost in line with the inner margin of antennal insertions; genal cones conspicuous and well developed; pterostigma absent. Other characters as in *Psylla*.

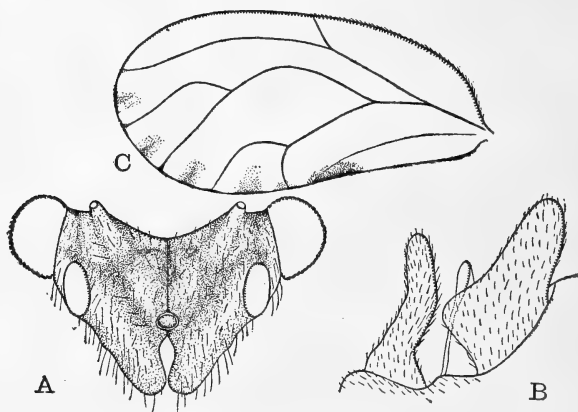
Type, *C. godmani*, sp. n.

This genus is similar in many respects to *Psylla* itself, but the position of the lateral ocelli gives the head a completely different facies to that found amongst the *Psyllinæ*.

Caradocia godmani, sp. n. (Fig. 7.)

Robust; head, with eyes, considerably wider than thorax, almost at right angles to axis of body, with conspicuous genal cones in same plane as vertex, pale canary-yellow in colour, obtuse at apex, contiguous at base and apex, leaving

Fig. 7.

*Caradocia godmani*, sp. n.

A, head; B, ♂ genitalia; C, tegmen.

a small fusiform space between, not separated off from vertex by any line or furrow; lateral ocelli remote from eyes, on conspicuous elevations; a brown stripe running from near the base of postocellar papillæ diagonally to near median

ocellus; a dark brown marking, like a Maltese cross, lying across median line posteriorly; whole head with many long whitish hairs. Eyes prominent. Antennæ as long as the whole insect with wings folded, pale yellowish green, with black apices. Thorax strongly arched; pronotum with the yellow ground-colour, a median and a lateral brown spot, rather hairy; dorsulum broader than long, with two lateral acute points, the posterior small, a medio-lateral triangular brown patch anteriorly and a lighter brown median area posteriorly; mesonotum large, twice as broad as long, almost entirely dark brown except for a greenish-yellow patch medianly anteriorly, and laterally; both dorsulum and mesonotum striate; scutellum dark brown, punctate, with strongly developed greenish-yellow fronto-lateral horn-like processes. Legs pale brown, with darker colouring on femora. Tegmen hyaline, no pterostigma, the margin between *Rs* and cubitus with long black-brown marks, a black patch on clavus, length twice the breadth. Abdomen dark brown, with lighter brown on segmental margins. Male genitalia with anal valve large, base broad, apex subconical, external margin about twice the length of inner margin; forceps rather long, narrow, rounded at apex, elbowed about one-third distance from apex.

Length 3.2 mm.; length of tegmen 3.5 mm.

PANAMA: V. di Chiriqui, 25-4000 feet (*G. C. Champion*).

LXXX.—*On the Presence of an Abietinean Cone-Scale, Pityolepis durleyensis*, sp. n., in the Bournemouth Eocene Beds. By H. BANDULSKA, A.R.C.S., M.Sc., F.L.S.

AMONG the plant-remains found in the Eocene deposits of Bournemouth, conifers are extremely common, but up to the present no genus of the Abietineæ has been recorded. Gardner (1886, p. 135), in fact, says that the Abietineæ "formed no part of the inland flora of the Middle Eocene" at Bournemouth.

It therefore seems worth while to place on record the finding of an Abietinean cone-scale in beds belonging to the Bournemouth Fresh-water series at Durley Chine, Bournemouth.

PITYOLEPIS, Nath.

Pityolepis durleyensis, sp. n. (See text-figure.)

Asymmetrical, somewhat fan-shaped; upper edge emarginate, raggedly crenulate on either side of the notch; base

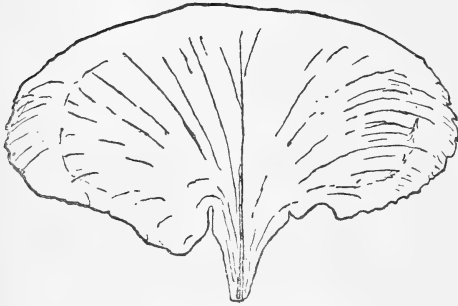
cuneate, with an ascending and sharply angular sinus on the wider side of the scale; median vein well marked, secondary veins coarse, radiating, and sometimes bifurcating, the lowest veins springing from the extreme base.

Length 19 mm., width 19.5 mm.

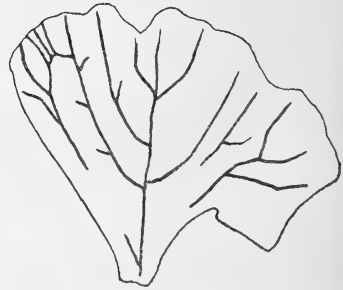
Age. Middle Eocene.

Locality. Durley Chine, Bournemouth. Type V. 15865 (specimen with counterpart), B.M. (Nat. Hist.).

Affinities.—It is possible to limit comparison to three living genera of the Abietinæ—*Abies*, *Picea*, and *Pseudotsuga*. The fossil cone-scale is slightly broader than long, hence the genus *Pinus* is excluded, since the ovuliferous scales of *Pinus* are oblong or strap-shaped. *Larix*, *Cedrus*, and *Tsuga* have symmetrical scales and no sinus. The asymmetry, which is well marked in the fossil, is a common



Abies religiosa, × 2.



Pityolepis durleyensis, × 2.

feature in *Abies*, is less obvious in *Picea*, and is slightly marked in *Pseudotsuga*. The emarginate or notched upper edge is a common characteristic of *Picea*. The irregularly crenulate or serrate margin is characteristic of both *Abies* and *Picea*, and of some species of *Pseudotsuga*—e. g., *Ps. douglasii*.

The ascending angular sinus found on one side of the basal stalk portion in *Pityolepis durleyensis* is present in recent species of *Abies*, which show either one sinus only or one on either side of the scale-stalk, in which case one sinus is usually more pronounced than the other. A short blunt angular sinus is present in *Pseudotsuga japonica*. A sinus on one side of the scale is present in some species of *Picea* (e. g., *P. engelmannii*), and is present or absent in *P. pungens*. The recent species of *Abies* show a stalk, as distinct from the expanded portion of the scale. The

passage in the fossil from scale to stalk is gradual, and there is no sharply delimited stalk. This is more like *Picea*, where the scale tapers gradually to a stalk-like portion, and is seen too in *Pseudotsuga japonica* and *Ps. douglasii*. The venation gives little aid in diagnosis; the veins are not well marked in Abietinean cone-scales, and are finer in *Picea* than in *Abies*. Though fairly strong in *Ps. douglasii*, where the characteristic bifurcation can be seen clearly near the edge, they are far less prominent in the body of the scale than in the fossil. The fact that a single cone-scale was found suggests that it belonged to a genus whose scales were deciduous. The scales of recent species of *Abies* are deciduous, but the cones of *Pseudotsuga* and *Picea* do not shed their scales at maturity. Groom (1909, p. 105) states that the lowest and uppermost scales are sterile in *Picea*, and it is significant in this connection that the scale under discussion shows no evidence of seed-impressions.

Other Tertiary Cone-scales.—Sismouda (1859, pl. iv. fig. 4) figures a cone-scale from the Miocene of Piedmont, showing the same type of venation as *Pityolepis durleyensis*. He describes it as a *Pinus* belonging to the division *Picea*. No measurements are given, but if drawn natural size it is very wide for a *Picea* and its general shape is more like that of a *Tsuga*.

Heer (1868, p. 143) records two species of cone-scale (*Pinus ingolfiana* and *Pinus steenstrupiana*) from the Miocene of Iceland. The general appearance of these is similar to that of *Pityolepis durleyensis*, but the venation is far more delicate. Heer compares *P. steenstrupiana* with *Abies* and *P. ingolfiana* with *Picea*, though the latter identification does not seem quite certain.

Conclusion.—While the fossil shows a certain amount of affinity with *Abies*, the resemblances are not sufficient to warrant us in referring it to that genus. It shows various features typical of the genus *Picea*, while its general appearance and venation suggest *Pseudotsuga*. The non-committal name *Pityolepis* expresses its Abietinean affinity without definitely associating it with a living genus.

The fossil was discovered while working on the Bournemouth flora with the aid of a grant from the Royal Society, and I am indebted to Dr. A. Smith Woodward for facilities afforded me at the British Museum (Natural History). I have to thank Mr. W. N. Edwards for much help and kindly criticism.

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LXXXI.—*Æthosciurus vexillarius and Æ. byatti.*

By P. S. KERSHAW.

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HAVING had occasion recently to refer to the skulls of the above two species, the descriptions of which are to be found in this Journal (ser. 9, vol. xi. pp. 591 & 592, May 1923), I discovered that I had assigned them to the wrong genus, which should have been *Æthosciurus*, not *Funisciurus*.

Both species are members of the *lucifer-ruwenzorii* group. From the brilliant *lucifer* they are at once distinguished by colour; from *ruwenzorii* and *r. vulcanius* by the absence of the broad median white streak on the underparts. The colour of the under surface from chest to tail of *vexillarius* and *byatti* is singularly like that of *lucifer*, in spite of the great difference in the coloration elsewhere.

The skull of *vexillarius* resembles that of *lucifer*, but is much flatter and broader—tip to tip of postorbital processes 25 mm. instead of 23,—while the nasals are flatter at the tip. The skull of *byatti* is narrower than either, as in *ruwenzorii*, but with quite different nasals to those of the latter, being very much longer and flatter, and, instead of being narrow at the posterior end and gradually widening to the tips, they are of the same breadth till quite near the tips. The palatal foramina of both *byatti* and *vexillarius* are narrow, as in *lucifer*, not broadening out posteriorly, as in *ruwenzorii*. The teeth, too, are large, as in *lucifer*.

The affinities of both species are with *lucifer*. They have little in common with *ruwenzorii*, except size.

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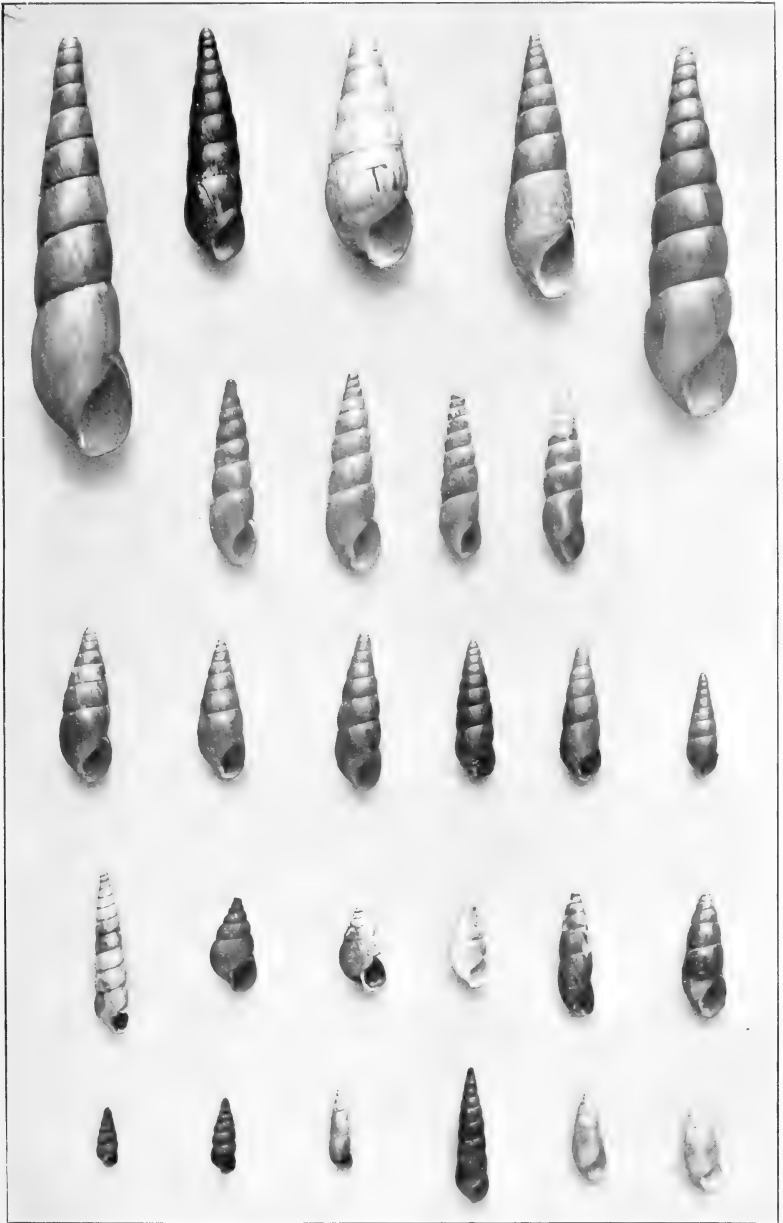
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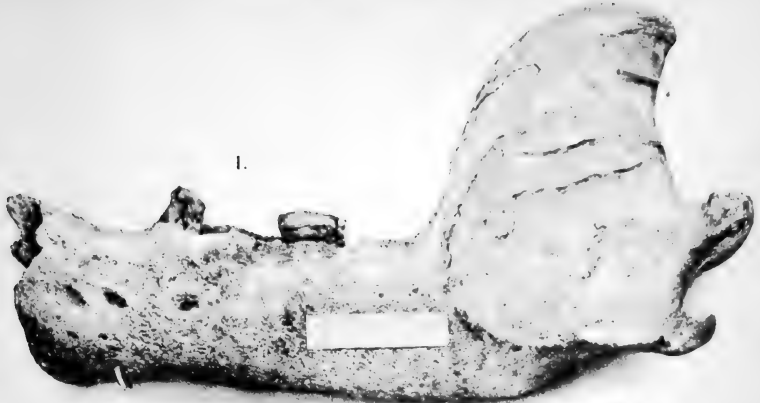
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AFRICAN ACHATINID.E.

(The figures read consecutively from left to right.)



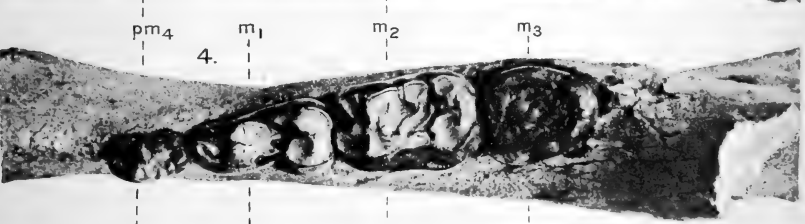
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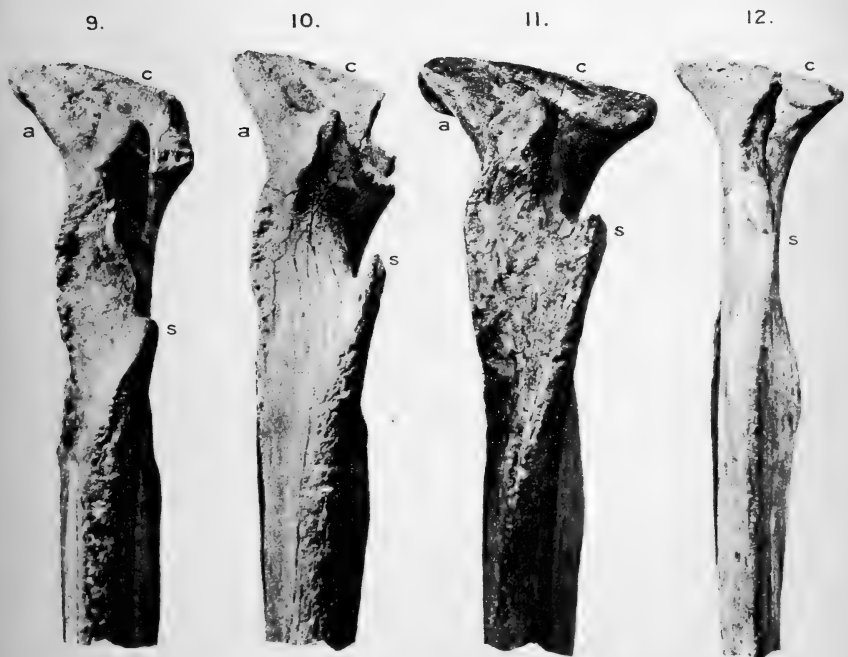
m₃



5.

1,3 'URSUS ARCTOS'.

2,4,5 URSUS ANGLICUS.



6, 9. *URSUS ARCTOS*. 7, 8, 10, 11. *URSUS ANGLICUS*.
 12. *URSUS FOSSILIS*.



FIG. 1.



FIG. 2.

FIG. 3.

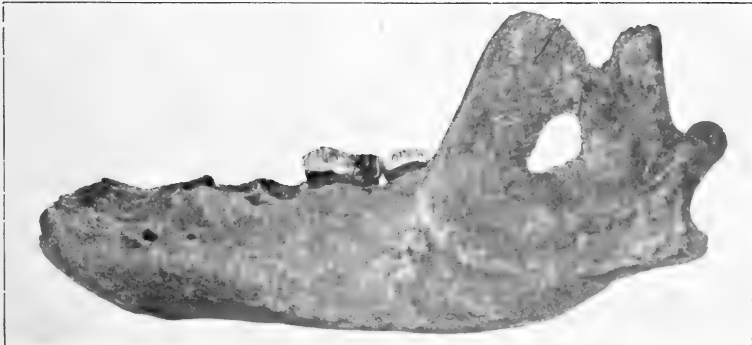
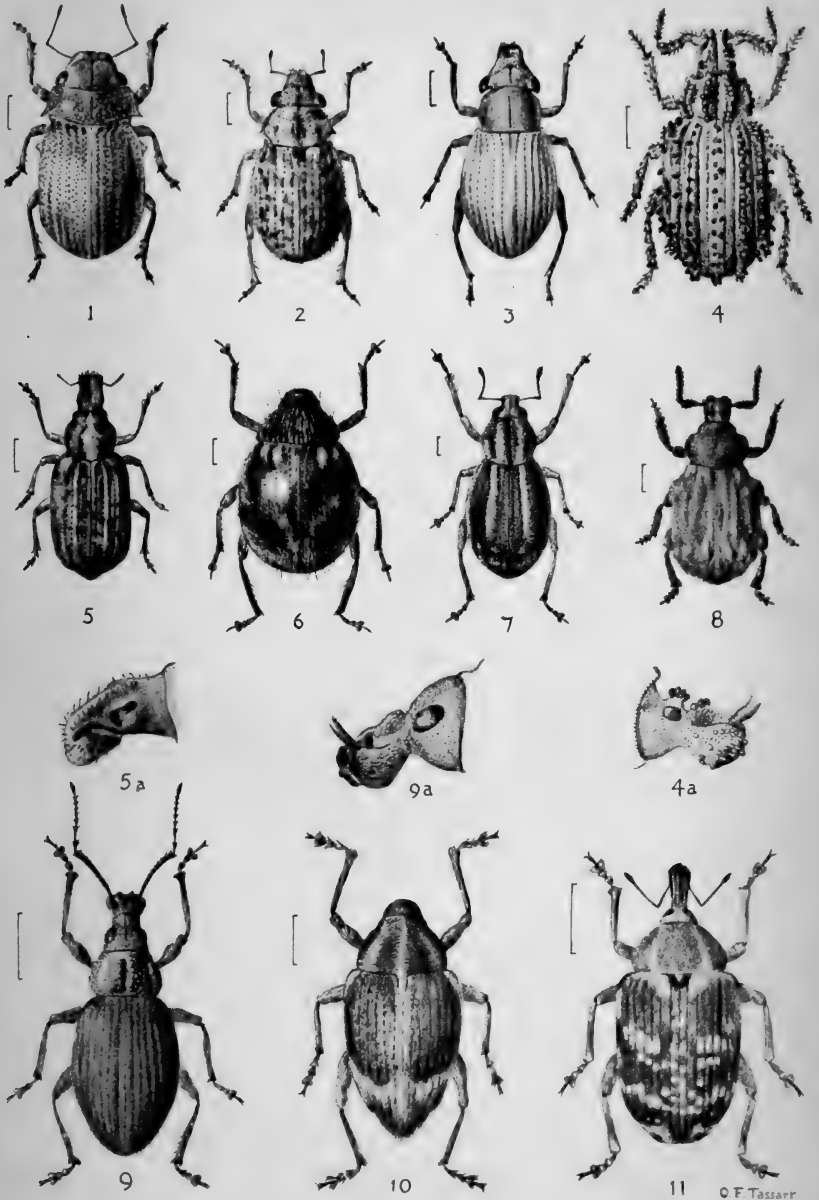


FIG. 4.

Ursus arctos nucefragus, subsp. n.



NEW SOUTH AFRICAN CURCULIONIDÆ.



1.



2.



3.



4.



5.



6.



7.



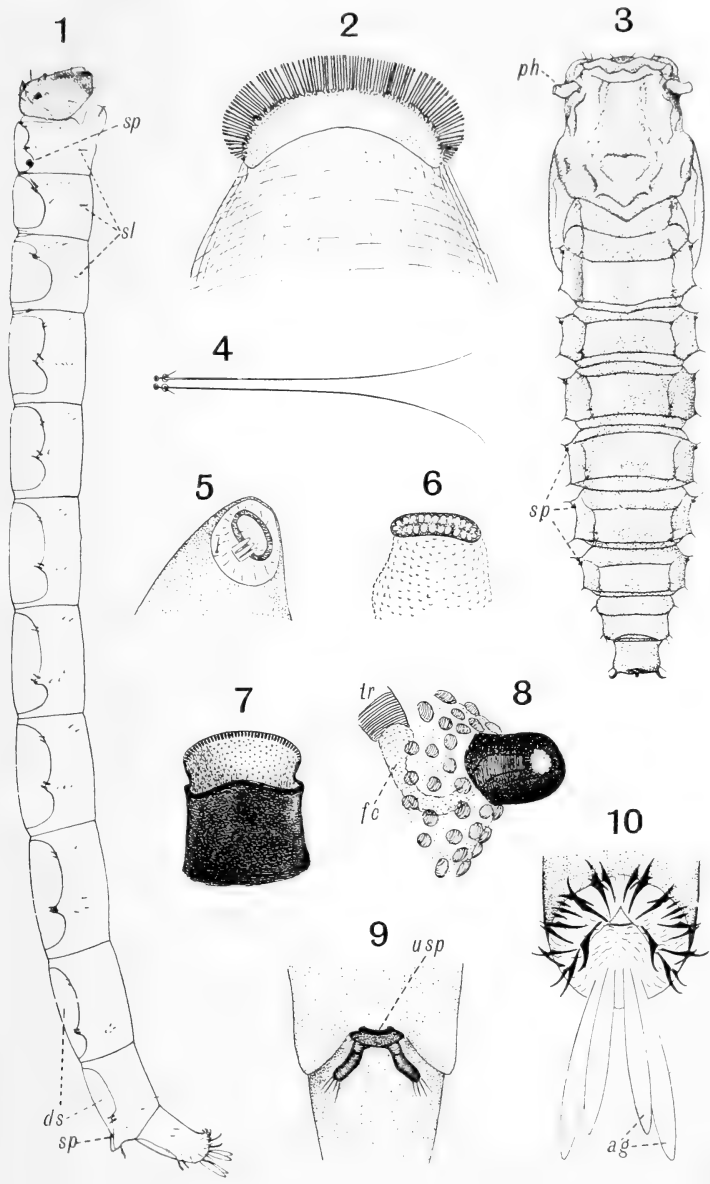
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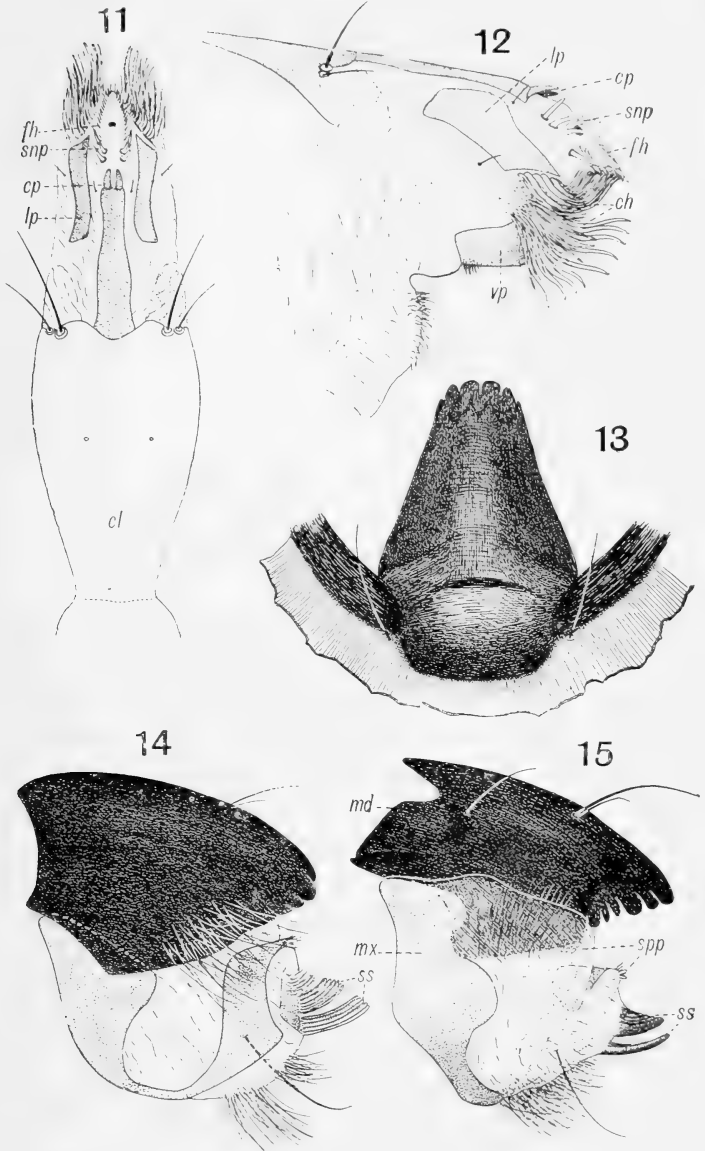
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