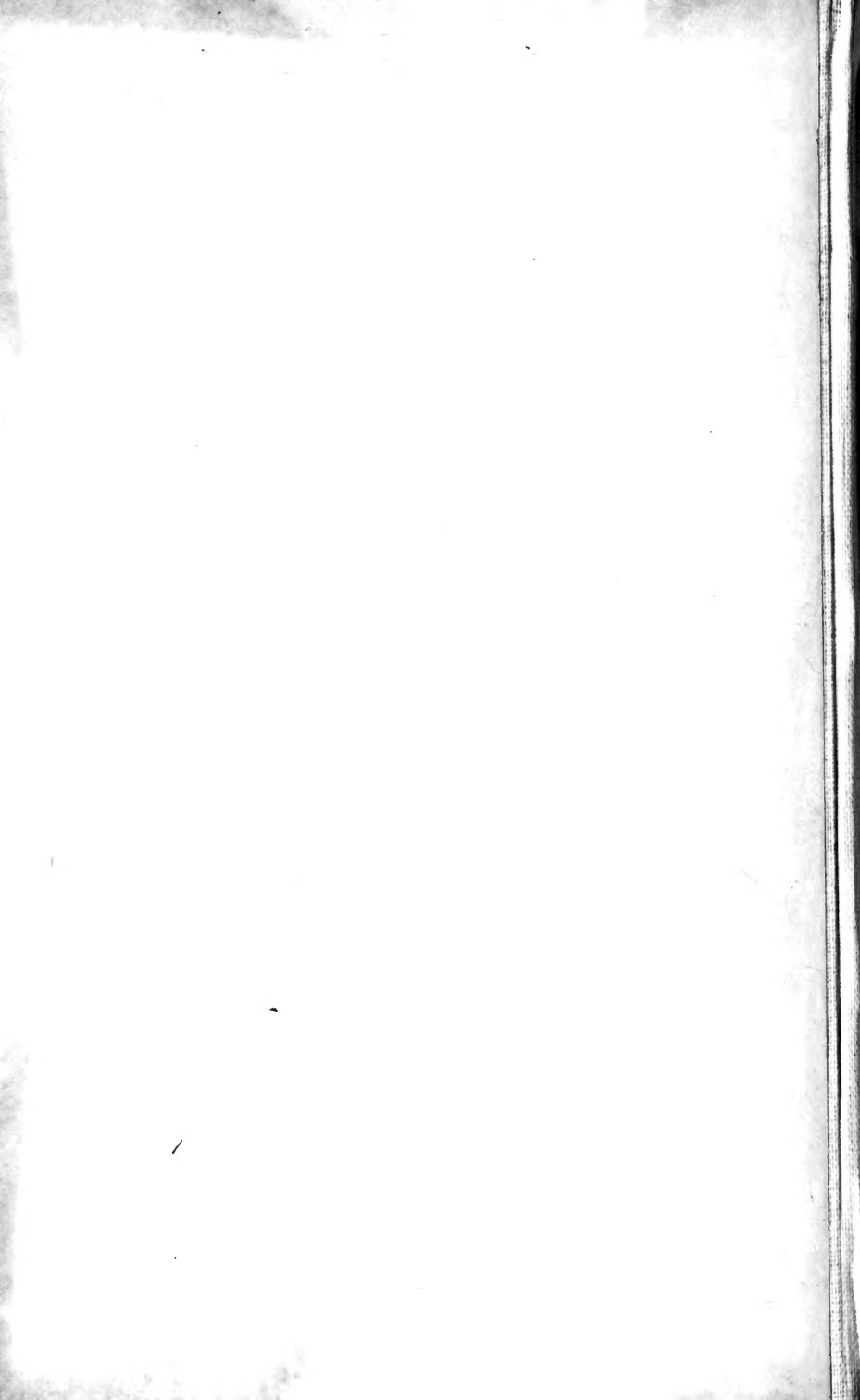


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*I*

THE ANNALS  
AND  
MAGAZINE OF NATURAL HISTORY,

INCLUDING

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ZOOLOGY, BOTANY, AND GEOLOGY.

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

CONDUCTED BY

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

ARTHUR E. SHIPLEY, M.A., Sc.D., F.R.S., F.Z.S.,

AND

WILLIAM FRANCIS, F.L.S.

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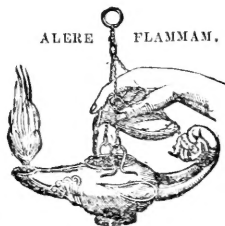
"Omnes res creatæ sunt divinæ sapientiæ et potentiæ testes, divitiæ felicitatis humanæ:—ex harum usu *bonitas* Creatoris; ex pulchritudine *sapientia* Domini; ex œconomiâ in conservatione, proportione, renovatione, *potentia* majestatis elucet. Earum itaque indagatio ab hominibus sibi relictis semper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

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

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

J. TAYLOR, *Norwich*, 1818.

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# THE ANNALS

AND

## MAGAZINE OF NATURAL HISTORY.

[EIGHTH SERIES.]

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"..... 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 nihi conchas  
Ferte, Dææ pelagi, et pingui conchyliis succo."  
*N. Parthenii Giannettasi, Ecl. 1.*

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No. 61. JANUARY 1913.

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I.—*New Species of Heterocera from Costa Rica.*—XIX.  
By W. SCHAUS, F.Z.S.

Noctuidæ.

*Erastria roseoviridis*, sp. n.

♂. Head and thorax mottled reddish brown and lilacine. Abdomen irrorated with fuscous grey, and at base dorsally with brown. Fore wings pale green; base reddish brown and lilacine, its outer edge vertical; outer margin broadly lilacine, crossed by two reddish-brown shades, preceded by an olive-green shade; termen narrowly pale green; a terminal macular line, pale brown; at end of cell a large spot, whitish behind, finely outlined with purple; costa postmedially streaked with purplish brown. Hind wings greyish at base, outwardly tinged with pale reddish brown. Wings below whitish, partly shaded with reddish brown; a black discal spot on hind wings.

Expanse 23 mm.

*Hab.* Sixola, Banana River.

*Ostha concinna*, sp. n.

♂. Body greyish brown. Fore wings light brown, thinly irrorated with dark brown and with fuscous-brown markings;

*Ann. & Mag. N. Hist.* Ser. 8. Vol. xi.

an antemedial wavy line, slightly outcurved, followed by a spot on costa, and small spot in cell; a large spot at end of cell containing some white irrorations; postmedial fine, sinuous, partly irrorated with white and suffusing beyond cell with the fuscous-brown terminal space, this latter crossed by a subterminal light brown shade, also sinuous; a narrow light brown shade terminally opposite cell, and pale points at veins; cilia light brown spotted with fuscous. Hind wings light brown, with dark irrorations; a small white discal spot; a postmedial dark brown lunular line not reaching costa and outwardly finely edged with white; terminal space tinged with fuscous grey, crossed by a pale subterminal shade. Hind wings below whitish grey on basal half; a dark spot on discocellular, and fine postmedial line; the terminal space broadly shaded with fuscous; traces of a paler subterminal line.

Expanse 20 mm.

*Hab.* Juan Vinas, Esperanza.

*Ostha rama*, sp. n.

♀. Body and wings brown. Palpi: second joint fringed below; third joint smooth, conical, short. Wings: terminal buff-white points at veins. Fore wings: a round white spot at base; a large round yellowish-white spot in cell suffusing behind with an oblique white fascia in bent from just beyond cell to submedian vein medially; this fascia partly shaded with yellowish, and with a dark brown line on discocellular; a yellow-white streak on costa before apex, and faint traces of a fine yellowish subterminal line. Hind wings: some pale brownish markings on inner margin. Wings below greyish brown; a darker medial line on hind wings, followed by a whitish-grey shade.

Expanse 16 mm.

*Hab.* Banana River.

*Ostha nomion*, sp. n.

♂. Head fuscous brown. Thorax and abdomen buff-brown. Wings brown, tinged with buff at base and on costa of fore wings, thinly irrorated with darker brown; a terminal fuscous-brown line interrupted by light brown points at veins; a faint dark subterminal line. Fore wings: antemedial line fine, dark, wavyly dentate, almost vertical; a black point in middle of cell; reniform oblique, white, darkly edged; postmedial line fine, dark, wavy, outcurved beyond cell. Hind wings: a white dark-edged line on

discocellular; postmedial fine, dark, irregular, deeply inbent below vein 2. Wings below pale, thickly irrorated with light brown; dark discocellular lines and outcurved postmedial line.

Expanse 18 mm.

*Hab.* Juan Vinas.

*Ostha hypsea*, sp. n.

♂. Palpi, head, and collar fuscous brown. Thorax and abdomen buff. Fore wings: base and costal margin buff; brown irrorations medially, increasing and forming a darker shade to postmedial, except on costa; postmedial outcurved beyond cell, defined by a buff shade following it; a black point in cell; a fuscous shade as reniform containing some white scales; terminal space broadly dark brown, with an indistinct still darker subterminal shade, only distinct on pale costa; terminal pale points, interrupting a fuscous line. Hind wings light brown irrorated with dark brown, and shaded with fuscous brown, medially, and on costal half to termen; a white streak on discocellular darkly edged; a dark postmedial line, inbent below vein 2, outwardly shaded with light brown. Fore wings below fuscous brown; a postmedial buff line and spot at apex. Hind wings below buff, thickly irrorated with brown except on outer side of dark postmedial line; a dark discal spot.

Expanse 18 mm.

*Hab.* Sixola.

AMPELASIA, gen. nov.

*Female*.—Palpi upturned, very long; second joint densely scaled, reaching well above head; third joint smooth, almost as long as second. Antennæ with short bristles. Legs smooth, spurs on hind tibia long. Abdomen with short dorsal tuft at base. Fore wings: apex acute, outer margin obliquely rounded; vein 2 from near middle of cell; 3 close to lower angle; 4 from lower angle; 5 slightly above lower angle; 6 from below upper angle; 7-10 stalked from upper angle, 7 from before 10; 11 free. Hind wings: apex and anal angle rounded, outer margin almost straight; cell very short; vein 2 from close to lower angle; 3 and 4 stalked; 5 well above angle; 6 and 7 stalked.

Type of genus, *Ampelasia azelinoides*, Schs.

*Ampelasia azelinoides*, sp. n.

♀. Body dark grey-brown. Fore wings dark grey-brown,  
1\*

shading to fuscous brown postmedially, limited by a fine yellow-buff line nearly vertical from costa to vein 4, inbent, vertical to submedian, and incurved on inner margin; outer margin broadly dull grey tinged with buff near line; a marginal angled fuscous-brown streak between veins 7 and 8 and a small spot below 7; a fine dark brown antemedial line, outcurved to median, vertical to submedian, inbent below it; orbicular and reniform spots both minute, whitish buff, partly edged with fuscous brown. Hind wings dull brownish grey; a fine postmedial fuscous line to vein 3, then white, surmounted by a triangular fuscous-brown patch, and followed by a light brown shade also from vein 3 to inner margin, beyond which are two fine inversely lunular brownish lines, with mottled brown shading between them. Wings below dull greyish brown; a postmedial series of pale yellow spots partly suffusing; a small white spot near apex of fore wing.

Expanse 40 mm.

*Hab.* Juan Vinas.

#### TRANOSES, gen. nov.

*Male.*—Palpi thickly scaled, obliquely ascending, fringed on second joint below, reaching beyond tip of third joint, which is very short. Antennæ pubescent. Legs smooth. Fore wings narrow; apex rounded, outer margin oblique; vein 3 well before lower angle; 4 and 5 apart from lower angle; 6 from upper angle; 7-10 stalked from before end of cell; 11 free. Hind wings: veins 3 and 4 on long stalk; 5 above lower angle; 6 and 7 stalked.

Type of genus, *Tranoses hirtipuncta*, Schs.

#### *Tranoses hirtipuncta*, sp. n.

♂. Body and fore wings buff-white, with some scattered brown irrorations. Fore wings: cell anteriorly and a shade to costa before apex clearer white, also the space between cell and submedian; the irrorations forming a faint streak in cell above median, upbent beyond cell to termen at apex, suffusing with the subterminal irrorations; orbicular and reniform brown points; terminal brown points. Hind wings white. Fore wings below whitish, base of costa tufted, terminating in a black spot; the costal margin and veins tinged with pale brown.

Expanse 20 mm.

*Hab.* Juan Vinas.

*Dagassa? parthenope*, sp. n.

♀. Palpi, head, thorax, and fore wings pale lilacine buff thinly irrorated with black. Abdomen and hind wings pale buff, the latter thinly suffused with fuscous brown except on costa. Fore wings: lines fine, indistinct, pale greenish brown; antemedial line sinuous, outcurved; a medial line, slightly outcurved; an indistinct paler shade on discocellular; postmedial line outangled at vein 6, suffusing with a thicker black line which extends from apex to vein 2, below vein 2 the postmedial is again pale greenish brown; a fine wavy subterminal shade; marginal black points on interspaces. Wings below pale buff; the disc of fore wings shaded with fuscous; a fine postmedial line.

Expanse 25 mm.

*Hab.* Juan Vinas.

*Capnodes herilis*, sp. n.

♀. Head and thorax brown, the abdomen darker. Wings brown shot with purple, the lines rich dark brown; a subterminal wavy sinuous line; a dark terminal line, narrowing at veins, where it is interrupted by a light brown point. Fore wings: antemedial line vertical, inwardly edged with lighter brown; reniform narrow, constricted, finely outlined in dark brown; postmedial line outcurved around cell, outwardly edged with lighter brown. Hind wings: a faint darker line on discocellular; postmedial line as on fore wings but straight. Wings below dark greyish brown; fine darker streaks on discocellular, and a fine dark postmedial line, straight on both wings, terminal line as above but less distinct.

Expanse 31 mm.

*Hab.* Cachi.

This is the *C. linula* of the 'Biologia,' but not of Guénée.

## PELODIA, gen. nov.

*Male.*—Antennæ ciliated. Palpi obliquely ascending; second joint flat, broad, thickly scaled, reaching well above head; third joint short, naked, acuminate. Legs smoothly scaled; base of fore tarsi with short process; hind tibia with two pairs of spurs. Fore wings narrow; costal margin straight; apex acute; outer margin bulged; inner margin straight; vein 3 near lower angle; 4 from angle, 5 close above; 7, stalk of 8 and 9, and 10 from end of areole.

Hind wings; costal margin straight; outer margin oblique, angled at vein 2; veins 3 and 4 from lower angle; 5 from lower third of discocellular; 6 and 7 from upper angle.

Type of genus, *Pelodia rava*, Schs.

*Pelodia rava*, sp. n.

♂. Palpi and head buff-brown; collar shading to grey; thorax light grey; abdomen brownish buff. Fore wings grey shaded with whitish antemedially below cell and at end of cell, obliquely extending to and expanding at tornus; a clearer white shade on apical third of costa; the base shaded with pale brown, limited by the faintly dark antemedial line, which is inbent to median, outset and inbent to submedian, outbent on inner margin; wing partly crossed by fine brownish striæ; orbicular a black point; a dark grey oblique line medially from costa to reniform, which consists of an incurved dark brown line, outwardly shaded with reddish brown; postmedial line as a fine greyish line on costa, from vein 7 whitish irrorated with reddish brown, outangled close above vein 6, inbent to vein 3, below which it is obsolescent. The termen from vein 3 to apex shaded with brown; terminal black points on interspaces, the largest on submedian fold. Hind wings luteous white, the outer margin broadly shaded with brownish grey; terminal black points. Fore wings below whitish shaded with brown; a straight vertical dark postmedial line. Hind wings below whitish with some scattered dark irrorations and a black discal point; the terminal points partly connected by a fine black line.

Expanse 28 mm.

*Hab.* Guapiles.

Subfamily DELTOIDINÆ.

*Mastigophorus pasithea*, sp. n.

♀. Body and wings whitish buff, thinly irrorated with dark brown. Fore wings: a faint brown postmedial shade, inwardly oblique, followed by a fine parallel line; subterminal line whitish, inwardly shaded with dark brown; termen shaded with brown; a terminal dark line. Hind wings: some brown irrorations on inner margin and between veins 2 and 4; the subterminal line and terminal space as on fore wings. Wings below more thickly irrorated with brown; a dark subterminal line on fore wings; fine medial, postmedial, and subterminal lines on hind wings. The male



of this species has the palpi very long, almost reaching to end of abdomen.

Expanse 15 mm.

*Hab.* Esperanza. In Coll. Dognin from French Guiana.

*Mastigophorus curvilinea*, sp. n.

♀. Palpi, head, and thorax dull brown. Abdomen dark brownish grey, with paler segmental lines and tufts at base. Fore wings brown, the lines fine, dark brown; a subbasal line, outbent on inner margin; antemedial line evenly outcurved; orbicular a white point circled with dark brown; a broad dark brown medial shade, barely indicated on costa; two white points on discocellular edged with dark brown; postmedial line outcurved on costa, with a small dark spot above it, inbent, faintly sinuous, outbent below submedian fold; outer margin broadly somewhat darker; a subterminal pale dentate line from costa to vein 7, followed by a dark brown shade above vein 7 to apex, and a small similar spot below 7; short subterminal pale streaks on veins otherwise; a fine dark terminal line, outwardly pale-edged. Hind wings whitish suffused with brownish grey; postmedial and subterminal fine lines; termen narrowly darker shaded; the terminal line fuscous. Fore wings below greyish, the costal margin shaded with light brown; a fine postmedial line; a black subterminal shade on costa. Hind wings below buff-grey irrorated with brown; a black spot on discocellular preceded by a black streak in cell; postmedial line finely wavy; an interrupted subterminal line.

Expanse 30 mm.

*Hab.* Poas.

This species can be recognized by the evenly curved antemedial line, which is usually outbent on inner margin.

*Mastigophorus evadnealis*, sp. n.

♀. Palpi light brown, head, collar, and patagia darker brown, thorax and abdomen above fuscous, all irrorated with minute metallic steel-coloured scales; body below pale buff. Fore wings rich brown, the inner margin broadly and terminal interspaces fuscous, thickly irrorated with metallic steel-colour; costal margin darker brown; some metallic irrorations on basal third, along median vein, and on postmedial space; a pale brown shade in and beyond cell interrupted by the broad rich brown reniform; a postmedial thick brown line on inner margin and a similar subterminal line from costa to inner margin; veins fuscous on outer margin to the

terminal brown line. Hind wings: costal and inner margins broadly fuscous grey, the intermediate space and termen from vein 2 to apex fuscous, irrorated with metallic scales, this space crossed by a short postmedial brown line, and a subterminal and terminal line from vein 2 to costa; cilia at anal angle buff-white.

Expanse 21 mm.

*Hab.* Limon.

#### MASTIXIS, gen. nov.

*Male.*—Antennæ pubescent, ciliate. Palpi upcurved, reaching thorax behind, the third joint with long tufts on inner side from base. Legs smoothly scaled. Fore wings: costal margin long, convex toward apex; outer margin oblique; vein 2 from near middle of cell; 3 before lower angle; 4 and 5 from lower angle; 6 from near upper angle; a minute areole; vein 7 from end, 8, 9, 10 stalked from end. Hind wings: cell short; veins 3 and 4 stalked; 5 from near lower angle; 6 from close to upper angle.

Type of genus, *Mastixis chloe*, Schs.

#### *Mastixis chloe*, sp. n.

♂. Body above brownish grey, underneath white irrorated with brownish grey. Fore wings brownish grey; ante-medial outbent on costa, fuscous, otherwise dark brown, finer, wavy, vertical; orbicular small, yellowish, finely circled with dark brown; reniform crescent-shaped, yellowish and reddish brown, edged with dark brown, above it an outbent fuscous line on costa, and traces of a fine brownish line from below it to inner margin; outer line straight, broad, yellowish white, inwardly edged by a very fine dark brown line and outwardly by a brown shade; subterminal fuscous spots towards apex; a terminal black line interrupted by veins. Hind wings whitish, the outer margin broadly brownish grey, inwardly limited by an outer line as on fore wing, but crossed by a whitish shade between veins 5 and 6; the outer line angled near tornus and followed by a pale subterminal line; some brownish-grey shading from cell to inner margin, and a postmedial fuscous shade towards inner margin. Hind wings below whitish irrorated with brown, and with faint medial, postmedial, and subterminal lines; all interrupted by a clear white streak above vein 5 from cell to termen; black discal spots on wings.

Expanse 23 mm.

*Hab.* Juan Vinas.

Near *M. lineata*, Schs.

*Mastixis poasalis*, sp. n.

♂. Palpi outwardly, head, collar, and thorax dark brown. Abdomen fuscous. Fore wings dark brown, somewhat paler between postmedial and subterminal lines from vein 5 to inner margin; antemedial line fine, pale brown, outcurved across median, outbent from fold, outwardly dark-edged; orbicular small, fuscous brown; a white line on discocellular; postmedial fine, light brown, inwardly dark-edged, almost vertical to vein 4, then slightly incurved; subterminal indistinct, sinuous, with short pale streaks on veins; a terminal black line. Hind wings brownish grey; faint postmedial and subterminal lines, the latter pale-edged; a black terminal line. Fore wings below fuscous; a faint postmedial line and dark subterminal shade on costa. Hind wings below whitish irrorated with grey-brown; a black discal spot; a fine postmedial line and subterminal shade; terminal black line partly interrupted.

Female brighter brown, the lines fuscous, a darker medial shade; orbicular with a white point; reniform consisting of four or five white spots.

Expanse, ♂ 23-27, ♀ 25 mm.

*Hab.* Poas, Turrialba.

*Mastixis turrialbensis*, sp. n.

♀. Palpi buff thickly irrorated with dark dull brown. Head dark dull brown. Collar and thorax buff-brown, irrorated with dark brown and black. Abdomen dull brown. Fore wings dull brown irrorated with dark brown, the lines black-brown, fine; a coarse line at base; antemedial line outbent to orbicular, incurved below cell, outbent on inner margin, preceded by a pale shade irrorated with ochreous; orbicular dark-edged, containing ochreous scales; reniform black-brown, crossed by a whitish and ochreous line; postmedial slightly inbent, lunular below vein 3; subterminal pale, indistinct, inset opposite cell, outwardly shaded with black, chiefly between veins 7 and 6, 4 and 3, and 2 and submedian; terminal semilunar black spots. Hind wings dull brownish grey, the costa whitish; a faint discal spot and postmedial line; a terminal dark line. Fore wings below greyish, shaded with buff on costa; a fine postmedial line on costal margin and large subterminal fuscous shade. Hind wings below greyish white, darkly irrorated; a dark discal spot; a dentate postmedial line; a subterminal shade, crossed by a thick fuscous line on fold.

Expanse 32 mm.

*Hab.* Turrialba.

*Palthis caecalis*, sp. n.

♂. Body greyish brown; abdomen with darker brown segmental lines and pale dorsal points. Fore wings lilacine brown; antemedial line fine, outcurved from subcostal, followed on costa by a pale oblique streak, and dark brown shade suffusing in cell with orbicular, which is small, fuscous, containing some light brown scales; a pale streak along median to postmedial line; reniform crescent-shaped, light brown edged with black; a broad fuscous shade below it to inner margin; postmedial fine, fuscous, incurved on costa and outbent to vein 4, then sharply incurved, and outangled on submedian, followed by a faint pale shade; a subterminal fuscous line from costa to termen at vein 4, inwardly shaded with light brown and outwardly with dark brown, which does not reach apex; a terminal dark line. Hind wings somewhat truncated at anal angle, fuscous grey; a terminal dark line and a fuscous shade at vein 2, cut by a short, subterminal, light brown line. Wings below brownish grey; fore wings with pale postmedial and subterminal lines on costal space; hind wings with fuscous discal spot, a postmedial line angled at vein 2, and a subterminal shade.

Expanse 18 mm.

*Hab.* Juan Vinas, Carillo, Esperanza.

Near *P. asopialis*, Gn., but easily separated by the subterminal line.

*Palthis eubæalis*, sp. n.

♂. Body brownish grey, the palpi greyer; small dorsal whitish spots on abdomen. Fore wings brownish grey faintly tinged with lilacine; antemedial line darker, outcurved, indistinct, followed by a faintly paler streak on costa and a fuscous line; orbicular a black point; reniform a light brown crescent inwardly edged with black, outwardly followed by a small black spot; a pale buff streak along median vein and a dark shade inbent from below reniform to inner margin; postmedial outbent and straight on costa, very fine, dark grey, followed by a pale buff shade, incurved from vein 4 and dentate on veins; subterminal very fine, scarcely darker, but inwardly shaded with whitish grey from costa to near termen at vein 3; a terminal fuscous line; cilia fuscous, with a pale line at base. Hind wings angled at vein 2, fuscous brown, darkest along termen; a terminal dark line and fuscous shade at vein 2. Fore wings below fuscous grey, whitish on inner margin; traces of the pale lines on costa.

Hind wings below whitish irrorated with fuscous brown; a fuscous discal streak, the termen dark-shaded.

Expanse 21 mm.

*Hab.* Peralta.

Near *P. æacalis*, Schs.; easily distinguished by the straight postmedial line on costa.

*Palthis submarginata*, sp. n.

♂. Palpi outwardly, head, collar, and thorax dark lichen-grey. Abdomen grey thickly irrorated with purple. Fore wings yellowish brown shaded with purple; a fuscous spot at base; a curved antemedial shade, reddish-brown below cell, not reaching submedian; a fuscous geminate medial line, filled in with reddish brown, darkest below cell, inbent and expanding towards base below submedian; an oblique dark line on discocellular shaded with yellow-brown; postmedial diffuse, fuscous, angled at vein 6, terminating at tornus; a wavy marginal black line from apex to vein 4, preceded by a yellowish shade between 4 and 6. Hind wings whitish; a brown shade from near base below cell expanding to subterminal; inner margin and tornus shaded with fuscous; termen from vein 2 to apex dark reddish brown, preceded by a geminate paler brown shade separated by fuscous-grey scaling, and inwardly shaded with black. Fore wings below fuscous; costa on terminal third orange; outer margin and apex yellow, crossed by a subterminal fuscous shade; inner margin white. Hind wings below white; apex and outer margin to vein 2 orange-yellow, preceded by a fuscous shade.

Female: Head and thorax lilacine brown, crossed by two black lines dorsally. Abdomen brownish yellow, with fine black segmental lines. Fore wings yellow-brown tinged with lilacine, the lines fine, fuscous on anterior half, dark purple-red on posterior half; a subbasal line; an antemedial and a medial line, inbent, parallel; outer line outangled on vein 6, inangled at vein 3 below the reddish-brown discocellular line, then outcurved; a faint subterminal line; a terminal dark brown line. Hind wings whitish yellow; a yellow-brown shade below cell expanding to termen and crossed between veins 2 and 5 by a dark outer, subterminal, and terminal line, the latter extending to apex. Wings below yellowish, darkest terminally, with faint outer and subterminal lines; some fuscous shading through cell on fore wings.

Expanse, ♂ 23 mm., ♀ 25 mm.

*Hab.* Tuis, Sixola. The ♂ type is from Surinam.

The palpi of female are unusually long.

*Palthis lineata*, sp. n.

♂. Body and wings greyish brown. Fore wings: antemedial line angled on costa, medial straighter, both dark brown and suffusing on inner margin; the antemedial suffusing in cell with orbicular; reniform dark velvety brown, linear, cut by a whitish shade which extends to subterminal; postmedial very fine and indistinct, pale-edged and slightly outcurved; subterminal wavy, whitish; a dark terminal line; the inner margin is lobed just before middle. Hind wings: costal margin whitish to outer line; a faint discal spot; postmedial line not reaching costa; outer line outwardly edged by a pale line. Wings below whitish thickly irrorated with grey-brown, darkest before the subterminal white line; a fuscous streak through cell of fore wing; a discal point and postmedial line on hind wings.

Female very similar to male: fore wings not lobed, the lines finer, more distinct; the antemedial and medial further apart, incurved, and not suffusing; the postmedial well marked; the white subterminal preceded by a fuscous shade. Hind wings: the postmedial line reaches costal margin.

Expanse, ♂ 20, ♀ 25 mm.

*Hab.* Poas, Cartago, Laguna.

*Palthis hieronymus*, sp. n.

♀. Body and fore wings buff-white, thinly irrorated with brown; abdomen with a black dorsal patch just beyond middle. Fore wings: costa and termen shaded with lilacine brown; antemedial very fine and indistinct, wavy, outangled in cell, marked by two fuscous spots on costa; a black point at either end of discocellular, narrowly surrounded by yellow-brown scaling, preceded by a fine black line which expands below cell to inner margin at middle, being heavily shaded with fuscous outwardly; postmedial very fine, somewhat punctiform, outangled on costa, inbent, sinuous, limiting medial shade below vein 2; subterminal sinuous, defined by a broad pale brown shading inwardly and a fine fuscous line outwardly; a terminal black line; a black spot at apex. Hind wings whitish, with a few scattered dark scales; the termen dull lilacine brown; traces of postmedial and subterminal lines. Fore wings below shaded with fuscous grey.

Hind wings below buff-white, more thickly irrorated with fuscous brown; a black discal spot and smaller spots on post-medial and subterminal below vein 6.

Expanse 19 mm.

*Hab.* San Geronimo.

#### GIRTESMA, gen. nov.

*Male*.—Antennæ pubescent, ciliate. Palpi flat, outwardly clothed with spatulate scales, the second joint upcurved, the third bent back, barely reaching thorax. Legs smoothly scaled. Fore wings large, apex acute, the termen bluntly produced at vein 4; vein 3 from before lower angle; 4 and 5 from lower angle; 6 from below upper angle; no areole; 7 shortly stalked with 8 and 9; 10 and 11 from cell. Hind wings broad, the outer margin angled at vein 2, the anal angle obtuse; veins 3 and 4 on short stalk; 5 from near lower angle; 6 and 7 from upper angle.

Type of genus, *Girtesma messala*, Schs.

General appearance of *Margites*, Dr., which has vein 10 stalked with 8 and 9.

#### *Girtesma messala*, sp. n.

♂. Palpi brown, the scales partly opalescent. Head and collar brownish buff, with a few dark irrorations. Thorax, base of abdomen, and fore wings pale buff irrorated with dull brown; abdomen otherwise brown above, with pale segmental lines. Fore wings: the scales partly curved at tips with a silvery reflection; costa shaded with brown; ante-medial line brown, wavy, nearly vertical; traces of a brown medial shade; postmedial line fine, slightly inbent below vein 5, followed by brown shading to the more heavily marked reddish-brown subterminal line, this shading crossed by an indistinct darker line; termen rather paler, irrorated with brown; a marginal interrupted black line. Hind wings shaded with brownish grey; postmedial line and line following it indistinct, the subterminal indistinct except from veins 4-2, where it is reddish brown, angled at vein 2 and fuscous grey to inner margin, followed between 4 and 2 by a dark greyish line; marginal line as on fore wings; cilia brown. Wings below darker, dull fuscous brown, with an indistinct dark postmedial line.

Expanse 37 mm.

*Hab.* Juan Vinas.

## THURSANIA, gen. nov.

*Male*.—Antennæ pubescent, ciliate; a raised tuft on upper side of shaft just beyond middle. Palpi upcurved, the third joint shorter than second, moderately scaled. Fore tarsi with tuft at base. Fore wings: vein 2 from just beyond middle of cell; 3 from before lower angle; 4 and 5 from lower angle; 6 from below upper angle; 7 from upper angle; 8, 9, 10 stalked from close to end of cell. Hind wings: veins 3 and 4 and 6 and 7 on short stalk; 5 from near lower angle.

Type of genus, *Thursania decocta*, sp. n.

*Thursania decocta*, sp. n.

♂. Body and wings dull grey; abdomen darker, with pale segmental lines. Wings faintly irrorated with whitish buff, markings fuscous; a fine medial shade; postmedial line fine, deeply and narrowly lunular; an interrupted terminal line, thickened between veins; a pale line at base of cilia and pale tipped. Fore wings: a fine antemedial line outbent on costa, vertical across cell, slightly outcurved below it; orbicular a small point; reniform a fine line; subterminal fine, whitish buff, preceded by a fuscous spot between veins 7 and 6, and inwardly edged with fuscous from vein 6 to inner margin. Hind wings: a fuscous discal spot; subterminal line edged on either side with fuscous, more heavily marked inwardly. Underneath paler, the markings similar, but no antemedial line on fore wing.

Expanse 28 mm.

*Hab.* Sixola.

Near *R. cacalis*, Schs.

*Thursania servilis*, sp. n.

♀. Head greyish brown. Collar and patagia roseate brown. Thorax and abdomen darker, abdomen below whitish irrorated with grey. Fore wings pale roseate brown; costa shaded with fuscous; a small velvety brown-black spot near base of cell; antemedial line fine, fuscous, outbent, outangled on inner margin, closely followed in cell by a round velvety spot, and a similar larger spot below cell, both finely circled with whitish; a larger velvety spot at end of cell, its edges outcurved, and broadest across its middle; postmedial line fine, dentate, fuscous, rather indistinct, followed by a broad greyish-white shade; terminal space somewhat ochreous,



crossed by an irregular, geminate, fuscous shade, more heavily marked at vein 6, below 4, and on inner margin; apex fuscous; a fuscous terminal line. Hind wings fuscous; the postmedial line more heavily marked, geminate between veins 5 and 2 and on inner margin; an indistinct darker subterminal shade. Hind wings below paler; a black discal spot; the postmedial line single.

Expanse 31 mm.

*Hab.* Tuis.

*Thursania pholoe*, sp. n.

♂. Palpi brown irrorated with buff. Head, collar, and thorax brownish grey. Abdomen fuscous grey. Fore wings brownish grey; a velvety brown-black subbasal streak to median; a similar antemedial fascia across costa and cell, expanding into a large spot between median and submedian; two similar superposed spots at end of cell, partly edged with whitish buff, closely followed by the dentate postmedial line; a subterminal narrow fuscous shade, outangled just above vein 6 and on vein 4; terminal fuscous spots on interspaces. Hind wings fuscous; a faint discal spot, straight postmedial shade, and curved subterminal line. Wings below fuscous grey; dark discal spots and postmedial line. Hind wings rather paler; a subterminal shade, more heavily marked at anal angle.

Expanse 27 mm.

*Hab.* Turrialba.

*Thursania dissona*, sp. n.

♀. Palpi upcurved, second joint smoothly scaled, with tuft above near middle, third joint tufted at middle above, leaving the tip naked, acuminate, lilacine brown irrorated with dull brown, the tufts mottled with black. Head, collar, thorax, and fore wings light brown faintly tinged with lilacine. Abdomen paler at base, irrorated with purplish brown terminally. Fore wings: lines indistinct, consisting of dark irrorations; antemedial outangled in cell, outbent on inner margin; traces of a medial line crossing the reniform, which is indistinct, orange-brown; postmedial vertical to vein 2, then slightly incurved; a subterminal, sinuous, dark brown shade, divided by a faint light brown line; the apex shaded with fuscous; an interrupted terminal dark brown line. Hind wings dark grey, the space from veins 2 to 4 buff irrorated with brown; a postmedial fine dark line, vertical to just below vein 2, angled and inbent to inner margin; the

termen broadly shaded with dark dull brown; a terminal dark brown line. Wings below paler, the hind wings irrorated with brown; a large black discal spot; the post-medial line finely irregular, slightly curved; the discal spot on fore wings a black point.

Expanse 29 mm.

*Hab.* Guapiles.

*Thursania chærilus*, sp. n.

♀. Head and thorax dark brown. Abdomen fuscous brown. Fore wings a trifle paler than thorax, the lines darker; antemedial line slightly outbent to median, then vertical; orbicular a black point; medial shade vertical, crossing discocellular, on which there is a fine blackish line; postmedial line wavy, vertical; a pale subterminal wavy line inwardly broadly shaded with dark brown; a terminal, faintly lunular, brown-black line on both wings. Hind wings dark greyish brown; a dark streak on discocellular, fine postmedial line, and a faint pale subterminal line inwardly shaded with dark brown, chiefly between veins 2 and 5. Wings below paler; black discal spots; a finely wavy dark brown postmedial line; a narrow subterminal dark brown shade.

Expanse 26 mm.

*Hab.* La Florida.

*Thursania faustitas*, sp. n.

♀. Palpi buff, finely darkly irrorated, very long, straight, slender, smoothly scaled, porrect or slightly ascending. Body and fore wings buff, the abdomen with paler segmental lines. Fore wings: antemedial line fine, black, wavy, outbent to submedian, outcurved on inner margin; orbicular small, annular; reniform finely outlined in fuscous, containing some orange-brown scaling; postmedial line finely wavy, vertical to vein 2, slightly incurved below it; subterminal line pale, defined by fuscous shading, which expands to apex, incurved opposite cell and below vein 2; on both wings a terminal black line, slightly lunular, interrupted by veins. Hind wings suffused with brownish grey; postmedial line fine, distinct, nearly vertical to vein 2, then inbent to inner margin, followed by a pale shade. Wings below thinly irrorated with brown; black discal spots, larger on hind wings; a fine postmedial line; a subterminal fuscous shade, crossed by a pale line.

Expanse 30 mm.

*Hab.* Guapiles.

*Epizeuxis zentium*, sp. n.

♂. Head, collar, thorax, and wings dull brown. Abdomen fuscous; anal hairs whitish buff. Fore wings: a black point at base of cell; antemedial fine, dark brown, slightly inset in cell and interrupted below it; a minute orbicular point; a dark brown medial shade, suffusing with reniform, which is large, darkly outlined; postmedial fine, inbent opposite cell, incurved between vein 2 and submedian, partly interrupted; subterminal indistinct, paler, inwardly shaded with dark brown, especially from vein 4 to costa; terminal brown-black points. Hind wings: a velvety discal point followed by a faint medial shade; postmedial dark brown, wavily dentate; a very faint subterminal paler shade; terminal black points. Wings below paler; a well-marked postmedial line; terminal dark points; a black discal point on hind wings.

Expanse 29 mm.

*Hab. Zent.*

Very near *E. (Bleptina) malia*, Dr., which has medial shade and postmedial line further apart and a white point in reniform.

*Heterogramma contempta*, sp. n.

♀. Palpi brown, upcurved, fringed above with grey-black hairs. Head, collar, and thorax dark grey-brown; patagia light brown. Abdomen light brown, darker shaded terminally. Fore wings light brown, the lines fuscous brown; antemedial line fine, angled on veins, outcurved from median to submedian; orbicular rather large, yellow-brown, finely dark-edged; medial shade inbent from costa, vertical below cell, closely followed by reniform, which is large, yellow-brown, containing two black points; postmedial fine, outcurved below costa, sinuous, inbent from vein 4, and slightly outangled on 3, 2, and submedian; an irregular, subterminal, yellow-brown line, partly narrowly edged with dark brown; terminal semilunar brownish-black spots on interspaces of both wings. Hind wings dark greyish brown; darker medial and postmedial lines; a fine subterminal pale line, partly dentate lunular. Fore wings below dull grey-brown; a darker postmedial line and dark-edged pale subterminal line on costal half of wing. Hind wings below white irrorated with dull brown chiefly on costal margin; a straight medial and curved postmedial line; the whitish subterminal defined by dark shading on either side.

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Expanse 22 mm.

*Hab.* Esperanza.

Fore wing without areole ; veins 8-10 stalked from end of cell.

APUSTIS, gen. nov.

*Male*.—Antennæ finely pubescent, ciliate. Palpi upcurved ; third joint nearly as long as second, smooth, acuminate, with tufts of hairs at middle. Fore wings broad, the apex acute, the outer margin incurved below apex, then obliquely rounded ; veins 3, 4, 5 apart from lower angle ; 6 from near upper angle ; 7, 8, 9 stalked from upper angle ; 10 and 11 from cell. Hind wings : veins 3 and 4 from lower angle, 5 from close to lower angle, 6 and 7 from upper angle.

Type of genus, *Apustis sabulosa*, Schs.

*Apustis sabulosa*, sp. n.

♂. Body bone-colour irrorated with black and fuscous brown, more thickly on collar and thorax ; abdomen with clear segmental lines. Fore wings similar, the irrorations almost completely obscuring ground-colour, except on a narrow basal space, and on lines which are of ground-colour ; antemedial lunular, outwardly edged by a fine fuscous line ; orbicular very small, whitish ; a fine fuscous medial line across reniform, which is narrow, black, inwardly marked with a white point ; postmedial fine, wavy, dentate, widest on costa ; subterminal forming irregular outcurves ; a terminal interrupted fuscous line ; cilia mottled with brown at base, crossed by a dark line and terminally spotted with fuscous. Hind wings bone-colour ; transverse shades and terminal lines fuscous ; medial shade faintly marked, postmedial and subterminal distinct ; outer margin thickly irrorated with brown ; base to postmedial thinly irrorated with fuscous. Fore wings below paler ; subterminal line heavily shaded inwardly with fuscous on costa. Hind wings below thickly irrorated with fuscous brown ; medial line more distinct, with blacker shading on discocellular ; a streak from postmedial inbent to cell ; postmedial and subterminal followed by clear bone-colour edging.

Expanse 27 mm.

*Hab.* Sixola.

METACINIA, gen. nov.

*Male*.—Antennæ with short cilia. Palpi flat, upcurved,

barely reaching thorax, smoothly scaled. Fore tarsi partly concealed by long process from base. Fore wings narrow; vein 3 from before lower angle; 4 and 5 from lower angle; 6 from near upper angle; 7 from upper angle; 8, 9, 10 stalked from end of cell. Hind wings narrow; anal angle truncated from vein 2; veins 3 and 4 and 6 and 7 shortly stalked; vein 5 from near lower angle.

Type of genus, *Metacinia limonalis*, Schs.

*Metacinia limonalis*, sp. n.

♀. Palpi upcurved, reaching well above head; antennæ thinly ciliated. Head and thorax dark lilacine brown; abdomen fuscous brown. Fore wings lilacine brown, shading to dull reddish brown before terminal space, which is thickly irrorated with white, inwardly limited by a lunular subterminal white line, and outwardly limited by a fuscous dentate lunular line; a fine reddish-brown antemedial line; a fine vertical medial shade and a fine dentate lunular postmedial line, also vertical; a black point as orbicular; a white point as reniform; cilia fuscous grey mottled with white. Hind wings fuscous brown; a subterminal whitish line at anal angle; a terminal fuscous line. Fore wings below fuscous grey, hind wings paler; an indistinct darker postmedial line; a pale subterminal line inwardly darker shaded.

Expanse 29 mm.

*Hab.* Limon, Sixola, Juan Vinas.

A male from French Guiana only differs in having the third joint of palpi a trifle longer. This is figured in the 'Biologia' as *theroalis*, Wlk., but is not that species, which also differs in neuration.

*Drepanopalpia arenacea*, sp. n.

♂. Palpi outwardly pale lilacine brown, with a line of black irrorations along upper edge, the tufts on third joint pale yellowish. Head, collar, and thorax pale lilacine-brown thinly irrorated with black. Abdomen paler, irrorated with dark brown, more thickly on terminal segments. Fore wings pale lilacine brown with some pale orange-brown shadings, and a few scattered dark scales; traces of a very fine, irregular antemedial line; reniform pale brown with some black irrorations; a fine dark postmedial lunular line, slightly incurved below vein 3; termen broadly dark lilacine grey, preceded by a faint brownish shade and crossed by a row of subterminal pale points on veins; a terminal lunular black line. Hind wings whitish, with some brown irrorations

beyond middle; a fine lunular postmedial line; termen broadly shaded with dark greyish brown crossed by a subterminal whitish line; a dark terminal lunular line. Fore wings below dark grey in disc, a black point at end of cell, fine postmedial line, and broad subterminal fuscous shade from costa, narrowing towards inner margin. Hind wings below white on inner area, pale buff on costa and termen with dark irrorations; a dark discal spot; a fine lunular postmedial line; a subterminal dark shade.

Expanse 30 mm.

*Hab.* Poas.

*Bleptina? infausta*, sp. n.

♀. Body fuscous brown, head, collar, and thorax tinged with purple-black; a few whitish irrorations on abdomen. Fore wings dark brown; base and medial space tinged with lilacine slate-colour; lines dull, darker brown; a subbasal, geminate antemedial, and geminate postmedial line; a black point in cell; an irregular dentate subterminal line, faintly marked, bluish white, followed by similar irrorations on margin. Hind wings black; a large white spot from base to beyond middle of wing. Underneath black, the white space on hind wing as above.

Expanse 34 mm.

*Hab.* Turrialba.

Veins 8, 9, 10 stalked from end of areole.

*Bleptina obscura*, sp. n.

♀. Body and wings very dark brown, the lines darker richer brown. Fore wings: antemedial line faintly outcurved; a broad medial shade, indistinct, crossing end of cell; two white spots on discocellular; postmedial slightly outcurved; an interrupted whitish subterminal line from costa to vein 3; a terminal dark line expanding into spots on interspaces. Hind wings: a postmedial line, very faint towards costa. Wings below dull greyish brown; a faint medial line; a more distinct postmedial line; hind wings with a subterminal line followed by a grey shade, and a dark point on discocellular.

Expanse 31 mm.

*Hab.* Guapiles.

*Mamerthes gangaba*, sp. n.

♂. Palpi whitish buff above, laterally streaked with black

and brown. Head, collar, and thorax fuscous brown. Abdomen dark with pale segmental lines. Fore wings dark lilacine grey tinged with brown; base to antemedial paler, crossed by a faint lunular subbasal line, and with a dark spot at base of median; antemedial yellowish buff, somewhat incurved across cell, outbent on inner margin, outwardly dark-edged, and followed below cell by an oblique velvety brown-black spot; orbicular horizontally oval, dark-edged, containing some yellowish scales; reniform large, broad, velvety brown-black, crossed by a crescent-shaped yellow line; postmedial yellowish, finely edged with brown-black scales, and followed by a dark spot below vein 7; an irregular line of dark scaling subterminally, forming a spot near apex; small terminal black spots. Hind wings dull brown-grey. Wings below paler; markings more pronounced on hind wings, with larger discal spot; a post-medial line and subterminal shade, which on costa of fore wings is broad and preceded by a pale shade.

Expanse 33 mm.

*Hab.* Poas.

*Gorosina*, gen. nov.

*Female*.—Antennæ ciliated. Palpi: second joint long, obliquely ascending; third short, angled back; both joints with long fringe of hair above: Fore wings broad; costal margin convex, apex acute; outer margin slightly oblique; vein 3 from well before lower angle; 4 and 5 from lower angle; 6 from upper angle; 7–10 stalked; 11 free. Hind wings: veins 3 and 4 stalked; 5 from lower angle; 6 and 7 on short stalk.

Type of genus, *Gorosina ampla*, Schs.

*Gorosina ampla*, sp. n.

♀. Palpi dark brown, fringed above with long fuscous hairs, thinly irrorated with grey; base below shaded with buff. Head, collar, and thorax fuscous, irrorated with grey, the patagia outwardly reddish brown. Abdomen above brown shaded with fuscous; pale lateral segmental spots. Fore wings light brown, darker on basal half; costal margin tinged with grey; inner margin finely fuscous; a fine dark antemedial line, angled on costa, inbent to median, out-curved below cell, and again somewhat inbent; spots whitish grey, the orbicular small, the reniform moderate, somewhat inbent; medial line beyond cell, fuscous brown, angled at vein 8, and slightly sinuous to middle of inner margin;

postmedial line fine, dark brown, deeply lunular with points on veins; subterminal white points shaded with fuscous on veins, the point on vein 7 black. Hind wings shaded with fuscous on termen; medial and postmedial fuscous lines, the latter finely dentate; subterminal spots as on fore wing. Fore wings below greyish brown; a small black orbicular spot; reniform narrow, outlined in fuscous brown, containing a greyish streak; medial line faint; postmedial less lunular; a subterminal white line followed by a black spot on vein 7. Hind wings browner; a black point in cell; a larger spot on discocellular; the medial and postmedial lines fainter; the subterminal spots as above.

Expanse 40 mm.

Hab. Tuis.

#### EPIPHANIS, gen. nov.

*Male*.—Antennæ pectinated. Palpi upcurved at base and porrect, the third joint turned back, slender, long, and with tufts at end. Fore wings: vein 3 from near lower angle; 4 from lower angle, 5 close above it; 6 from near upper angle; 7 from upper angle; 8, 9, 10 stalked from cell. Hind wings: veins 3 and 4, and 6 and 7, on short stalk; 5 from near lower angle.

Type of genus, *Epiphanis esperanzalis*, Schs.

#### *Epiphanis esperanzalis*, sp. n.

♂. Antennæ pectinated. Palpi: first joint upturned; second long, porrect; third three times as long as second, with long hairs at end. Head buff; collar and thorax dark purple-brown. Abdomen dull fuscous purple. Fore wings brown tinged with purple, irrorated with dull lilacine on termen; the markings fuscous brown; a spot at base; an irregular antemedial line, slightly outbent, inwardly shaded with dull lilacine; orbicular small, round; reniform crossed by a paler line, its outer edge suffusing with a narrow, interrupted medial shade; postmedial dentate, interrupted, vertical to vein 5, slightly outcurved to 3 and incurved below it; a broad subterminal shade, limited by a fine pale buff line, sinuous and rather deeply inbent between veins 5 and 6; a coarse terminal dentate lunular black line. Hind wings dark brown; postmedial and subterminal darker shades, the latter outwardly pale-edged, some marginal greyish irrorations; terminal line as on fore wings. Wings below greyish irrorated with brown; the lines finely dentate,



dark brown; discal spots; terminal line forming triangular spots on interspaces.

Expanse 33 mm.

*Hab.* Esperanza.

PAROMIA, gen. nov.

*Male.*—Antennæ pubescent, ciliate. Palpi curved back, reaching thorax behind, smoothly scaled, the third joint fringed with long hairs. Legs stout, smoothly scaled. Fore wings broad; costa straight; outer margin slightly rounded; vein 3 from lower angle of cell; 4 and 5 above it, apart; vein 6 from upper angle; areole narrow; veins 7, 8, 10 from end of areole, 9 stalked with 8. Hind wings broad, the outer margin rounded; veins 3 and 4, and 6 and 7, on short stalk; 5 from near lower angle.

Type of genus, *Paromia nigripunctata*, Schs.

*P. lysandria*, Dr., has the fore tibiæ thickly clothed with hairs.

*Paromia nigripunctata*, sp. n.

♂. Body grey-brown tinged with lilacine. Fore wings dull lilacine; costa finely ochreous brown; antemedial line fine, nearly vertical, olive-brown; a similar broad medial shade; a fine postmedial line suffusing with medial shade below cell; a broad subterminal shade, its outer edge darker shaded; terminal dark brown points on interspaces; orbicular a black point; two black points on discocellular. Hind wings fuscous brown, darker shaded subterminally. Wings below brownish; faint postmedial and subterminal lines. Hind wings somewhat shaded with lilacine grey; a small discal spot.

Expanse 30 mm.

*Hab.* Juan Vinas.

Smaller, paler coloured than *S. lysandria*, Dr., and easily distinguished by the black spots.

TARISTA, gen. nov.

*Male.*—Antennæ pubescent, ciliate, with raised tuft about middle of shaft. Palpi upturned, second joint fringed with hair above, third joint very short. Fore tarsi with long tufts of hair. Fore wings narrow; vein 2 from just beyond middle of cell; 3 from before lower angle; 4 and 5 from lower angle; 6 from below upper angle; areole narrow. 7, 8, and 9 on long stalk, 10 from end of areole. Hind

wings: veins 3 and 4, and 6 and 7, from angles; 5 from near lower angle.

Type of genus, *Tarista morosa*, Schs.

*Tarista morosa*, sp. n.

♂. Palpi dark brown. Head, collar, and thorax dark purplish brown. Abdomen fuscous brown. Fore wings purplish brown; antemedial fine, lunular, outbent, black; orbicular yellow-brown circled with black; a faint fuscous medial line; reniform large, round, yellow-brown, containing a curved black line near inner edge; postmedial dentate, fuscous, indistinct; a fine greyish subterminal line, sinuous and partly dentate; terminal fuscous streaks between veins, ending in small points. Hind wings fuscous brown; a postmedial black shade from vein 2 to inner margin where it expands; a faint subterminal line, edged with whitish scales towards anal angle. Wings below fuscous; black discal points and postmedial line; a subterminal line on hind wings.

Expanse 30 mm.

*Hab.* Juan Vinas.

*Tarista rufipalpis*, sp. n.

♀. Palpi reddish, the joints tipped with white. Head, collar, and thorax reddish brown. Abdomen fuscous. Fore wings reddish brown, darker shaded on interspaces beyond medial line, and below vein 6 to margin; antemedial darker tinged, vertical, slightly outset below cell; orbicular a black point; medial line outcurved in cell; reniform fuscous mottled with whitish-blue scales, similar irrorations scattered over outer half of wing; postmedial outcurved, sinuous; a subterminal bluish-white line, incurved opposite cell and on inner margin, otherwise indistinct, followed at tornus and between veins 4 and 7 by pale irrorations, which also form an edging to the terminal fuscous line. Cilia yellow-buff mottled with black. Hind wings fuscous; a faint darker postmedial and subterminal line; some bluish-white scaling before terminal black line. Hind wings below fuscous brown irrorated with bluish white; a black discal spot and postmedial line; a subterminal whitish line on both wings.

Expanse 37 mm.

*Hab.* Poas.

In this species the palpi are longer than in male type of genus, but the third joint is proportionately short; on hind wings veins 4 and 5 are stalked, 6 and 7 more shortly so.

*Tarista innocua*, sp. n.

♂. Body dull dark brown, some whitish irrorations on abdomen. Wings dull greyish brown, lines dark brown. Fore wings: antemedial line fine, outangled close below cell, inangled on submedian; orbicular darkly outlined, containing a buff-brown centre; a broad medial shade suffusing with inner edge of reniform, which contains a light brown shade; postmedial line fine, sinuous, dentate; subterminal dark shade more heavily marked, dentate and parallel with postmedial; terminal dark points partly connected by a line. Hind wings: postmedial and subterminal shades more heavily marked towards inner margin, and partly edged with white irrorations; a terminal dark line. Hind wings below greyish white irrorated with brown; a brown line on discocellular; postmedial and subterminal finely wavy lines.

Expanse 23 mm.

*Hab.* Poas.

*Aristaria nigrifrons*, sp. n.

♀. Palpi and frons black; vertex and collar outwardly brownish ochre; collar medially and thorax steel-grey, iridescent. Abdomen fuscous. Fore wings dark brown; extreme costa brownish ochre, edged behind with steel-grey; lines darker brown, indistinct; antemedial lunular, slightly outbent; medial across end of cell; postmedial vertical; outer margin thickly irrorated with bluish white, crossed close to its inner edge by a brown lunular line. Hind wings fuscous brown, some terminal whitish scales between veins 2 and 4. Wings below fuscous brown, darkest along outer margins; a faint discal spot and postmedial line on hind wings.

Expanse 33 mm.

*Hab.* Juan Vinas.

*Aristaria scortea*, sp. n.

♀. Palpi buff-brown with darker irrorations and shadings on fringe above. Head, collar, and thorax brown. Abdomen lilacine grey, irrorated with dull greyish brown and with pale segmental lines. Fore wings light brown; some dark scales at base; antemedial line fine, dark, wavy outbent, inangled on submedian; an orbicular black point; reniform incurved, edged with dark scales; postmedial line fine, black, lunular, incurved opposite cell and below vein 2;

a subterminal dark lunular shade, followed by small clusters of dark scales on interspaces; apex shaded with fuscous grey; terminal black lines on interspaces. Hind wings suffused with grey; a fine postmedial fuscous line, vertical on costa, slightly sinuous below vein 7, dentate below vein 4; a broad subterminal dark grey shade followed by a fine irregular line; a black terminal line interrupted by veins. Wings below paler; black discal spots; the postmedial line more heavily marked on hind wings.

Expanse 30 mm.

*Hab.* Juan Vinas.

*Tortricodes furrina*, sp. n.

♀. Palpi upcurved, third joint slightly tufted above, brown, finely irrorated with buff. Body and fore wings brownish grey, tinged with lilacine; some paler irrorations on abdomen. Fore wings thinly irrorated with brown; lines fine, darker; antemedial line more heavily marked on costa, where it is outcurved, then wavy, vertical; postmedial line sinuous, vertical; a large black-brown spot as reniform; postmedial fine, lunular, the lunules incurved opposite cell, otherwise outcurved; subterminal line defined by narrow darker edging; terminal dark spots. Hind wings duller, not tinged with lilacine; postmedial line fine, dark, vertical, angled below vein 2; subterminal defined by darker shadings, downbent to termen below vein 2. Fore wings below paler, duller; hind wings buff-white irrorated with brown; a fine postmedial dark line; the subterminal indistinct; black discal spots, preceded on hind wings by a short dark streak in cell.

Expanse 28 mm.

*Hab.* Juan Vinas.

Fore wings without areole; veins 7-10 stalked.

*Hypena hicetasalis*, sp. n.

♀. Palpi, head, collar, and thorax fuscous grey, mottled with dull grey. Abdomen dull fuscous, the basal dorsal tuft like thorax. Fore wings grey irrorated with fuscous brown; a clearer pale grey shade along median and submedian to postmedial; antemedial brown line indistinct, chiefly noticeable on inner margin; postmedial dark brown, slightly incurved on costa, angled and inbent with a slight angle on fold, followed by a broad whitish-grey shade, biturcating to apex; a broad fuscous shade from termen

below apex to inner margin, edged below vein 5 by parallel black lines; veins terminally streaked with black; marginal greyish shadings below vein 5, interrupted by a black shade above submedian; a terminal black line, thickening at veins; cilia with a pale line at base. Hind wings dull fuscous. Wings below dull fuscous grey; faint traces of a postmedial darker line; a fine terminal fuscous-brown line.

Expanse 28 mm.

*Hab.* Juan Vinas, Banana River.

*Hypena fufialis*, sp. n.

♀. Palpi roseate brown irrorated with dark brown. Head, collar, and thorax lilacine grey. Abdomen above fuscous grey; a velvety brown dorsal tuft at base; underneath whitish buff. Fore wings: a whitish-buff shade in and just below cell, limited below by a black-brown line to postmedial; costal margin broadly lilacine with scattered brown irrorations; inner margin to postmedial similar; a small black spot at base of cell; antemedial fine, brown, indistinct, followed in cell by a small velvety black spot; a minute black dot on discocellular behind, and traces of one in front; postmedial fine, dark brown, downcurved and acutely angled at vein 6, then inbent, straight, slightly out-set at fold, followed by a whitish-buff shade from inner margin to vein 6, where it diverges to apex; a broad fuscous-brown shade from termen at apex to inner margin, expanding to termen from apex to vein 4, below which the termen is shaded with lilacine buff, with darker irrorations; a terminal fuscous line, inwardly edged with pale lunules. Hind wings fuscous grey; a terminal velvety black line; cilia buff at base, crossed by a fine darker geminate line and tipped with white. Hind wings below whitish, dusted with grey; the terminal line distinct; a dark shade on discocellular.

Expanse 24 mm.

*Hab.* Juan Vinas.

*Hypena miranda*, sp. n.

♂. Palpi, head, collar, and thorax greyish brown, the scales faintly paler tipped. Fore wings brown, slightly tinged with red medially, the lines dark reddish brown; antemedial line outbent to fold, incurved, and vertical on inner margin, where it is inwardly shaded with some whitish scales; postmedial line outangled beyond cell; a darker

line on discocellular; small subterminal dark spots outwardly pale shaded; a terminal narrow darker shade. Hind wings fuscous brown; cilia tipped with whitish. Wings below fuscous grey; no markings.

Expanse 36 mm.

*Hab.* Sixola, Banana River.

*Hypena tithonalis*, sp. n.

♀. Palpi, head, and thorax brown. Abdomen fuscous. Fore wings: basal half reddish brown, limited by the postmedial line; some dark irrorations at base; antemedial line fine, dark brown, outcurved on costa and cell, and irregularly outcurved below cell; a medial black shade, heaviest in cell and above submedian; postmedial line fine, whitish buff, inwardly edged with dark brown, slightly inbent on costal margin, faintly curved beyond cell, and very slightly outbent from median to inner margin; outer half fuscous grey, almost black; small subterminal black spots; apex and tornus shaded with grey; a terminal black line inwardly shaded with light brown; cilia dark grey, crossed by two fine darker lines. Hind wings fuscous brown. Wings below dark grey; costa of fore wings, and the hind wings, irrorated with brown; fuscous discal points; an interrupted terminal dark line; subterminal small black spots on fore wings.

Expanse 27 mm.

*Hab.* Juan Vinas.

Near *H. bergealis*, Schs.

*Hypena cæruleopicta*, sp. n.

♀. Palpi buff-brown, darkly irrorated. Head, collar, and thorax dark brown somewhat irrorated with lilacine. Abdomen fuscous grey; a dark brown dorsal tuft at base. Fore wings fuscous brown, thinly irrorated with bright blue scales; antemedial line vertical, lunular, dark reddish brown, inwardly edged with dark lilacine grey; orbicular small, black; reniform a black line, edged with pale brown; postmedial dark reddish brown, very slightly inbent, sinuous, outwardly edged with dark lilacine grey; subterminal coarse, black, somewhat macular, sinuous inversely to postmedial, outwardly edged with pale blue; cilia fuscous tipped with pale reddish brown; inner margin straight. Hind wings brownish grey; a black shade at anal angle, and one on termen at vein 2; cilia light brown. Fore wings below fuscous grey, the costa irrorated with buff and brown; traces

of postmedial and subterminal lines, the latter with black and white spots near costa. Hind wings below greyish irrorated with dark brown, the veins light brown; a fuscous discal point; a fine postmedial line; a subterminal black shade at anal angle.

Expanse 34 mm.

*Hab.* Poas, Turrialba.

*Pterhemia excissa*, sp. n.

♂. Palpi fuscous grey. Body and wings dull brownish grey, the latter thinly irrorated with dark brown. Fore wings: traces of a fine lunular antemedial line; orbicular a black point; reniform a white point; postmedial straight, inbent, consisting of a fuscous-brown shade, outwardly edged with buff and a pale brown line; a subterminal fuscous spot from above vein 5 to above 6, inwardly edged by a fine buff line which continues to inner margin; a smaller fuscous spot above vein 6, nearer termen, and a small terminal spot above 7; apex shaded with buff; a very fine terminal dark line. Hind wings: outer margin above vein 3 to costa broadly excised; costal half grey, thinly scaled; below vein 3 like fore wings, with postmedial and subterminal lines. Wings below paler, thinly irrorated with brown; a buff spot at apex of fore wings; hind wings with a dark streak on discocellular, the space beyond cell thinly scaled.

Expanse 27 mm.

*Hab.* Banana River.

*Gustiana undilinea*, sp. n.

♂. Palpi brown with pale irrorations. Body brownish grey, the abdomen paler than thorax. Fore wings brownish grey, paler on terminal third, and with darker irrorations; lines fuscous brown; antemedial inbent in cell, outcurved to submedian, and again on inner margin; a dark shade on discocellular; postmedial outcurved beyond cell, slightly inbent at vein 4, and sinuous to inner margin; a faint darker subterminal shade; terminal fuscous spots. Hind wings whitish irrorated with brownish grey, more so terminally and at apex; terminal fuscous spots. Fore wings below fuscous grey; traces of postmedial line. Hind wings below with fewer irrorations.

Expanse 22-26 mm.

*Hab.* Juan Vinas, Tuis.

*Boletobia tenebrosa*, sp. n.

♂. Body and wings fuscous faintly tinged with brown. Wings: the termen greyish buff, thickly irrorated with fuscous, leaving a subterminal clearer buff shade. Wings below fuscous grey, thickly and coarsely irrorated with fuscous brown.

Expanse 13 mm.

Hab. Sixola.

*Boletobia turpis*, sp. n.

♂. Body fuscous. Wings brown, thickly irrorated with fuscous, and with faint traces of an antemedial, postmedial, and subterminal dark line, very confused and indistinct. Fore wings: a minute lighter brown medial spot on costa, and pale points towards apex. Wings below dull greyish, more thinly irrorated with fuscous; the postmedial line slightly outbent on fore wings; the subterminal shade cut by veins.

Expanse 20 mm.

Hab. Cachi.

## LUTOGONIA, gen. nov.

*Female*.—Antennæ minutely ciliated. Palpi porrect, twice the length of head, the second joint fringed below with long hairs, the third smoothly scaled, the tips blunt. Legs smoothly scaled. Fore wings: costal margin straight, outer margin rounded; vein 3 from before lower angle; 4 and 5 from lower angle; 6 from upper angle; areole very narrow, 7 from end, 8, 9, 10 stalked; 11 free. Hind wings: outer margin slightly incurved opposite cell; veins 3 and 4 from a point; 5 from lower angle; 6 and 7 from upper angle.

Type of genus, *Lutogonia simplex*, Schs.

*Lutogonia simplex*, sp. n.

♀ Palpi, head, collar, and thorax buff-brown. Abdomen buff-grey irrorated with brown. Fore wings light brown, shaded with dark brown beyond cell to costa before apex; a broad white streak on discocellular which is oblique; a fine terminal dark line, lunular; cilia dark brown. Hind wings white; a dark terminal line, preceded by some light brown irrorations; cilia buff mottled with dark grey. Hind



wings below white, the costa darkly irrorated ; a dark discal spot ; traces of a subterminal brown shade.

Expanse 19 mm.

*Hab.* Juan Vinas.

#### UZINIA, gen. nov.

*Male*.—Palpi obliquely ascending, barely reaching above head, moderately scaled, the third joint minute. Antennæ fasciculate. Legs smooth ; fore tibiæ with longer hairs. Abdomen with dorsal tuft at base. Fore wings : costa slightly convex ; outer margin obliquely rounded ; vein 3 well before angle of cell ; 4 and 5 from lower angle ; 6 from close to upper angle ; areole narrow ; veins 7, 8, 10 from end of areole, 8 and 9 stalked. Hind wings : veins 3 and 4 from lower angle ; 5 slightly above angle ; 6 and 7 from upper angle.

Type of genus, *Uzinia hyas*, Schs.

#### *Uzinia hyas*, sp. n.

♂. Palpi and head dark brown. Collar and thorax brown. Abdomen greyish brown. Fore wings light brown, darkly irrorated, the outer margin shaded with fuscous ; antemedial line indistinct, buff-brown, inangled in cell, crossing below cell a fuscous-grey shade ; a fuscous shade along costa to postmedial ; this line finely wavy, slightly inbent, on costa buff divided by a fine dark line, from below vein 7 white with fine dark edging ; a subterminal dark sinuous line, faintly edged outwardly with white irrorations ; the terminal black line fine, edged with light brown ; cilia fuscous. Hind wings dark grey, the cilia mottled with light brown towards apex. Hind wings below white irrorated with grey-brown, chiefly on costal half ; a faint discal point.

Expanse 16 mm.

*Hab.* Esperanza, Sixola.

#### *Ocalaria pavo*, sp. n.

♀. Body dull brownish grey, the collar shaded with brown ; basal segment of abdomen buff-white, overlapped by fuscous hairs on thorax. Wings buff-white, thickly irrorated with brownish grey except along outer edge of the dentate postmedial, and inner edge of the dentate subterminal darker lines, the space between them grey-black shot with golden brown ; a marginal dark lunular line. Fore wings : an

irregular vertical antemedial dark line, inwardly pale-shaded ; a large black ocellus at end of cell edged with yellowish white, and containing a white point ; the medial line fine, dark, outcurved close around the ocellus, and immediately followed by the reniform, which is long and narrow, slightly curved, white, containing a dark line ; a round black spot at apex containing a white point on its costal edge. Hind wings : a straight dark medial line, and dark shade on discocellular, the latter partly paler edged. Wings below whiter, the lines similar but reduced ; the medial line on fore wings not reaching inner margin ; the ocellus and apical spot as above.

Expanse 28 mm.

*Hab.* Sixola.

Allied to *O. oculata*, Dr.

#### POROSANA, gen. nov.

*Male.*—Palpi upcurved, barely reaching vertex, smoothly scaled, with very short fringe on second joint below ; the third acute, one-third as long as second. Antennæ pubescent. Legs smoothly scaled ; spurs on hind tibiæ long ; abdomen short. Fore wings narrow ; veins 3, 4, 5 from lower angle ; 6 from close to upper angle ; 7-10 on long stalk, 7 from before 10 ; 11 free. Hind wings : veins 3 and 4 on long stalk ; 5 from near middle of discocellular ; 6 and 7 from upper angle.

Type of genus, *Porosana uruca*, Schs.

#### *Porosana uruca*, sp. n.

♂. Palpi, head, collar, and thorax fuscous brown ; a large white spot on thorax behind extending on basal segments of abdomen ; abdomen otherwise fuscous. Fore wings fuscous brown to postmedial line, the termen dark slate-colour ; the scales forming transverse striæ ; antemedial and postmedial lines outcurved, brownish, marked by white streaks on costa and geminate white points on interspaces ; a marginal dark brown line, inwardly edged with white, outwardly with light brown, preceded by a white spot on submedian fold ; cilia dark slate-colour, tipped with white at vein 5 and below apex. Hind wings brownish grey ; a dark discal point ; a dark brown terminal line, outwardly edged with whitish brown ; cilia partly tipped with white. Wings below silky grey ; a postmedial white streak on costa of fore wings and small

apical white shade. Hind wings: a dark discal point; a whitish subterminal line and similar shade at anal angle.

Expanse 19 mm.

*Hab.* La Uruca.

I am indebted to Mr. Dognin for a specimen of this species.

*Rhæsena darconis*, sp. n.

♀. Palpi, head, and collar yellowish buff irrorated with ochreous, sometimes browner. Thorax lilacine brown. Abdomen greyish brown irrorated with purple-red. Fore wings brown tinged with lilacine; base slightly darker; antemedial line outcurved, vaguely indicated by pale scales preceded by a rust-brown shade; orbicular annular, faintly marked; a fine, straight, lilacine medial line, outbent from costa to inner margin, broadly shaded inwardly with rust-brown; reniform faintly indicated by some dark points; a curved brown postmedial line from subcostal to vein 4, followed by some rust-brown shading; a fuscous subterminal line, inangled on vein 5; termen shaded with rust-brown. Hind wings fuscous brown. Fore wings below fuscous, the apex tinged with yellowish buff. Hind wings below partly shaded with yellow-buff and irrorated with dark brown; a small dark discal spot, postmedial line, and subterminal shade.

Expanse 22 mm.

*Hab.* Sixola, Banana River.

Near *C. lea*, Druce.

*Rhæsena melicerta*, sp. n.

♀. Palpi dark brown, points tipped with buff. Head, collar, and thorax dark brown; some light reddish-brown scales on vertex; some lilacine irrorations on collar and thorax. Abdomen above fuscous brown; some grey scaling terminally. Fore wings brown, darkest at base, medially and subterminally; lilacine blue irrorations at base, outwardly on lines, in cell medially, and on termen from vein 4 to tornus, also before postmedial on costa, beyond cell, and on inner margin; lines black, antemedial outbent, incurved between veins; postmedial lunular, twice outcurved, inangled on vein 2; orbicular and reniform indistinct, small, linear; subterminal shade expanding between veins 4 and 6, cut by a whitish streak at vein 6. Hind wings fuscous brown. Fore wings below fuscous, the costa tinged with lilacine brown; a black postmedial line. Hind wings below tinged

with lilacine, the inner margin whitish, and irrorated with fuscous brown; a dark discal spot and very distinct post-medial line; a fuscous subterminal shade.

Expanse 30 mm.

*Hab.* Sitio.

Close to *Platydia rufinalis*, Wlk., but of a different colour.

*Dercetis? plumbea*, sp. n.

♀. Body and wings leaden grey, the two basal segments of abdomen paler. Fore wings: lines thick, orange-brown; a basal line on costa and cell; antemedial very slightly inbent, mottled with black-brown scaling; a small yellow spot in cell medially close to subcostal and a streak on costa beyond it; a spot on discocellular irrorated with black-brown; postmedial also irregularly mottled with black-brown, inangled at vein 5 and slightly outcurved to submedian fold and again to inner margin; termen sinuous. Hind wings tinged with brown; a dark postmedial outcurved line and indistinct subterminal shade. Wings below paler; fore wings with a dark postmedial line; hind wings with a large black-brown spot on discocellular, preceded by a smaller spot in cell; a similar postmedial fine line and small terminal spots above and below vein 6.

Expanse 14 mm.

*Hab.* Sixola.

*Mecynoptera convergens*, sp. n.

♀. Palpi orange, mottled with dark brown outwardly. Head and collar orange irrorated with reddish brown. Thorax purple-brown. Abdomen dark reddish brown, tinged with orange terminally, and with dark grey segmental lines. Fore wings purple-brown; an outcurved darker brown antemedial line, interrupted by the annular orbicular spot; an outbent medial and an inbent postmedial dark brown shade almost meeting on inner margin; the reniform very large, outlined in dark brown; the medial line outwardly edged with white on costa; subterminal fuscous spots almost forming a line and a marginal dark shade at vein 3; an almost terminal fine dark line. Hind wings fuscous brown. Fore wings below brown; the costal margin, apex, and termen orange finely irrorated with dark brown; the inner margin white; a brown spot at end of cell; a dark postmedial line from costa to vein 4. Hind wings orange irrorated with dark brown; a dark discocellular streak and fine postmedial line.

Expanse 29 mm.

*Hab.* Esperanza.

## PÆNOMIA, gen. nov.

*Male*.—Antennæ pubescent, ciliate. Palpi upcurved, the third joint longer than second, upturned, with long tufts from its base on inner side. Fore tibiæ hairy. Wings long and narrow. Fore wings: costal margin with fold below at base, medially slightly depressed; veins 3, 4, 5 close together from lower angle of cell; 7, 8, 10 from areole, 9 stalked with 8. Hind wings: veins 3 and 4, and 6 and 7, on short stalk; 5 from near lower angle.

Type of genus, *Pænomia turpis*, Schs.

*Pænomia turpis*, sp. n.

♂. Palpi, head, collar, and thorax fuscous, thinly irrorated with yellowish scales; third joint of palpi with long tufts of whitish hairs. Abdomen fuscous grey above, underneath buff-brown, with dark segmental lines. Wings fuscous tinged with olive-brown, the markings darker, partly defined by pale edging. Fore wings: a subbasal line; antemedial vertical, slightly lunular; a medial shade; postmedial lunular, dentate, vertical to vein 5, then slightly outcurved; subterminal fine, indistinct, whitish grey. Hind wings: a line on discocellular; postmedial and subterminal broad, the latter outwardly pale-edged; terminal white points between veins on both wings. Fore wings below fuscous grey; a dark discal point; a faint darker postmedial line; a whitish subterminal line. Hind wings whitish irrorated with fuscous grey, forming postmedial, subterminal, and marginal shades, all rather broad; discal spot well marked.

Expanse 35 mm.

*Hab.* San José.

*Pænomia maculata*, sp. n.

♀. Palpi, head, collar, and thorax fuscous tinged with lilacine; third joint of palpi ringed and tipped with grey. Abdomen fuscous above with dorsal tufts, underneath whitish grey. Fore wings fuscous tinged with lilacine, the markings velvety black; a basal and broad subbasal shade, the latter expanding just above submedian, and closely followed by a very fine antemedial line, parallel to its outer edge and tinged with reddish brown above and below submedian; orbicular small, round, dull black; a geminate outcurved medial line, broken into spots from cell to inner margin; reniform large, its outer edge incurved; postmedial outcurved, consisting of small quadrate spots, followed by

smaller grey and black spots on veins ; a subterminal dentate black shade, more noticeable above vein 4 ; small black marginal spots. Hind wings fuscous brown ; some black shading and a short white line on inner margin near anal angle ; small black marginal spots. Fore wings below fuscous grey ; faint traces of a discal spot, medial, postmedial, outer, and subterminal lines. Hind wings below whitish irrorated with brownish grey, forming three lines beyond the discal spot ; terminal black spots on interspaces.

Expanse 33 mm.

*Hab.* Cartago.

*Pænomia hiempsal*, sp. n.

♂. Palpi roseate brown at base, the third joint dark-shaded, tufted with whitish hairs. Head, collar, and thorax dull olive-grey, the patagia with dark brown mottlings. Fore wings pale olive-green ; base dark reddish brown, the outer edge straight, inwardly oblique from costa, crossed by a fine oblique pale line ; the costa narrowly black ; an ante-medial black spot on costa and indistinct fine dentate brown line ; orbicular spot small, mottled brown and whitish grey ; a black medial spot and an irregular reddish-brown line, followed by a dull olive-brown shade to postmedial, enclosing the reniform, which consists of fine whitish lines, followed by a dark brown shade ; postmedial line dark brown, irregular, incurved above inner margin, followed there and on costa by a pale olive-buff shade, and some bluish-white irrorations on interspaces between veins 2 and 7 ; a large triangular fuscous spot on costa before apex ; termen above vein 5 whitish buff, with a subterminal brownish shade, below vein 5 dark brown crossed by a paler subterminal line, edged on either side with fuscous spots on interspaces ; terminal black spots. Hind wings dark greyish brown, with darker transverse medial, postmedial, and subterminal shades, more heavily marked and irrorated with bluish-white scales between veins 2 and 5. Fore wings below grey-brown ; the costa and shade beyond postmedial yellowish ; subterminal whitish, irregular ; whitish irrorations terminally. Hind wings below white irrorated with brown ; a dark discal spot and faint medial line ; postmedial lunular dentate, distinct ; subterminal somewhat geminate.

Expanse 25 mm.

*Hab.* Tuis.

*Rivula rufescens*, sp. n.

♂. Head, thorax, and fore wings brown tinged with reddish, the thorax and basal half of wings darker. Abdomen above fuscous brown; anal hairs light brown; underneath luteous, with black hairs at anus. Fore wings: a small white spot at base of costa and point subbasally above subcostal; small white spots faintly edged with black forming an irregular antemedial line; a white medial spot on costa, a fine line below it; spots in cell and below it; a point on discocellular; postmedial line also consisting of white points, outcurved, inbent opposite cell, and deeply incurved from veins 4-2, slightly outbent on inner margin; white costal spots towards apex; faint subterminal spots. Hind wings fuscous, thinly scaled in cell. Hind wings below whitish; costa tinged with yellow and thinly irrorated with brown; a dark discal point, postmedial line, and subterminal shade.

Female browner, darker, the white points less distinct.

Expanse 16 mm.

*Hab.* San José.

*Rivula nigripuncta*, sp. n.

♂. Body buff-grey, the abdomen dorsally shaded with fuscous; anal hairs brownish. Fore wings buff-grey, thinly irrorated with brown; termen brown; cilia darker buff-grey, irrorated with dark brown, forming a central line and faint oblique lines; costa finely fuscous grey on basal third, then more broadly so, interrupted by four small white spots; a fine fuscous line, almost medial, inbent in cell to small fuscous orbicular spot; two small black spots on discocellular; an apical small black spot; marginal white points. Hind wings whitish, the veins and termen fuscous; a dark terminal line; cilia fuscous tipped with white, entirely white at anal angle.

Expanse 14 mm.

*Hab.* Carillo, Sixola.

*Rivula latipes*, sp. n.

♂. Antennæ with long finely ciliated pectinations. Palpi rich dark brown, shaded below with orange-brown. Head, collar, and thorax brown; patagia irrorated with lilacine white. Abdomen fuscous above, underneath whitish on basal half. Hind tibia and tarsi thickly tufted. Fore wings dark brown; a small, lilacine, black-edged spot at base of

costa and a point beyond it above subcostal; an inbent bluish-white streak below cell; an irregular antemedial line of small lilacine spots, larger and whitish on costa; reniform very large, outlined in lilacine white, disconnected, inwardly vertical, outwardly angled on vein 7; an outer paler brown shade, twice outcurved, preceded by bluish points to vein 3, and by a white point on vein 2, with a white lunule above and below it; small white spots on costa apically, at apex, and along termen. Hind wings fuscous, the cilia mottled with luteous. Fore wings below fuscous grey; three conspicuous white costal spots on apical half. Hind wings below greyish white, the apex dark-shaded; a fuscous discal spot, post-medial line, and subterminal shade.

Expanse 22 mm.

*Hab.* Carillo.

#### PRORIVULA, gen. nov.

*Male*.—Palpi obliquely ascending; second joint heavily fringed below, reaching above vertex, third smooth, very short. Antennæ bipectinate. Wings broad, outer margins slightly rounded. Legs smoothly scaled. Fore wings: veins 3, 4, 5 equally apart from lower angle of cell; 6 from close to upper angle; no areole; 7, 8, 9 stalked; 10 and 11 stalked. Hind wings: cell long; veins 3 and 4 from lower angle; 5 from well above angle; 6 and 7 from upper angle.

Type of genus, *Prorivula leucosticta*, Schaus.

#### *Prorivula leucosticta*, sp. n.

♀. Palpi dark brown outwardly, inwardly and at base deep yellow. Head, collar, and thorax brown, the latter irrorated posteriorly with lilacine. Abdomen fuscous above, whitish underneath. Fore wings dark brown, thinly irrorated on base and postmedially with bluish grey; basal and sub-basal lilacine spots; a similar fine streak below cell to near antemedial, which is outcurved, interrupted across cell, where there is a small inset spot, the line below cell broader, whiter, not extending below submedian; some lilacine points at end of cell; postmedial consisting of fine incurved lilacine lunules; a fuscous brown subterminal shade, followed by some minute lilacine clusters of scales; cilia tipped with dark grey. Hind wings fuscous; cilia tipped with whitish grey.

A male, badly broken, has the legs smoothly scaled, the



pectinations of antennæ shorter than in *R. latipes*, Schs., and the lilacine and whitish markings are differently placed.

Expanse 18 mm.

*Hab.* Juan Vinas.

Near *R. violetta*, Schs.

CARILLADE, gen. nov.

*Male*.—Palpi porrect, second joint twice the length of head, smooth, with slight fringe above. Antennæ pubescent, ciliate. Fore legs thickly scaled; base of fore tarsi with tufts. Fore wings: outer margin obliquely rounded; vein 3 from before lower angle; 4 and 5 from lower angle; 6 from upper angle; 7 from end of areole, also 8 and 9 on long stalk; 10 from areole above; 11 free. Hind wings: veins 3 and 4 very shortly stalked; 5 from close to angle, 6 and 7 very shortly stalked.

Type of genus, *Carillade harmonia*, Schs.

*Carillade harmonia*, sp. n.

♂. Palpi outwardly dark brown irrorated with buff. Head, collar, and thorax mottled dark and light brown; a similar tuft at base of abdomen. Abdomen above fuscous grey, with paler segmental lines. Fore wings mottled dark and light brown; costa narrowly black; a subbasal black line, buff on costa, followed by a small white spot in cell; an antemedial, fine, dark brown line, geminate, angled in cell, single, and edged with whitish buff on costal margin; reniform ochreous buff, inwardly edged by a curved black-brown line; a buff shade above it on costa crossed by a fine black line inwardly edged with white, slightly outcurved beyond cell, edging reniform behind, inbent in cell and lunular to middle of inner margin, followed below cell by a broad ochreous-buff shade, thickly irrorated with white along submedian; a broad subterminal black shade from costa to vein 3, expanding towards termen between veins 4 and 3, and narrow from vein 3 to inner margin, followed by white shadings from vein 6 to apex; terminal space from vein 4 to tornus yellow-brown; a terminal thick black line, somewhat lunular; cilia fuscous brown mottled with light brown. Hind wings fuscous brown; a darker terminal line; cilia at base mottled with light brown. Fore wings below grey-brown, the costa dark brown; an oblique yellowish shade above discocellular; termen yellowish brown; a more distinct

whitish-yellow shade at apex. Hind wings below dirty white irrorated with brown, except on inner margin; a dark discal spot; postmedial shade outbent on costa, outwardly dentate above vein 7 and below 6; subterminal dark shade, interrupted, chiefly noticeable at apex, between veins 5 and 6, and at anal angle.

Expanse 22 mm.

*Hab.* Carillo.

#### EPISTREMA, gen. nov.

*Male*.—Palpi upcurved, short, reaching just above vertex; second joint shortly fringed below, third joint smooth. Antennæ pubescent, without cilia. Fore legs hairy. Abdomen with dorsal tuft at base. Fore wings: veins 3, 4, and 5 equally apart; 6 from upper angle; 7, 8, 10 from end of areole; 9 stalked with 8; 11 free. Hind wings: veins 3 and 4, also 6 and 7, very shortly stalked; 5 from above lower angle.

Type of genus, *Epistrema ora*, Schs.

#### *Epistrema ora*, sp. n.

♂. Palpi, head, collar, thorax, and basal dorsal tuft on abdomen dark brown; abdomen otherwise brownish grey. Fore wings dark greyish brown, thinly irrorated with lilacine white scales; a broad antemedial light brown shade, edged with fuscous brown and crossed by a fine dark line, slightly inbent on inner margin; a fuscous line from costa above discocellular, incurved in cell and below vein 2, followed by a buff shade, broadest on inner margin, crossed by a diffuse brownish shade, and enclosing the reniform, which is narrow and vaguely outlined in dark scales; a subterminal dark brown shade, not reaching costa and twice incurved, outwardly paler shaded; terminal dark brown semilunar spots. Hind wings brownish; terminal spots indistinct; base of cilia greyish. Wings below greyish brown, the hind wings faintly paler, crossed by medial and subterminal darker shades.

Expanse 18 mm.

*Hab.* Carillo.

#### *Hyphenodes modesta*, sp. n.

♀. Head and thorax greyish brown. Abdomen light brown. Fore wings brown, irrorated with grey on basal space, beyond discocellular, and broadly beyond postmedial line; an elongated dark brown spot filling end of cell; an

antemedial pale brown line, angled in cell and touching this spot; postmedial line light brown, vertical, almost straight; cilia fuscous, with pale brown mottlings. Hind wings dark grey, faintly tinged with brown.

Expanse 11 mm.

*Hab.* Carillo, Sixola.

*Hyphenodes dubia*, sp. n.

♀. Head and thorax grey-brown. Abdomen fuscous grey. Fore wings light brown, the costa shaded with dull grey; a dark brown streak above and below cell at base; antemedial yellowish defined by dark scaling, outangled at middle of cell, finely wavy and inbent to inner margin; a fuscous brown shade in cell from antemedial to discocellular, which is crossed by a white line; postmedial fine, yellowish white, oblique from costa to below vein 7, then vertical but wavyly incurved; a fine terminal pale line, preceded by dark shadings above and below vein 6 and below vein 3; a faint pale shade from vein 7 to apex; cilia dark brown. Hind wings pale grey, slightly darker on discocellular.

Expanse 12 mm.

*Hab.* Sixola.

This species has vein 10 stalked with 8; 9 absent, as in *Hyphenodes*, but veins 4 and 5 are stalked from lower angle of cell.

*Arrade juba*, sp. n.

♂. Palpi, head, collar, and thorax mottled light and dark brown. Abdomen whitish, irrorated with brown; a black dorsal tuft at base and brown tuft on second segment. Fore wings brown tinged with lilacine; a fuscous shade below cell, interrupted by lines and expanding beyond postmedial; a dark shade on inner margin from base to antemedial; a black basal line, outangled in cell; antemedial line remote from base, fine, black, inwardly pale-edged, twice angled on costal margin, inbent from subcostal to inner margin, followed in cell by a fuscous shade to discocellular; postmedial line light brown, becoming whitish below vein 3, finely edged with black-brown, partly preceded by a pale shade, deeply outcurved around cell, then incurved to inner margin; a subterminal light brown sinuous line, preceded by fuscous shadings; a thick, interrupted, terminal brown-black line, finely edged with light brown. Hind wings whitish, the margins shaded with light brown. Fore wings below fuscous grey. Hind wings below white; the costal margin darkly

irrorated; a spot on discocellular; interrupted postmedial and subterminal shades, the latter more heavily marked at anal angle and vein 5.

Expanse 15 mm.

*Hab.* Carillo.

*Arrade monæses*, sp. n.

♀. Palpi: second joint outwardly mottled yellow and purple-brown, third joint yellow. Head and collar white; thorax whitish shaded with lilacine. Abdomen white, with transverse grey shades. Fore wings light reddish brown, strongly shaded with lilacine and thinly irrorated with black; the basal space lilacine, limited by the fine black antemedial line which is incurved in cell, inbent from median to inner margin; a black basal line not reaching inner margin; some black scaling on discocellular; postmedial line fine, black, not so well marked as antemedial, inwardly finely edged with white; outcurved around cell, then wavyly inbent; a subterminal indistinct black line from costa, not traceable below vein 4. Hind wings white, faintly shaded with grey. Fore wings below mostly dull grey without markings. Hind wings below with a dark spot on discocellular, an interrupted postmedial line, and shade at anal angle.

Expanse 17 mm.

*Hab.* Poas.

*Leptoctenista pretiosa*, sp. n.

♂. Palpi dark brown, the third joint above and tip buff. Thorax fuscous brown. Head, collar, and patagia dark brown, mottled with buff and light brown. Abdomen above fuscous, ventrally buff. Fore wings brownish tinged with lilacine; some dark irrorations on costa; basal third in and above cell shaded with buff-white, this shade continuing as a downbent fascia to postmedial, enclosing below cell an elongate black-brown shade, slightly paler below submedian; orbicular a black point circled with white; an oblique dark shade on costa above it; reniform a white line, preceded and followed by a black-brown shade; postmedial black, outcurved, deeply lunular, partly suffusing with a broad dark shade from apex, narrowing on inner margin; a terminal coarse, wavy, fuscous line; cilia buff, slightly mottled with darker scales. Hind wings fuscous. Wings below pale buff; large fuscous-brown discal spots; outer line lunular dentate, remote from cell on hind wings; termen shaded with fuscous.—*Female.* Fore wings fuscous, irrorated with

dull lilacine-slate colour; the oblique fascia faintly tinged with brown; the black shade at base below cell smaller; orbicular and reniform small, black; the postmedial line and oblique shade suffusing with ground-colour; the termen narrowly light brown, on which the terminal line is distinct. Wings below fuscous brown, the spots and outer line very indistinct.

Expanse, ♂ 31, ♀ 32 mm.

*Hab.* La Florida, Sixola.

The female possibly belongs to another species.

#### ARTILOXIS, gen. nov.

*Female.*—Palpi porrect, twice the length of head; second joint with short fringe below; third joint short, smooth, slightly upbent. Antennæ simple. Fore wings: vein 3 before lower angle; 4 and 5 from lower angle, apart; 6 from upper angle; areole small; 7, 8, 10 from end of areole, 8 and 9 on long stalk; 11 free. Hind wings: cell short; veins 3 and 4 stalked; 5 well above lower angle; 6 and 7 very shortly stalked.

Type of genus, *Artiloxis vitiosa*, Schs.

#### *Artiloxis vitiosa*, sp. n.

♂. Palpi, head, collar, thorax, and base of abdomen whitish buff irrorated with dark brown; abdomen otherwise grey, more thickly irrorated with brown. Fore wings pale buff thinly irrorated with brown; the base and outer third tinged with yellow-brown; some black scales at base of costa and cell; some small subbasal spots; an antemedial fuscous-brown line, thickest on costa, and not reaching below submedian fold; a small fuscous-brown orbicular spot, and a similar point on discocellular; postmedial wavy, outcurved beyond cell, fine, brown, originating from a fuscous spot on costa above discocellular; subterminal defined by fuscous shades preceding it, and others following it to termen except at apex; these outer shades mottled with buff-brown from vein 4 to tornus; a terminal lunular black line; cilia with fuscous spots. Hind wings fuscous brown. Fore wings below fuscous, the costa buff. Hind wings below buff irrorated with brown; a dark discal spot, very fine medial line, and more heavily marked postmedial line; a faint subterminal shade, and interrupted dark brown terminal line.

Expanse 24 mm.

*Hab.* Sixola.

## LEPTERIA, gen. nov.

*Male*.—Antennæ ciliated. Palpi porrect, hairy, twice the length of head, fringed above with longer hairs at base. Legs smoothly scaled. Fore wings: apex acute, outer margin oblique; vein 3 near lower angle, 4 from angle, 5 near angle; 6 below upper angle; 7 and 8 from upper angle; 9 and 10 stalked with 8. Hind wings: veins 3 and 4 stalked; 5 well above angle; 6 and 7 on short stalk.

Type of genus, *Rhyncholita ? viridicosta*, Schs. (A. M. N. H. 1912, p. 202).

## UPOTHENIA, gen. nov.

*Male*.—Antennæ pubescent, ciliate. Palpi obliquely ascending, slender, smoothly scaled, acuminate. Fore wings: apex acute; outer margin oblique; no areole; veins 7–10 stalked. Hind wing: veins 3 and 4 from lower angle; 5 well above lower angle; 6 and 7 from upper angle.

Type *Megachyta acutipennis*, Schs. (A. M. N. H. 1912, ix. p. 211).

II.—*New Species of Diptera in the Collection of the British Museum.* By GEOFFREY MEADE-WALDO, M.A.

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## PART IV.

THE following paper deals principally with points in the synonymy of known species, but four species and a variety are described for the first time.

In the *Ann. & Mag. Nat. Hist.* (8) vi. p. 100 (1910), I stated that no species of *Alastor* had been recorded from tropical Africa; but two species have been recently received from Cape Colony, and are here described, so that its occurrence further north may be confidently expected.

As before, all measurements of length are from the front of the head to the apex of the second abdominal segment.

## ISCHNOCÆLIA, Perkins.

In the *Ann. & Mag. Nat. Hist.* (8) vol. v. p. 38 (1910) this genus was synonymized with *Elimus*, Sauss., but it has

since been shown by Dr. R. C. L. Perkins that the mouth-parts of *Ischnocælia* are quite distinct from those of *Elimus*, a character which was overlooked at the time. The genera may be separated as follows:—

*Ischnocælia*.

Both maxillary and labial palpi 3-jointed; maxillary palpi very short, hardly as long as joint 2 of the labial palpi.

*Elimus*.

Maxillary palpi 6-jointed, labial palpi 4-jointed.

The two species described (*l. c.* pp. 38 & 40) as *Elimus ferrugineus* and *E. robustus* are both referable to *Ischnocælia*, of which *I. xanthochroma*, Perk. (*Proc. Hawaii. Ent. Soc.* p. 32, 1908), is the type species. *Elimus mackayensis*, M.-Waldo, remains in *Elimus*.

## RHAPHIDOGLOSSA, S. S. Saunders.

*Rhaphidoglossa flavo-ornata*, Cam.

*Rhaphidoglossa flavo-ornata*, Cam. *Trans. S. Afr. Philosoph. Soc.* vol. xv. pt. 4, p. 231 (1905). ♀.

*Rhaphidoglossa punctata*, M.-Waldo, *Ann. & Mag. Nat. Hist.* (8) vol. v. p. 34 (1910). ♂.

My species, described from the male, is certainly synonymous with *R. flavo-ornata*, Cam., of which species I have received a pair from Dr. Brauns, of Willowmore. It was suggested (*l. c.* p. 35) that *R. punctata* might be the male of *R. natalensis*, Sm., which species is exceedingly closely related to *R. flavo-ornata*, but may be distinguished from it by the subtubercular process in the middle of the anterior margin of the clypeus, which is not present in any specimen of *R. flavo-ornata* which has been examined. The yellow band at the base of the clypeus of *R. flavo-ornata* is wanting in Smith's type.

Dr. H. Brauns has bred this species commonly in South Africa, and has communicated some interesting facts concerning its life-history. The species excavates its cells in dry stems with a soft pulp, chiefly Liliaceæ, and makes simple partitions, provisioning its larvæ with small larvæ of Lepidoptera. The larvæ remain sometimes, when adult, two or three years motionless without pupating. The imagines do not leave the stem in the ordinary way, but each one perforates its cell sideways.

## ICARIA, Sauss.

In the 'Genera Insectorum' (family Vespidae) Dalla Torre has given names to the sections of Saussure (Stettin. ent. Zeit. vol. xiii. pp. 133 *et seq.*, 1862). In my paper on the Hymenoptera collected by the British Ornithologists' Union's Expedition to Dutch New Guinea (Ann. & Mag. Nat. Hist. (8) vol. ix. p. 446, 1912) some new species of *Icaria* were described to which subgeneric names were applied. It is necessary for me to designate types for these subgenera, as they must now be considered. In each case the first species mentioned by Saussure in his sections has been selected.

Subgenus *Icariastrum*, D. T. (Section I., Sauss.). Type:  
*Icaria opulenta*, Smith.

Subgenus *Icarielia*, D. T. (Section II., Sauss.). Type:  
*Icaria flavopicta*, Smith.

Subgenus *Icariola*, D. T. (Section III., Sauss.). Type:  
*Icaria gregaria*, Sauss.

## SYNAGRIS, Latr.

*Synagris cornuta*, L., var. *ugandæ*, var. nov.

♂. *S. cornuta* similis, sed differt segmento secundo dorsali fascia flava ornato.

This fine insect, evidently an East-African variety of *S. cornuta*, is rendered most conspicuous by the broad pale yellow fascia at the base of the second abdominal tergite. The typical form of *S. cornuta* is subject to considerable variation in colour, some specimens being much more rufous than others; the East-African variety has the whole mesonotum black, and the first abdominal segment is rufous at the extreme base (Saussure's var. A) or else entirely black.

The horns on the mandibles of the type are well developed.

Length (to apex of second abdominal segment) 28 mm.

2 ♂♂, 2 ♀♀.

UGANDA: Entebbe (*Gowdey*), 18. viii. 1911 (type), ♂; banks of Nile, near Kakindu, 3400 feet, Aug. 1911, ♂ (mandibular horns rudimentary); Upper Buddu, W. of Victoria Nyanza, Sept. 1911, ♀. BRITISH EAST AFRICA: Ilala, Maramas District, 14 miles east of Mumias, 4500 feet, June 1911, ♀ (*S. A. Neave*). Presented by the Entomological Research Committee.

The female is similar, differing only in the usual sexual characters.



## ALASTOR, Lep.

*Alastor braunsi*, sp. n.

♀. Niger, rugose profundeque punctatus; segmentis primo (dorsali) et secundo (dorsali et laterale ventrali) anguste apicaleque flavo-fasciatis; pronoti angulis flavis; alis fuscis. Tegulis maximis, pedibus anterioribus intermediisque plerumque, ferrugineis. Segmenti mediani lateribus bituberculatis, postscutello area mediaque segmenti mediani, nitidis. Abdominis segmento secundo dorsali V-sulcato parum profundo.

Long. 9 mm.

♀. Black; the extreme anterior angles of the pronotum and narrow apical fasciæ on abdominal segments 1 (tergite) and 2 (tergite and laterally on sternite) pale yellow; tegulæ very large, ferruginous; anterior femora, tibiæ, and tarsi wholly, and intermediate and posterior femora and tibiæ partly, ferruginous. Wings fuscous.

Mandibles with four longitudinal carinæ, approximating apically; clypeus subtriangular, convex, apically truncate; pronotum truncate anteriorly, about as broad as head, widening towards tegulæ, lateral angles acute; scutellum separated from disc of mesonotum by a transverse suture and overhanging postscutellum; postscutellum shining; median segment with surface of its truncation medially shining, lateral angles produced to form two spines. First abdominal segment cupuliform; second segment somewhat constricted at base, the tergite with a broad, irregular, shallow furrow, widely V-shaped, the extreme apex of segment flat. Punctured—head, scape, thorax, and abdominal segments 1-3 coarsely and evenly, terminal abdominal segments finely. The whole covered with a fairly long and dense pale brown pubescence.

Length 9 mm.

1 ♀, 4 ♂♂.

SOUTH AFRICA: Willowmore, Cape Colony (*Dr. H. Brauns*), to whom the species is dedicated. *Dr. Brauns* informs me that the majority of his specimens of *Alastor* were caught when "bitten fast to a dry stem for night rest."

Females are rare.

♂. Strongly resembles the female, and has the clypeus black, an unusual feature in the males of this genus. The suture on the second tergite is more clearly defined in the males than in the unique female. The amount of ferruginous on the legs is subject to variation. The antennæ terminate in a hook.

*Alastor promontorii*, sp. n.

♀. Niger; angulis pronoti margine antico, segmentis primo (dorsali) et secundo fasciis apicalibus angustis, flavis. Mandibulis basi, apice clypeali, tegulis, pedibusque plerumque, ferrugineis. Alis semihyalinis.

Long. 7 mm.

♀. Black; angles of the anterior margin of pronotum laterally, narrow apical fasciæ on abdominal segments 1 (tergite) and 2 (tergite and sternite) pale yellow; clypeus at apex, mandibles (except the apex), tegulæ, legs for the most part ferruginous.

Wings fusco-hyaline. Mandibles long, 3-toothed; clypeus as broad as long, narrowly produced towards apex, truncate at apex. Pronotum truncate anteriorly; median segment subtruncate, lateral angles somewhat bluntly produced, each armed with a spine. First abdominal segment subpetiolate, as broad at apex as segment 2 at base; abdominal segment 2 cylindrical. Punctured, head and thorax coarsely, abdomen more finely.

Length 7 mm.

1 ♀, 5 ♂♂.

SOUTH AFRICA: Willowmore, Cape Colony (*Dr. H. Brauns*).

♂. Differs from the female in having the clypeus yellow, with an apical emargination, and the antennæ terminated in a hook; abdominal segment 1 subpetiolate, half as broad at apex as segment 2 at base.

## PTEROCHILUS, Klug.

*Pterochilus waltoni*, sp. n.

Niger, ochraceo-aurantiaco variegatus; capite thoraceque rugose punctatis; clypeo apice truncato; segmento mediano inermi; tegulis partim, segmentis dorsalibus 1-3 abdominis fasciis, femoribus apice tibiis tarsisque, ochraceo-aurantiacis. Alis hyalinis, costa infuscata.

Long. 10 mm.

♀. Black; a short line in the sinus of the eyes, a spot behind the eyes, anterior margin of pronotum laterally, outer half of tegulæ, irregular apical fasciæ on abdominal tergites 1-3, that on tergite 2 considerably the broadest, sternite 2 on the sides at apex, femora at extreme apex, tibiæ, and tarsi orange-ochraceous.

Wings hyaline, the costal area infuscate.

Head as broad as thorax; mandibles 5-toothed (including the large apical tooth and the basal tooth, which is very small and indistinct), furnished with long hairs on the outer side; clypeus truncate at apex, as broad as long, narrowly produced towards apex; hairs on labial palpi orange-ochraceous; pronotum truncate anteriorly, widening towards the tegulæ; disc of mesonotum with four carinæ terminating at its posterior margin; scutellum, postscutellum, and median segment rounded, unarmed.

First abdominal segment narrower than second, with a shallow longitudinal sulcus at apex. Head and thorax covered with deep, reticulate punctures; abdomen subnitidulous, with a few minute punctures; head, thorax, and abdominal segment 1 basally covered with an irregular griseous pubescence, thickest on the vertex and truncation of median segment.

Length 10 mm.

♂. Differs only in the usual sexual characters; the yellow clypeus is shallowly emarginate at apex.

TIBET: Gyangtse, 13,000 feet. Collected by H. J. Walton on the Tibet Expedition, 1903-4.

10 ♀♀, 2 ♂♂.

This striking form differs from the other species of *Pterochilus* from Western and Central Asia in the form of the clypeus, which is truncate at the apex. *P. aberrans*, *P. atrohirtus*, and *P. fuscolhirtus* all have the lateral angles acute (according to the descriptions) at the apex of the clypeus, while *P. eckloni* and *P. dalla-torrei* have the clypeus apically emarginate. In *P. crabroniformis* the median segment is laterally armed with tubercles.

#### *Pterochilus tibetanus*, sp. n.

Niger; duobus maculis postocularibus, pronoto antice, postscutello, segmentis dorsalibus 1-5 fasciis apicalibus, pallide flavis. Palpis labialibus ferrugineis. Segmento mediano inermi. Alis semi-hyalinis, costa infuscata.

Long. 10½ mm.

♀. Black; a small spot behind the eyes, the anterior margin of pronotum, postscutellum, narrow apical fasciæ on tergites 1-5, and sternite 2 on the side at apex lacteous white.

Labial palpi and hairs ferruginous. Wings subhyaline, the costal area infuscate.

Head as broad as thorax, mandibles with the teeth blunt; clypeus apically truncate, as broad as long, narrowly produced towards apex; postscutellum and median segment

truncate, surface of truncation of median segment laterally rounded.

Abdomen shining, first segment considerably narrower than second. Punctured, head and thorax coarsely, except postscutellum; postscutellum and abdomen minutely punctured. Covered with an irregular, long, pale pile, thickest on vertex and median segment.

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

TIBET: Phari (15,000 feet) to Gyangtse (13,000 feet); June 1904 (*H. J. Walton*).

6 ♀ ♀, 5 ♂ ♂.

♂. Differs from the female in having the following parts pale yellow: clypeus, scape beneath, lower part of the sinus of eye, mandibles along the outer edge, all the tibiæ on the outer side, and a spot on the anterior femora on outer side at apex. Last four joints of antennæ testaceous; last joint of tarsi and claws ferruginous.

The seventh tergite is emarginate at apex.

\* *Notes on the Vespidae of the Sjöstedt Kilimanjaro-Meru Expedition.*

Through the courtesy of Dr. Sjöstedt it has been possible to examine the collection of Vespidae made during his Kilimanjaro-Meru Expedition (1905-1906).

This collection was worked out by P. Cameron, and the results published in Sjöstedt's 'Zoologische Kilimandjaro-Meru Expedition,' Bd. ii. Abt. 8, pp. 169-196 (1910).

As is unfortunately often the case with this author, the work done is to be deplored, since it is only too evident that every insect not recognized at the first glance has been described as new.

The Vespidae are a widely spread and abundant family, and after every allowance has been made for the excellence of the localities visited, it is surely surprising to be told that of *forty-two species collected by the Expedition no less than thirty-five are new to science!*

Under the circumstances it is hardly surprising that a considerable amount of synonymy has been created.

*EUMENIDINÆ.*

*LABUS*, Sauss.

*Labus annulipes*, Cam. *l. c.* p. 182 (1910).

*Labus fragilis*, M.-Waldo, *Ann. & Mag. Nat. Hist.* (8) viii. p. 452 (1911).

*Labus maculicollis*, Cam. l. c. p. 181 (1910).

*Labus adelphus*, M.-Waldo, Ann. & Mag. Nat. Hist. (8) viii. p. 452 (1911).

*Labus crassinoda*, Cam.

*Eumenes crassinoda*, Cam. l. c. p. 181 (1910), certainly belongs to this genus.

#### EUMENES, F.

(*Eumenes erythrospila*, Cam. l. c. p. 178) = *Eumenes maxillosa*, de Geer (1773).

(*Eumenes meruensis*, Cam. l. c. p. 176) = *Eumenes lepeletieri*, Sauss. (1852).

The tubercles are present on the petiole of Cameron's type, notwithstanding his assertions to the contrary; colour distinctions are valueless in this variable species.

(*Eumenes variventris*, Cam. l. c. p. 180) = *Eumenes fenestralis*, Sauss. (1852) (type in British Museum).

#### RHYNCHIUM, Spin.

(*Rhynchium thomsoni*, Cam. l. c. p. 183) = *Rhynchium grayi*, Smith, var. with rufous markings.

The two insects agree perfectly in size and structure, and both have the clypeus apically carinate.

(*Rhynchium usambaraense*, Cam. l. c. p. 183, ♀) = ? *R. grayi*, subsp. *neavei*, M.-Waldo, Ann. & Mag. Nat. Hist. (8) viii. p. 456 (1911), ♂.

Cameron's species is certainly no more than a subspecies of *R. grayi*, and is almost certainly the female of the subsp. *neavei*, *mihii*, from Nyasaland. In colour the two insects entirely agree, and *neavei* has the apex of the clypeus without carinæ, as in *R. usambaraense*. The insect described by Cameron as the male of *R. usambaraense* is possibly that of *R. thomsoni*, in which the apical part of the clypeus is somewhat carinate.

## ODYNERUS, Latr.

(*Odynerus pulchripilosellus*, Cam. l. c. p. 186) = *Odynerus 4-tuberculatus*, Sm. (1857).

It is difficult to understand why Cameron has made such confusion in dealing with the genera and subgenera under *Odynerus*. *Ancistrocerus*, Wesm., is given both generic and subgeneric rank in two consecutive species, and the same is true of *Nortonia*, which is also placed as a subgenus of *Odynerus* and *Ancistrocerus*!

The species of *Odynerus* described as new in the results of the Kilimanjaro-Meru Expedition may be separated by means of the following key:—

- |   |  |
|---|--|
| 1. First abdominal segment with 1 or 2 transverse carinæ. (Subg. <i>Ancistrocerus</i> .) . . . . .  | 2.   |
| First abdominal segment simple. (Subg. <i>Lionotus</i> .) . . . . .   | 6.   |
| 2. Abdominal segment 1 with 2 transverse carinæ. L. 7 mm. . . . .   | <i>massaicus</i> , ♀.  |
| Abdominal segment 1 with 1 transverse carina . . . . .  | 3.   |
| 3. Larger insects, 10-12 mm. . . . .  | 4.   |
| Smaller insects, 8 mm. . . . .  | 5.   |
| 4. Clypeus black and yellow; legs mostly black; whole insect covered with long dark hair; tegulæ black. . . . .   | <i>striativentris</i> , ♂.                                       |
| Clypeus black; tibiæ and tarsi red; abdomen sparsely clothed with hair; tegulæ ferruginous . . . . .  | <i>lineaticollis</i> , ♀.  |
| 5. Pronotum ferruginous; postscutellum black. Pronotum black, anterior margin yellow; postscutellum yellow . . . . .  | <i>maculiscapus</i> , ♂.   |
| 6. Larger insects, 13-16 mm. . . . .  | 7.   |
| Smaller insects, 10 mm. and less . . . . .  | 9.   |
| 7. Totally black, wings smoky . . . . .   | <i>cnemophilus</i> , ♀.  |
| Otherwise coloured . . . . .  | 8.   |
| 8. Black; head, prothorax, postscutellum, and median segment ferruginous; wings hyaline at base, fusco-violaceous apically. Black and ferruginous; abdominal segments for most part with yellow apical fasciæ; tergites 1 and 2 with lateral, oval, yellow spots; abd. segment 2 ferruginous. Wings fulvo-hyaline, radial cell fuscous. . . . . | <i>meyeri</i> , ♀.   |
| 9. Postscutellum armed laterally with tubercles . . . . .   | 10.  |
| Postscutellum unarmed . . . . .   | 11.  |
| 10. Black, with yellow markings; scutellum with two yellow marks . . . . .  | <i>armatiscutis</i> , ♀.   |
| Ferruginous, with yellow markings; scutellum ferruginous . . . . .  | <i>pulchripilosellus</i> , ♀<br>(= <i>4-tuberculatus</i> , Sm.). |

- |  |   |
|--|---|
| 11. Abdominal segment 1 subpetiolate at apex, considerably narrower than second segment . . . . .  | 12.   |
| Abdominal segment 1 not subpetiolate, as broad apically as second segment . . . . .  | 13.   |
| 12. Black; anterior margin of pronotum and tegulae ferruginous; postscutellum and apical fasciae on abdominal segments 1 and 2 yellow; wings smoky . . . . .       | <i>rufo-4-pustulatus</i> , ♀.                         |
| Black; pronotum, scutellum, postscutellum, tegulae, and apical fasciae on abdominal segments ferruginous; wings hyaline, slightly fuscous in radial cell . . . . . | <i>curvirufolineatus</i> , ♂.                         |
| 13. Colours black and yellow; 7-8 mm. . . . .  | 14.   |
| Colours ferruginous and yellow; 10 mm. . . . .   | 16.   |
| 14. Clypeus and flagellum with some ferruginous coloration . . . . .   | 15.   |
| Clypeus yellow at base, black apically; flagellum black . . . . .  | <i>kilimandjaroensis</i> , ♀.                         |
| 15. Clypeus yellow and ferruginous; terminal joints of flagellum ferruginous beneath; scutellum and postscutellum with small lateral yellow spots . . . . .        | <i>sjöstedti</i> , ♀.                                 |
| Clypeus yellow; otherwise resembling <i>sjöstedti</i> , except in secondary sexual characters . . . . .  | <i>yngei</i> , ♂<br>(? <i>sjöstedti</i> , ♂).         |
| 16. Posterior margin of prothorax and postscutellum yellow . . . . .   | <i>meruensis</i> , ♂<br>(? <i>rotundiscutis</i> , ♂). |
| Prothorax and postscutellum entirely ferruginous . . . . .   | <i>rotundiscutis</i> , ♀.                             |

VESPINÆ.

ICARIA, Sauss.

(*Icaria africana*, Cam. l. c. p. 170, and *Icaria cariniscutis*, Cam. l. c. p. 171) are both *Icaria distigma*, Gerst. (1857).

In a short key to the three species of *Icaria* collected by the Expedition, Cameron gives points of difference in the shape of the petiole; but there is no such difference in reality. He was evidently misled by the fact that the abdomens of his two types hang at different angles from the median segment.

*I. africana* is a variety with the stigma black.

BELONOGASTER, Sauss.

(*Belonogaster erythrospilus*, Cam. l. c. p. 172) = *B. griseus*, F. (1775).

(*Belonogaster massaicus*, Cam. l. c. p. 171) = *B. dubius*, Kohl (1894), var. with ferruginous clypeus. Only inner margin of eyes yellow.

(*Belonogaster 6-maculatus*, Cam., ♂, l. c. p. 174) = *B. facialis*, Buyss., ♂ (1908).

Cameron's type, a unique male, is in very poor condition.

#### PARAMISCHOCYTTARUS, Magretti.

##### *Paramischocyttarus africanus*.

*Tanyzethus africanus*, Cam. l. c. p. 195, described as the type of a new genus, is certainly this genus. Cameron places his genus in the Eumenidinae, or solitary wasps, but there is no justification for transferring *Paramischocyttarus* to this subfamily until our knowledge of the genus is considerably greater as regards nesting-habits &c.

*Paramischocyttarus* forms, together with *Ischnogaster*, as pointed out by Colonel Bingham (Fauna Brit. India, Hymen. vol. i. p. 375), a link between the social and solitary Vespidae as regards structural characters. Dr. P. Magretti has been kind enough to examine his type of the genus and confirms my observation that the intermediate tibiae are armed with two calcaria and the tarsal claws dentate. We know from the nest-habits of *Ischnogaster* that it is social in habits; so there is every reason to expect *Paramischocyttarus* has a similar life-history.

#### ISCHNOGASTEROIDES, Magretti.

On structural characters this genus should be placed in the solitary wasps or Eumenidinae, since Dr. P. Magretti informs me that there is only one calcar on the intermediate tibia and the tarsal claws are dentate. The clypeus is strongly Eumenid in appearance according to the figure. Unfortunately nothing is known of the nesting-habits.

### III.—*Descriptions and Records of Bees*.—XLVIII.

By T. D. A. COCKERELL, University of Colorado.

#### *Augochlora (Augochloropsis) charapina*, sp. n.

♀.—Head and thorax green; abdomen shining crimson. Exactly like the Mexican *A. subignita*, Ckll., except as



follows :—Smaller (anterior wing 6 mm. long) ; mesothorax, although dull and excessively densely minutely punctured at sides, smooth and shining (tinged with golden) in middle, with the punctures well separated ; wings distinctly darker and redder, the first r. n. meeting second t.-c. a little on inner side ; inner orbits and upper margin of clypeus edged with blue ; the strong ridges of metathoracic area longer ; first abdominal segment green at base, and with a slight greenish shade across the middle. Also allied to the Brazilian *A. wallacei*, Ckll., but separated by the densely punctured scutellum. The sculpture of the second abdominal segment is intermediate between that of *subignita* and *wallacei*.

In Vachal's table this runs to the vicinity of *nitidicollis*, *multiplex*, *sympleres*, and *radians*. From *A. nitidicollis* (*Halictus nitidicollis*, Vachal), also from Peru, it differs by the closely punctured scutellum and sides of mesothorax ; from the others by the smooth relatively sparsely punctured middle of mesothorax. From *A. multiplex* it is known by the area of metathorax, which has about as many striae as that of *subignita*. The margin of the area of metathorax is thick, shining, but very finely granular. The lateral corners of prothorax form angles greater than right angles. The dark fuscous hair of the thorax above, front and vertex, as well as the outer side of the hind tibiae, separates it from some species. The tibiae are brilliant green.

*Hab.* Rio Charape, Peru, 5000 feet, Sept. 12-16 (*C. H. T. Townsend*).

*Augochlora (Augochloropsis) notophops*, sp. n.

♂.—Length about  $7\frac{1}{2}$  mm., anterior wing 6.

Brilliant shining green, including the legs, *except the tarsi, which are piceous* ; head in front and above and thorax above with coarse black hair ; face on each side of clypeus, cheeks, pleura, and sides of metathorax with inconspicuous pale ochreous-tinted hair ; mandibles (except obscurely reddish apical part), labrum, and lower margin of clypeus black ; *antennae black, not very long* ; head broader than long, eyes very deeply emarginate ; clypeus prominent, shining, golden-tinted, with strong distinctly separated punctures ; front very densely rugoso-punctate ; *corners of prothorax with acute prominent angles* ; mesothorax densely rugoso-punctate at sides and in front, in certain lights with the appearance of a longitudinal black shade on each side ; *a square space in middle of mesothorax shining, with sparse strong punctures, and dark purple, contrasting with the surrounding green* ;

scutellum densely punctured, but with a smooth spot on each side near the middle; area of metathorax with strong plicæ, formed as in *A. charapina*, but upper corners of truncation rounded (distinctly angulate in *charapina*); tegulæ green and rugulose, with a very large, smooth, purplish-piceous spot (essentially the same in *charapina*). Wings dusky, reddish; second s.m. very narrow (not so in *charapina*); first r. n. joining second t.-c. Tarsi with conspicuous ochreous hair. Abdomen smooth and brilliantly shining, with some golden tints, the punctures of the first two segments very distinct, alike, not at all dense; discs of segments with black hair; vibrissæ well developed, pale orange; second and third ventral segments brilliant greenish golden; second ventral segment with the hyaline margin very obtusely angled in middle; third with a larger median process, which is broadly truncate; fourth apparently very deeply emarginate, but the emargination filled by a hyaline plate, the margin on each side of this fringed with orange-ferruginous hair; fifth sharply keeled in the middle.

*Hab.* Rio Charape, Peru, 5000 feet, Sept. 12-16 (C. H. T. Townsend).

Closely related to *A. charapina*, but aside from the entirely different colour of the abdomen there are several structural differences which do not seem to be due to sex. In Vachal's table (Misc. Entom.) it runs to *A. notophos* (Vach.), differing apparently by the structure of the abdomen. I have seen only the female of *notophos*; it has a reddish abdomen and appears to be distinct from the present insect.

*Augochlora nigromarginata* (Spinola).

Rio Charapa, Peru, 5000 feet, Sept. 12-16 (C. H. T. Townsend).

*Augochlora (Augochloropsis) anquisita*, sp. n.

♀.—Length about  $8\frac{1}{2}$  mm., anterior wing  $5\frac{1}{4}$ .

Bright blue-green, the mesothorax with two longitudinal purple stripes; first abdominal segment largely purplish in middle, second segment with a median transverse purple patch; mandibles (except a little green at extreme base) and a large semicircular patch on lower part of clypeus black; clypeus prominent, well punctured; when the face is seen in profile the supraclypeal area is prominent, forming an obtuse angle; eyes very deeply emarginate; front and sides of mesothorax excessively densely and minutely punctured; disc of mesothorax shining, with sparse small punctures;

scutellum closely and minutely punctured; area of metathorax with fine but distinct, but short, raised ridges, the bounding margin shining; apical truncation of metathorax with obscure sparse punctures; anterior lateral angles of prothorax distinct, moderately prominent, lateral (tubercular) angles greater than right angles; antennæ black; tegulæ green, with a large piceous spot. Wings greyish hyaline, not reddish; stigma and nervures dull, rather pale yellowish brown; second s.m. higher than broad; first r. n. entering third s.m. Legs green, the tarsi piceous, the hind basitarsi with a little green. Head and thorax above with black hair, cheeks and pleura with pale hair; hair of legs mostly pale, orange-tinted on inner side of tarsi; hind spur with about four very long spines. Abdomen shining, little punctured, but first segment well punctured at sides; marginal fringe of first segment excessively short, white, the hairs microscopically plumose; fringe of second segment the usual orange vibrissæ, not very conspicuous; third and fourth segments with a fine white pruinosity and scattered black hairs; apex black; venter partly yellowish green. The posterior lateral scutellar punctures become confluent, forming little ridges.

*Hab.* Rio Charape, Peru, 5000 feet, Sept. 12-16 (C. H. T. Townsend).

Looks at first sight like a species of *Pseudaugochloropsis*. It is related to *A. electra*, Sm. (*artemisia*, Sm.), but Smith's species is larger and golden-green, with the face broader below. By the angular profile of the face it resembles *A. terrestris* (*Halictus terrestris*, Vachal), but the tegulæ are not entirely or almost entirely green and the vibrissæ do not agree well.

*Augochlora aurifera*, Cockerell.

Quirigua, Guatemala, Feb. 18, at yellow flowers of a small species of Compositæ (*W. P. Cockerell*); Antigua, Guatemala (*W. P. Cockerell*). The Quirigua form has clearer wings than the type.

*Augochlora chorisis* (Vachal).

Quirigua, Guatemala (*W. P. Cockerell*). At flowers of *Ipomæa sidæifolia*.

*Augochlora binghami*, Cockerell.

Quirigua, Guatemala (*W. P. Cockerell*). Variety with rich purple tints.

*Augochlora nigrocyanea*, Cockerell.

Quirigua, Guatemala, 21 ♀ (*W. P. Cockerell*). Six (Feb. 12) at *Ipomæa sidæfolia*; two (Feb. 20) at *Ipomæa quinquefolia*; two at *Zexmenia virgulta*. A male was taken at *Ipomæa sidæfolia*, Feb. 10. It has the head and thorax more green than blue, the colour brilliant; clypeus strongly produced, its apical margin, the labrum, and mandibles testaceous; flagellum ferruginous beneath; wings reddish. The mesothoracic punctures are considerably larger than in the female, but extremely dense.

*Augochlora seminigra*, Cockerell.

Quirigua, Guatemala, 16 ♂, 19 ♀ (*W. P. Cockerell*).

The females mostly show more green on the abdomen than the type. The male is new; it is like the female except for the usual sexual characters; the lower edge of clypeus is broadly cream-colour. Thirteen females were resting on a branch of *Solanum*. Two males and four females were at flowers of *Zexmenia virgulta*; two females were at flowers of *Pontederia cordata*, February 11.

*Augochlora urania*, Smith, var. *a*.

♀.—Middle of mandibles broadly ferruginous; wings dusky, rather greyish than reddish.

Gualan, Guatemala, Feb. 22, 1 ♀ (*W. P. Cockerell*); Quirigua, Guatemala, 7 ♀ (*W. P. Cockerell*). Of the Quirigua specimens two are from yellow flowers of a species of Compositæ; three (Feb. 20) are from *Ipomæa quinquefolia* flowers; one (Feb. 20) is from *Ipomæa sidæfolia*.

*A. urania* was described from Brazil, and there is reason to suspect that actual comparison with Smith's type might show the Guatemalan species to be distinct. There is, however, practical agreement with Smith's description, and if our bee is not a local variety of *urania*, it is at least very closely allied. At first sight *A. urania*, var. *a*, may easily be confused with *A. seminigra*, also common at Quirigua. On closer inspection it is readily separated by its broader form and coarsely granular mesothorax. It is, in fact, nearer to *A. azteca*, Ckll., which it very greatly resembles; but *azteca* has the abdomen entirely green and the anterior tibiæ clear ferruginous with a dark patch behind.

The type of *A. urania* is in the W. W. Saunders collection, presumably at Oxford, so I did not see it when examining Smith's species at the British Museum.

*Augochlora quiriguensis*, sp. n.

♀.—Agreeing with *A. nigrocyanea*, Ckll., except in being smaller (variable in size, the smallest hardly over 7 mm. long); head much narrower; head and thorax rich metallic Prussian green, the mesothorax with a more or less evident blackish shade in the middle. Wings dusky grey, without the reddish tint seen in *nigrocyanea*.

♂.—Like that of *A. nigrocyanea*, but smaller; wings clearer and not reddish; disc of mesothorax not so densely punctured.

*Hab.* Quirigua, Guatemala, 9 ♀, 2 ♂ (*W. P. Cockerell*). Four females and one male at flowers of *Ipomœa sidæfolia*, Feb. 10–12.

*Augochlora quiriguensis sidæfoliæ*, var. n.

♀.—Head and thorax black or blue-black, with green on the inner orbits; prothorax, lateral and posterior margins of metathorax, postscutellum and metathorax, or the metathorax largely black.

♂.—Head and thorax bright blue; punctures on disc of mesothorax distinctly separated; wings pale greyish, not reddish.

*Hab.* Quirigua, Guatemala, 4 ♀, 1 ♂ (*W. P. Cockerell*). Two females are from flowers of *Ipomœa sidæfolia*, Feb. 12. The male, which is possibly not correctly assigned to this variety, is from flowers of plant no. 7.

I confess to being puzzled by *A. quiriguensis*. It seems too different from *A. nigrocyanea* to be a dimorphic form or variety; yet the males, if I have associated them correctly, agree closely in structure, the only conspicuous difference being in the evidently spaced punctures of the mesothorax of *quiriguensis*. Then, again, *sidæfoliæ* looks at first very different from *quiriguensis*, but it is certainly no more than a variety.

A study of these insects in the field is necessary to determine their exact status. *A. quiriguensis* is very much like the Brazilian *A. francisca*, Schrottky, but it is a more slender insect, and the tarsi resemble the tibiæ in colour (in *francisca* dull ferruginous, with their pubescence of the same colour).

*Halictus (Evylæus) hewetti*, sp. n.

♀.—Length about 7 mm., anterior wing  $4\frac{3}{4}$ .

Black, the pale pubescence faintly tinged with ochreous;

tegulae rather large, piceous, finely punctured all over; hind spurs with numerous oblique fine teeth, rather too long to call the spur serrate. Head broader than long; clypeus short; face and front quite hairy; cheeks unarmed; antennae entirely black; mesothorax and scutellum moderately shining, very finely and quite closely punctured; scutellum depressed in middle; area of metathorax a broad band, angulate in middle, its whole surface dull black, rugulose, with strong irregular ridges; apical truncation of metathorax heart-shaped, sharply margined. Legs black. Abdomen shining, with very minute piliferous punctures, the whole surface finely pilose, the pile shining pale greyish in certain lights; lateral bases of second and third segments, and fourth slightly, with pale triangular hair-patches; discs of apical segments laterally with fuscous hair.

*Hab.* Quirigua, Guatemala, 2 ♀ (*W. P. Cockerell*).

The type carries much pale yellow pollen, of large grains, on the hind legs. Superficially very like *H. pseudopectoralis*, Ckll., from Mexico, but easily separated by the dull opaque area of metathorax. There is no close resemblance to any of the Mexican species described by Vachal and Smith. In Crawford's table of North-American species (1907) it runs to *H. glabriventris*, Crawf., from Oregon, but differs by the structure of the metathorax.

The species is dedicated to Dr. E. L. Hewett, under whose directions the ancient ruins at Quirigua were being excavated at the time when the bees were caught.

#### *Halictus townsendi*, Cockerell.

The male, hitherto unknown, was taken by Mrs. Cockerell at Antigua, Guatemala.

It is like the male of *H. armaticeps*, but rather large (anterior wing 7 mm.), with the middle and hind tibiae black except at base and apex. Owing to the colour of the tibiae, this runs in my table in Proc. Philad. Acad. 1898, p. 51, to *H. pacificus*, but the structure of the metathorax is as in *armaticeps*.

#### *Halictus adustipennis*, sp. n.

♂.—Length a little over 8 mm., anterior wing 7.

Black, including the antennae and legs, except that the tarsi are obscure reddish; tegulae shining black, well punctured all over, but so minutely that a compound microscope is needed to bring out the character well; wings orange-tinted, becoming a strong orange-fuscous in the

marginal cell, and with a diffused fuscous cloud in the apical region, beyond the marginal cell. Head broad; clypeus not produced, its upper part closely and finely punctured, the lower part (with an angular projection above in middle) dull cream-colour, depressed, shining, with only a few scattered punctures; mandibles normal, dark reddish subapically; antennæ long; sides of face with conspicuous pale hair, contrasting with the bare clypeus; front and vertex dull and minutely granular; hair of head and thorax above short, rather dull white; mesothorax dull and granular (extremely densely punctured); scutellum more shining, but finely and densely punctured; upper border of prothorax at sides, tubercles, and base of postscutellum covered with dense, pale, felt-like hair; area of metathorax poorly defined, shining but closely striatulate; posterior truncation with sharp lateral margins failing above; wing-veins all distinct, third s.m. not elongate. Abdomen dull and minutely granular (extremely densely and minutely punctate as seen under compound microscope), the bases of second and third segments broadly, and most of fourth, shining; no hair-bands, but base of third segment at sides (second also slightly), and whole of fourth (partly abraded in type) and following segments, covered with fine, ochreous, felt-like hair; apical part of venter reddish.

*Hab.* Amatitlan, Guatemala, Feb. 1912 (*W. P. Cockerell*).

A well-marked species, running in Crawford's table of North-American species nearest to *H. trizonatus*, Cresson, but with the abdomen and wings differently marked and the tegulæ punctured.

*Sphecodes patruelis*, sp. n.

*Sphecodes minor*, Cockerell, *Canad. Entom., Ang.* 1904, p. 231 (Olympia, Washington State).

♀.—Length 7 mm. or a little more.

Abdomen entirely red; tarsi, and anterior tibiæ in front, dark ferruginous; flagellum broadly chestnut-red beneath.

When this was recorded as *minor*, it was remarked that actual comparison of specimens might prove it different from Robertson's species. I now have the genuine *S. minor*, Rob., collected by Miss Eleth Cattell at Wood's Hole, Mass., and it is distinct from the north-western insect, although undoubtedly closely allied. *S. patruelis* is really more like the south-western *S. sophiæ*, Ckll., from which the female differs by the very dusky, reddish wings, and the less hairy face and front. Specimens from intermediate

localities may show that *patruelis* is a subspecies of *sophiæ*. The male of *S. patruelis* is described at the place cited above; it may be useful to add that there are five hooks on the hind wing.

*Sphecodes hyalinatus*, Schenk.

One male; Wangen, Baden, Aug. 5 (Cockerell). Hind wing with six hooks.

*Sphecodes trentonensis*, sp. n.

♀.—Length about  $5\frac{1}{2}$  mm., expanse  $9\frac{3}{4}$ .

Head and thorax black; abdomen shining rather light ferruginous red, the fourth segment except at base, and the fifth, suffusedly blackish; flagellum obscure reddish beneath; mandibles red, bidentate; face thinly clothed with white hair; clypeus sparsely but distinctly punctured; front very densely punctate, but shining; mesothorax shining, sparsely punctured, a slight median sulcus; area of metathorax shining, coarsely and strongly reticulated; tegulæ rufo-testaceous. Wings dilute brownish, stigma and nervures rufo-fuscous; second s.m. narrow, receiving first r. n. at beginning of last third; five costal hooks on hind wing; tibiæ and tarsi obscure reddish. Abdomen smooth and shining, with hardly any hair except at apex; first segment apparently impunctate, but the compound microscope shows extremely minute very widely scattered punctures; second segment at base with very few punctures, these extremely minute.

*Hab.* Trenton Falls, N.Y. (*R. Foster*). From F. Smith's collection; British Museum.

In Robertson's tables (*Entom. News*, April 1903) this runs nearest to *S. cressonii* (Rob.), but the mesothorax is much less densely punctured than in a specimen of that species received from Robertson. The same character separates it from *S. mandibularis*, Cresson, which has been considered identical with *cressonii*. I have what I consider to be true *mandibularis* from Lincoln, Nebraska, April (*L. Bruner*); it differs a little in the metathorax from *cressonii* and is possibly separable. Both *cressonii* and *mandibularis* have the abdomen more hairy than in *trentonensis*. From *S. heterus*, Lovell, *trentonensis* is separated by the brownish wings and other characters; from *S. fragariæ*, Ckll., by the red mandibles, lighter tegulæ, and coloration of abdomen; from *S. eustictus*, Ckll., by the smooth



abdomen ; from *S. nitidissimus*, Ckll., by the sculpture of the metathorax.

*Sphecodes manni*, sp. n.

♀.—Length about 7 mm.

Not very robust ; head, thorax, antennæ, and legs black, the tarsi obscure reddish at extreme apex ; abdomen shining, rather dark chestnut-red, the apical margin of the fourth segment, and most of the fifth, black or nearly so, but the black not sharply defined ; head and thorax conspicuously hoary with short white hair ; head broad ; mandibles simple, but with a slight inner angle, black, with the apical part dark rufous ; labrum moderately elongated, shorter than in *S. falcifer*, not emarginate at apex ; the basal process of labrum broad and low, coarsely pitted, its margin with extremely short yellowish hairs ; clypeus well punctured ; front extremely minutely and densely punctured ; mesothorax minutely and very densely punctured, but shining between the punctures ; area of metathorax rather small, with irregular confused wrinkles ; tegulæ pale testaceous. Wings pale greyish, stigma and nervures dark brown ; second s.m. very broad. Abdomen, except the hind margins of the segments, conspicuously and quite closely though finely punctured ; end of abdomen with white hair ; middle of first segment almost free from punctures.

*Hab.* Wawawai, Washington State, Sept. 6, 1908, 3 ♀ (*W. M. Mann*).

The finely punctured abdomen gives the species a rather peculiar appearance. Among the described species of the north-west it may be compared with *S. olympicus* and *S. columbiæ*, which are much larger and very different ; or with *S. washingtoni*, which has the sculpture of mesothorax entirely different. In the table of Maine species it runs to the vicinity of *S. prosphorus*, which has dentate mandibles and a quite different metathorax. In the New Mexico table it falls near *S. fortior*, Ckll., which is no doubt its nearest relative ; but *fortior* is larger, with the mesothorax more coarsely and less closely punctured.

In Robertson's Illinois table, owing to the characters of labrum and mandibles, the species will not run anywhere, though of Robertson's segregates it falls best in the genus *Drepanium*. The combination of mandibular and labral characters given for *Drepanium* does not hold in a series of species ; some have simple mandibles and short labrum, while the female of *S. davisii*, Rob., has bidentate mandibles and a long labrum.

*Sphecodes eustictus*, Cockerell.

The known range is greatly extended by a female from Pullman, Washington State, Sept. 13, 1908 (*W. M. Mann*).

*Sphecodes rohweri*, Cockerell, var. *a*.

♀.—Abdomen chestnut-red, with the apex suffusedly blackish; wings greyish.

*Hab.* Santa Fé, New Mexico, Aug. 1, 1902, 2 ♀ (*Cockerell*).

*S. rohweri* is known only by a single female, which agrees in structure with the Santa Fé insect, but not altogether in colour. It is possible that a valid subspecies is indicated, but more material is required. The simple mandibles separate this from *S. eustictus*, &c.

*Andrena vestali*, sp. n.

♂.—Length about 11 mm., anterior wing 8.

Rather robust for a male; black, with abundant lively fox-red hair; clypeus cream-colour, with two cuneiform marks and the narrow lower margin black; head broad; cheeks rounded, simple; process of labrum very broadly truncate, not emarginate; malar space extremely short; sides of face shining, front dull and granular; antennæ black, third joint a little longer than the next two combined; sides of vertex depressed; mesothorax closely and distinctly punctured, the spaces between the punctures moderately shining; area of metathorax dull and granular, not margined; tegulæ piceous. Apical part of wings suffusedly dusky; nervures and stigma dark reddish, stigma rather small; second s.m. receiving first r. n. a little beyond beginning of last third; the long third s.m. greatly narrowed above, so that on marginal it is less, or no greater, than lower side of second s.m. beyond insertion of r. n. Abdomen shining, rather roughened with fine piliferous punctures, the second segment depressed hardly a third; the red hair of abdomen forms a thin covering all over, and is dense at apex, but does not form bands; the ventral segments have evident marginal hair-bands. The joints of the labial palpi measure as follows in  $\mu$ : (1) 288, (2) 176, (3) 160, (4) 208.

*Hab.* Five miles east of Boulder, Colorado, on Mesa, at flowers of *Viola nuttalli*, May 3, 1912 (*A. G. Vestal*).

Superficially resembles *A. leptanthi*, from which it is quite distinct. In Bruner's table of *Andrena* it runs to *A. kincaidii*, which has a much broader head, broader clypeus, and

coarsely sculptured metathorax. In Viereck's table in Entom. News, July 1907, it runs to *A. helianthi*, which is not closely allied. In my table in Entom. News, Nov. 1899, it runs nearest to *A. rudbeckiæ*, but is quite distinct from that. I was left in doubt whether it could be Robertson's *Iomelissa violæ*, the male of which was described as without yellow face-marks, but later mentioned as possessing them. Mr. Charles Robertson kindly informs me that "of seven specimens of *Iomelissa violæ* ♂, three have no face-marks; two have a yellow dot on each lower lateral angle of the face; one has a dot on one side, none on the other; and one has a dot on apex of the clypeus." This is not at all like *A. vestali*. *Iomelissa* also has different labial palpi.

IV.—On some Features of the Structure of the Therocephalian Skull. By D. M. S. WATSON, M.Sc.

AMONGST the specimens of South African fossil reptiles sent to England by Andrew Geddes Bain in 1847 or 1851 is the back of a small Therocephalian skull, now no. 47098 in the British Museum (Natural History). The locality and horizon of this specimen are unknown, but it no doubt comes from the *Endothiodon* or *Cisticephalus* beds of Fort Beaufort or Graaf Reinet.

The skull is broken off through the anterior part of the orbits. The upper, the posterior, and part of the lower surfaces are naturally cleaned by weathering, which has in some parts cut right down into the bone.

Despite the fact that the bones are much cracked, all the sutures are clearly shown.

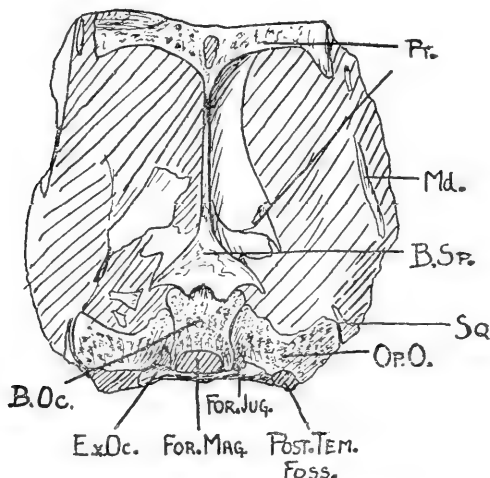
The value of the specimen depends on the fact that the structures of the base and back of the skull, hitherto quite unknown in Therocephalia, are beautifully shown.

The specimen belongs to a new genus and species of the Gorgonopsidæ, but as the dentition is not shown I do not propose to name it.

The basioccipital is so much weathered that the condyle has been destroyed. It is a small bone of oblong shape whose forward end is joined by the basisphenoid, which has a somewhat squamous and easily visible suture with it. The lateral border has a shallow notch which forms part of the border of the pit in which the fenestra ovale is lodged;

behind this it has a long smooth articulation with the opisthotic, very well shown on both sides. This suture terminates behind in the foramen jugularis, the whole of whose inner and lower border appears to lie in the basioccipital.

Fig. 1.



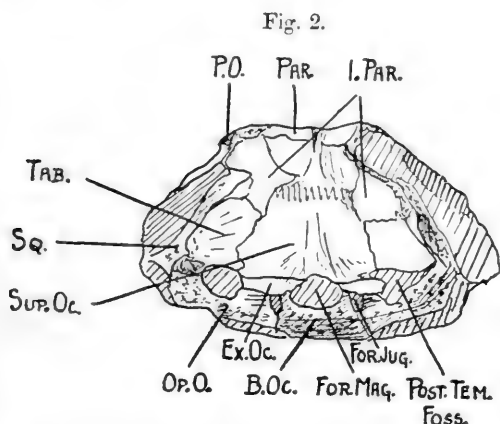
Gorgonopsid skull (B. M. Nat. Hist. 47098). Palatal aspect.  $\times \frac{3}{4}$ .

B.OC., basioccipital; B.SP., basisphenoid; EX.OC., exoccipital; FOR.JUG., foramen jugularis; FOR.MAG., foramen magnum; Md., lower jaw; OP.O., opisthotic; POST.TEM.FOSS., post-temporal fossa; Pt., pterygoid; Sq., squamosal.

The exoccipital is a very small bone on the extreme back of the skull. Its inner border forms a good deal of the foramen magnum, but it does not meet its fellow so as to exclude the supraoccipital from that opening. The bone has a small notch forming the back of the foramen jugularis, from which a suture runs outward separating it from the opisthotic. The outer end of the bone forms part of the small post-temporal fossa, and it is separated from the supraoccipital by another straight suture.

The supraoccipital is a large bone forming a great deal of the occipital plate of the skull and forming the top of the foramen magnum. On each side of this it has sutures with

the exoccipitals. Its upper border is connected by jagged suture with the interparietal and its lateral borders are overlapped by the tabulares.



The same skull as figure 1. Posterior aspect.  $\times \frac{2}{3}$ .

Reference-figures as in fig. 1, with, in addition:—I.PAR., interparietal; PAR., parietal; P.O., postorbital; SUP. OC., supra-occipital; TAB., tabulare.

The interparietal appears as a thin bone entirely on the back of the skull, whose lower border joins the supraoccipital; the sides of the bone are overlapped by the tabulares and the top of the bone overlaps the parietals.

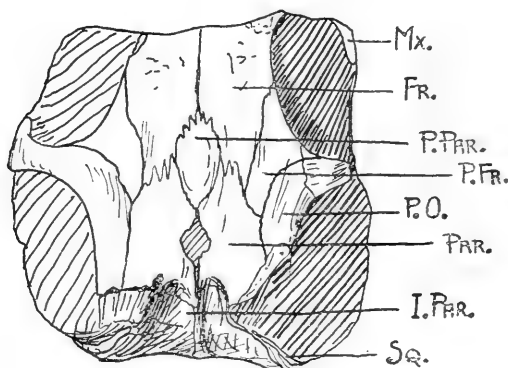
The tabulare is a thin bone overlapping the interparietal and supraoccipital and covering some of the back of the internal ramus of the squamosal. The lower end of the bone thickens and passes round the outer end of the post-temporal fossa to meet the end of the opisthotic. The lateral borders of the bones are removed by weathering in this specimen.

The opisthotic is a bone which articulates by straight smooth sutures with the basioccipital below and the exoccipital behind. It forms the posterior part of the pit, in which lies the fenestra ovale, and the outer side of the foramen jugulare. There is a powerful paroccipital process which forms the lower border of the post-temporal fossa and articulates with the squamosal and tabulare distally.

Very little of either squamosal remains. Other specimens of the same family show that in its general plan it is very similar to that of *Diademodon*, but probably lacks the groove for the external auditory meatus. The internal ramus runs upward and forward along the front of the tabulare to the parietal and postorbital, the actual junction with the latter bone being destroyed by weathering in this specimen, but clearly shown in other members of the family.

The lower end of this ramus thickens, articulates with the outer end of the opisthotic, and supports the lateral ramus, which holds the quadrate.

Fig. 3.



Same skull as the preceding figures. Dorsal aspect.  $\times \frac{3}{4}$ .

Reference-letters as before, with:—FR., frontal; Mx., maxilla; P.FR., prefrontal; P.PAR., preparietal.

The parietal is a flat bone on the top of the skull whose posterior end is bent sharply down and overlapped by the interparietal. The bone articulates with its fellow by a long median suture, which is interrupted anteriorly by the pineal foramen, which lies entirely between them. In addition the bone articulates with the preparietal, frontal, postfrontal, postorbital, squamosal, and interparietal, never entering into the border of the temporal fossa.

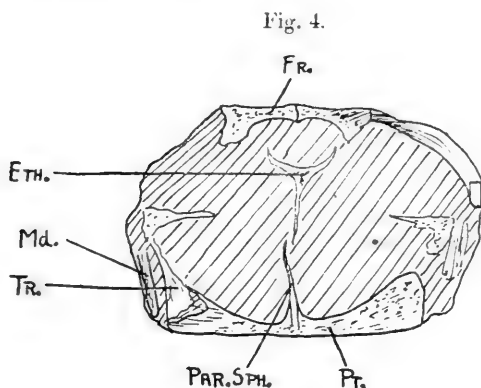
The preparietal is very clearly shown as a median lozenge-shaped bone surrounded entirely by the parietals and frontals.

The frontals are separated by suture; they are imperfect anteriorly, but articulate behind by jagged sutures with the

parietal and preparietal and laterally with the postfrontal; they form at any rate a small part of the upper rim of the orbit.

The postorbital is a large bone forming the whole of the back of the orbit and articulating below with the jugal. It has a long process running back in contact with the parietal to the squamosal. The outer edge of this bone forms the whole of the anterior and superior borders of the temporal fossa.

The postfrontal is a rather large triangular bone lying between the frontal, parietal, and postorbital, and forming a good deal of the border of the orbit. It is entirely excluded from the temporal fossa.



Same skull as the preceding figures. Anterior view of the broken front face of the specimen.

Reference-letters as before, with :—ETH., ethmoid ;  
PAR.SPH., parasphenoid.

The basisphenoid and parasphenoid are indistinguishably fused. They articulate behind with the basioccipital and send out a process which forms the outer wall of the pit which encloses the fenestra ovale. In front of this region the conjoint bone narrows very rapidly; the nearly vertical sides bear very curious basipterygoid processes, which are entirely laterally directed and apparently quite thin. The very narrow anterior prolongation of the bone which separates the pterygoids for a long distance is presumably entirely parasphenoid. There are no carotid foramina.

The posterior part of the pterygoid, which alone remains, has its inner margin in contact with the parasphenoid and basisphenoid for a considerable distance. At the back it is connected with the basiptyergoid process; underlying it, and having a dorsal ridge which passes round its end and is continued towards the quadrate region. On the left side of the skull this dorsal ridge is separated by a crack, which, I think, is not a suture; it may conceivably, however, be one, in which case the dorsal portion would be epiptyergoid. In front the two pterygoids appear to meet under the parasphenoid; they then separate to form a very small interptyergoid vacuity and perhaps meet again in front. On each side of the vacuity is a powerful process, deep but rather narrow antero-posteriorly. The outer half of this process is covered in front by the transverse bone, which rises almost vertically to the maxilla.

The ethmoid is only exposed in section on the front of the specimen; it forms a thin vertical septum articulating below with the top of the parasphenoid, and opening out above into two wings so as to form a groove for the olfactory nerves. It does not appear to reach the top of the skull.

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Where corresponding parts are present, this specimen, the type specimen of *Goryonops torvus*, and three skulls of *Scymnosuchus whaitsi* agree closely in all their important structural features.

#### SOME GENERAL CONSIDERATIONS CONCERNING THE STRUCTURE OF THERAPSID SKULLS.

##### *Homologies of Bones.*

*Interparietal.*—The interparietal occurs in all satisfactorily known South African Therapsid skulls. It seems to be in all particulars similar to the mammalian bone of the same name. It is to be remembered that in ontogeny this latter bone is paired, so that it is in every way probable that it was arrived at by the fusion of two bones. The bone agrees closely with the postparietals of the Stegocephalian skull, lying as it does dorsal to the supraoccipital and epiotics and behind the parietals. The Stegocephalian postparietal is a dermal bone which covers the upper end of the epiotic; in later types it



perhaps actually fuses with that bone, but in the very primitive *Pteroplax* it is undoubtedly distinct.

*Tabulare*.—The Stegocephalian tabulare is a dermal bone associated with the opisthotic exactly as the postparietal is with the epiotic. It always retains this articulation in Cotylosaurs wherever it is recognizable, as, for example, in *Seymouria*. In *Captorhinus* the bone called by Case the quadrato-jugal, if it really be a separate bone, is undoubtedly a tabulare having its normal relation to the end of the opisthotic; its unusual appearance here is due to the fact that, instead of forming a horizontally expanded plate, it forms a vertical one on the back of the skull, and it extends far down because the end of the opisthotic to which it is attached is bent downward, instead of pointing upwards as it does in *Seymouria* and all Stegocephalia.

The bone which I hold to be a tabulare in Therapsids occurs in Deinocephalia, Therocephalia, and Cynodontia, where it always extends down outside the post-temporal fossa to articulate with the end of the opisthotic; it lies entirely on the back of the skull, and obviously belongs to the same transverse row as the interparietal, which I have shown above to be probably homologous with the Stegocephalian postparietal.

In Anomodontia it is usually either absent or, perhaps, but improbably, indistinguishably fused with the squamosal, but it is very probable that the bone on the posterior surface of the type skull of *Lystrosaurus declivis* which Owen and Lydekker have supposed to be part of the parietal is really a very reduced tabulare.

When describing the skull of *Diademodon* I held the tabulare, which I now know to be a separate bone, to be a part of the parietal. Broom has recognized the separate nature of the bone in Cynodonts and *Moscops*, a Deinocephalian, but has called it an opisthotic, a determination which is obviously inadmissible now that we know the perfectly normal opisthotic described above and the position of the fenestra ovale in Cynodonts and of the internal ear in *Dicynodon*.

The resemblance of this bone to the pars mastoidea of the petrosal of marsupials, which is the basis of Dr. Broom's determination, is, however, so close as to suggest that that part of the bone is really separate, and that it may be found to develop as a membrane-bone, and subsequently come into contact with the cartilage bones of the periotic capsule.

*Preparietal*.—This bone is exactly similar to that of *Anomodonts*; its homologies remain obscure, but it is quite certain that it does not represent a fused pair of parietals. This is the first recorded occurrence of the bone out of the order *Anomodontia*.

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*General Discussion of the Palate.*

The specimen which is the subject of this paper agrees so closely with *Gorgonops* that we are justified in combining the well-known preorbital part of the skull of that genus with it to get a complete knowledge of the palate.

The palate of *Gorgonops* is on the whole very similar to that of *Scylacosaurus* as described by Broom. There are the same large prevomers separating very large posterior nares.

*Gorgonops* shows, however, in an exaggerated form a feature which is present in many diverse early Therocephalian genera; that the tooth-bearing edge of the premaxilla lies considerably above that of the maxilla, so that there is a step in the outline of the jaw. This curious feature also occurs in *Dimetrodon*, so that it is possible that it is a primitive feature. I think on the whole, however, that it has been independently acquired, owing to latent homoplasty, on several different lines of descent.

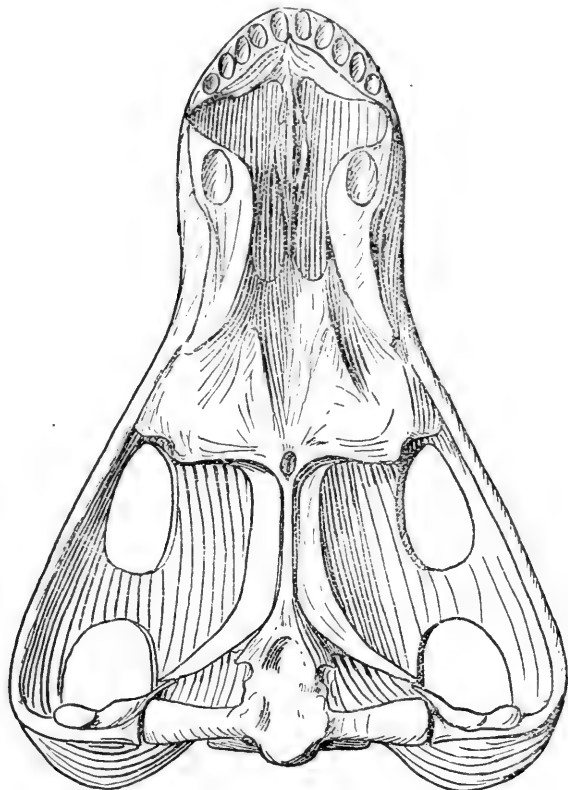
It is of great importance, because it results in the prevomers, which are directly attached to the palatal processes of the premaxillæ, being raised considerably above the level of the tooth-bearing edge of the maxillæ. This is the explanation of the fact that in mammals the palatine processes of the premaxillæ articulate with the anterior end of the vomer in such types as the dogs. Like the vomer they belong to the original primitive palate and lie above the level of the secondary plates of the maxillæ and palatines. In *Gorgonops* the lower borders of the maxillæ are somewhat approximated, so as to tend towards the formation of a secondary palatal plate. This early stage in the formation of a secondary palate by the raising of the prevomers above the level of the lower edge of the maxillæ and the incipient production of secondary palatal plates from the latter bones is exactly paralleled by *Belodon*, which shows a morphological stage in the evolution of the Crocodilian secondary palate.

Another large much-weathered Therocephalian skull\* in

\* Belonging to a different family.

the British Museum, collected by Mr. T. Bain from the *Pariasaurus*-zone of Uitkyk, Gouph, shows the extension of

Fig. 5.



Gorgonopsid palate. Figure founded as far as possible on the type specimen of *Gorgonops torvus*, restored by comparison with an imperfect skull of a Gorgonopsid (*Scymnosuchus whaitsi*, Broom?) from the *Endothiodon*-zone of Beaufort West and the skull which is the subject of the four preceding figures.  $\times \frac{1}{2}$ .

This figure should be compared with Griesbach's excellent lithographic drawings in Owen's 'Catalogue of the Fossil Reptilia of the Karroo System.'

the parasphenoid forward to meet and extend some way between the prevomers\*. The specimen described above

\* Dr. Broom has very kindly shown me the snout of a Therocephalian skull which exhibits the prevomers separated by a median bone which he determined as a mammalian vomer; so that this observation should be credited to him.

shows that the Therocephalia agree very closely with such a Cynodont as *Diademodon* in the structure and relations of the basisphenoid and parasphenoid to the pterygoids.

There thus seems to be no room left for doubt that Dr. Broom is quite correct in his contention that the mammalian vomer is homologous with the reptilian parasphenoid and that the reptilian vomers, the prevomers, are lost in the majority of recent mammals.

The skull described in this paper seems to show a rather more primitive condition of the articulation of the pterygoid with the basis cranii than occurs in *Diademodon*. There is a distinct basipterygoid process, and the connection between the pterygoids and the parasphenoidal rostrum seems not so close as in the more recent type.

One very remarkable feature of the Gorgonopsidæ is the extreme shortness of the postorbital part of the skull and its remarkable length in front of the orbit. The short cranial region is paralleled by all the Deinocephalians, Dromasaurians, and *Dimetrodon*, and seems to be undoubtedly a primitive Therapsid character.

The great elongation of the face occurs in Therocephalia, *Titanosuchus* amongst the Deinocephalia, and *Dimetrodon*; it does not occur in *Edaphosaurus*, *Moscops* and allied Deinocephalia, Dromasauria, and Anomodonts; it is noticeable that all these types with an abbreviate face are or may be herbivorous, there being no large canine in any of them except *Dicynodon*, where its occurrence seems to be a secondary sexual character. There is thus considerable reason for supposing that the elongated face, like the deepening of the maxilla, is an adaptation to the development of a powerful carnivorous dentition. It is probable that this lengthening is the cause of the enormously long prevomers and of the long region where the pterygoids are in contact with the parasphenoid in Therocephalia. The curious position of the basipterygoid process of the basisphenoid, which is dorso-ventrally flattened and laterally directed, seems to depend entirely on the reduction of all the parts of the skull which lie below the opisthotics. This reduction is progressive; it is scarcely shown in the Pelycosauria and perhaps Deinocephalia, is very marked in Therocephalia, and still more so in Cynodontia. One interesting case of it is well brought out by comparison of the position of the foramen jugulare of the Therocephalian described above with that of *Diademodon*. In the earlier type it is directed very nearly backwards and lies considerably above the level of the bottom of the

opisthotics, resembling fairly closely that of *Sphenodon*; in the *Cynodont* it opens entirely downwards on the extreme lower surface of the cranium.

Other features of the palate which deserve mention are the small interpterygoid vacuity and the absence of any suborbital vacuities.

It is certain that, although the matrix cannot be removed so as to show it, the parasphenoid lying above the level of the palate really divides the vacuity. This condition is exactly similar to that in *Anomodonts*, where the pterygoids meet below the parasphenoid, and then separate to form a large interpterygoid vacuity which is divided by the parasphenoid lying above the level of the palate. The higher *Cynodonts* show an advance on the mammalian direction in the complete obliteration of the interpterygoid vacuity and the exposure of the parasphenoid (mammalian vomer) for its whole length. The remarkable *Cynodont* type *Microgomphodon oligocynus*, which may, I think, be included in the same family with *Bauria*, has a large interpterygoid vacuity.

The condition of the parietal region of the *Gorgonopsis* skull is of great interest. The extension of the postorbital backwards to meet the squamosal, and the consequent exclusion of the postfrontal and parietal from the border of the temporal fossa, occurs also in *Deinocephalia*, *Dimetrodon*, *Dromasauria*, and *Anomodonts*; it has thus every appearance of being a primitive Therapsid character. When I described the skull of *Diademodon* I thought it most probable that it was a secondary feature; but examination of much more material, including particularly some of that in South Africa, has convinced me that Dr. Broom was quite justified in holding it to be primitive. It does not therefore follow that he is right in holding that the Therapsid temporal fossa is homologous with the lower one of *Sphenodon*. The fact that in all Diapsid reptiles except *Sphenodon* the quadrato-jugal forms part of the border of the lower temporal fossa and that in the *Deinocephalia* the squamosal meets the postorbital below the fossa, and that these two bones form a good deal of the zygomatic arch in all Therapsids, seems to me to show that the Therapsid temporal fossa is not homologous with either of those of *Sphenodon*, but is really developed in the upper temporal arcade of that reptile, being primitively bounded by the squamosal and postorbital alone. By increase

in size of the temporal fossa the parietal and jugal may enter into its border, but the postfrontal never does so. This last point is of interest in connection with the fact that in several Nothosaurians the postfrontal, although present, takes no part in the formation of the temporal fossa.

This new view of the homology of the Therapsid temporal fossa raises no difficulties and allows of the occasional production of incipient upper temporal fossæ in *Dimetrodon* and lower temporal fossæ as in the type skull of *Cynognathus crateronotus*.

The Gorgonopsidæ in the characters of their parietal region agree very closely indeed with the Anomodontia; in many other features of the skull they also present resemblances to them, and it becomes interesting to speculate on the possible relation between the two types. Typical Anomodonts of small size are known from the *Pariasaurus*-zone, and Gorgonopsids first appear, so far as is at present known, in the succeeding *Endothiodon*-zone, so that direct derivation is not possible. It seems to me most probable that they agree so closely owing partly to actual descent of primitive features to them from ancestral Therapsids and partly to the direction imposed on their evolutionary change by latent homoplasty\*.

They both agree closely in the constitution of their cranial roof with the Deinocephalia, although the preparietal is not known to occur in that group. The remarkable general resemblance between the apparent method of development of the secondary palate in Crocodiles, where in *Metriorhynchus* there is a large median vomer, and that of Cynodonts as outlined above suggests that the development of the secondary palate of Therapsids may have taken place independently on several lines of descent.

It seems to me very probable that *Bauria* is the terminal type of a completely different but parallel line of descent to *Cynognathus*. *Bauria* with a secondary palate retains large suborbital vacuities, as shown in a specimen collected by myself, which is exceedingly like *Bauria cynops*, but perhaps belongs to an allied species. The family, as shown by *Microgomphodon oligocynus*, has also a large interpterygoid vacuity †. The Permian type *Arctognathus curvimola* (cf.

\* I owe this convenient phrase to Baron Fr. Nopsca, Jun.

† Comparison of the anterior part of the dentition of *Microgomphodon*, Seeley (Phil. Trans. vol. 186 B. pl. i. fig. 4), with that of *Bauria*, Broom (Proc. Zool. Soc. 1911, p. 896, fig. 168), will render the close relation of the types certain.

Seeley, Phil. Trans. vol. 185 B, pp. 987-1018, pl. lxxxviii. fig. 1) has a lower surface which, except for the fact that it is not known to have any secondary palate, is extraordinarily like that of *Cynognathus* or *Diademodon*, especially in the fact that the interpterygoid vacuity is entirely suppressed, and the suborbital vacuities not developed.

Fig. 6.

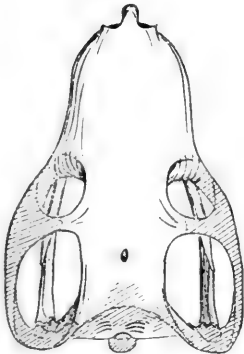
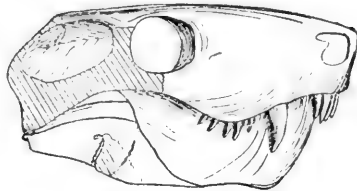


Fig. 7.



Figs. 6 and 7.—Dorsal and right lateral views of the skull of *Arctognathus curvimola* (Owen),  $\times \frac{1}{2}$ , restored from the type and only known specimen. Areas with uniform shading are completely missing on both sides of the specimen. These figures will render the lithographic drawings of the skull published by Owen more intelligible.

This type is remarkable in that it has a broad parietal region, so badly preserved, however, that its structure is not known. It shows no features which are inconsistent with a close connection with the *Cynognathidae*, using that term to include *Cynognathus*, *Diademodon*, and *Trirachodon*, for the broad cranial roof could easily be reduced to the narrow ridge of the later type.

At the same time this broad roof, in which presumably the postorbitals extend back to the squamosals, suggests a connection with the *Gorgonopsids*. I see nothing in the palate of the two types to negative such an affinity, but the extreme shortness of the preorbital part of the *Arctognathus* skull is rather opposed to it. It must, however, be remembered that in carnivorous animals after the establishment of a carnivorous dentition there is often a tendency towards an abbreviation of the face, for example, in *Felis*, *Lutra*, *Patriofelis*, and amongst reptiles *Tyranosaurus*.

The Gorgonopsids appear to have generally five upper incisors, one canine, and a variable number of cheek-teeth; in the lower jaw they may have three incisors, one canine, and cheek-teeth. *Arthognathus* has four upper incisors, one canine, and five cheek-teeth. The Cynognathids appear to have  $\frac{4}{3}$  i.,  $\frac{1}{1}$  c., cheek-teeth variable, so that as far as dentition goes these types agree.

One curious special feature of the skull of *Bauria*, the deep keel on the under surface of the basisphenoid, can be exactly matched by a large Therocephalian skull from the *Pariasaurus*-zone in the British Museum.

The relation of the family Gorgonopsidæ to the other Therocephalia is not easily decided. It agrees closely with them in the general structure of the snout, palate (except for the absence of suborbital vacuities), and occiput, and, what is perhaps more important, in the size and general relations of the quadrate. It differs in the broad and extremely short parietal region, but this difference is only due to the retention of a primitive feature. It also differs in the presence of a preparietal bone, but this may also be a primitive feature, and, moreover, it is possible that there is a small preparietal in *Syclacosaurus*.

Altogether the final conclusion seems to be that the earliest Therapsids had a skull resembling that of *Moscops* with its obvious specializations removed, and that from such a type different but parallel lines of descent gave rise to the Anomodonts and several families of Therocephalia, some of which subsequently developed into Cynodontia, *Bauria* and *Diademodon* being the terminal types of two such lines. Another of these lines became mammals. In any case, the passage from the Therocephalia to the Cynodontia seems to be so completely covered even by known types, that those two groups can scarcely be given ordinal separation from one another.

The view of Cynodont derivation outlined above differs from that shown by Dr. Broom's phylogenetic tree (Proc. Zool. Soc. 1911, p. 923) in the conception that the boundary between the Therocephalia and the Cynodontia has been repeatedly crossed, and that the actual common ancestor of the various Cynodont families (and the mammals) was most probably in a pre-Therocephalian condition when the first cleavage between the families took place.



I have to express my thanks to Dr. Smith Woodward and Dr. C. W. Andrews for their many kindnesses whilst working at the British Museum.

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V.—*Two new Australian Mammals.*

By OLDFIELD THOMAS.

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*Nyctophilus geoffroyi pallescens*, subsp. n.

A pale desert race of *N. geoffroyi*.

Size and other characters as in *geoffroyi*, but colour much paler, that of the upper surface closely agreeing with Ridgway's "drab-grey," and that of the under surface white, though the hairs are slaty at their bases. Ordinary specimens of *N. geoffroyi* are dark brown above and paler brown below.

Dimensions of the type :—

Forearm 34 mm.

Head and body (measured by collector) 49 ; tail 36 ; ear 22.

Skull : greatest length 15·3 ; basi-sinual length 11·2 ; front of canine to back of  $m^3$  5·7.

*Hab.* Alexandria, Northern Territory of S. Australia. Alt. 800'.

*Type.* Adult male. B.M. no. 7. 1. 4. 1. Original number 240. Collected 25th May, 1906, by W. Stalker. Presented by Sir W. Ingram and the Hon. John Forrest.

A Kalgurli specimen obtained by Mr. Shortridge is intermediate as regards the upper colour, but its lower surface is brown as usual.

*Phascogale murex*, sp. n.

Allied to *Ph. longicaudata*, but much larger.

Size approaching that of the larger species of the genus. Fur short, close and crisp; hairs of back about 5-5.5 mm. in length. General colour above near "Prout's brown," becoming warmer posteriorly nearly to "burnt umber." Head and sides dark mouse-grey. Under surface whitish, the bases of the hairs brown. Limbs dark mouse-colour externally, dull whitish on their inner surfaces; hands and feet pale brown. Tail with its basal inch clothed with fur like the back, the remainder short-haired, brown above and below.

Skull as in *Ph. longicaudata*, but larger throughout.

Dimensions of the type (measured on the skin):—

Head and body 197 mm.; tail 167; hind foot 35.

Skull: greatest breadth 24; nasals 16.5 × 4.6; inter-temporal breadth 7.5; palatal length 26; breadth between outer corners of  $m^3$  14.6; combined length of three anterior molariform teeth 7.9.

*Hab.* Sattelberg, German New Guinea.

*Type.* Adult male. B.M. no. 12.2.4.1. Collected by Herr O. Fritsche. Presented by the Hon. N. Charles Rothschild.

This fine *Phascogale* is readily distinguishable by its greater size from its only near ally *Ph. longicaudata*, Schleg., a native of the Aru Islands.

VI.—*Raia undulata*, *Lacep.*, and its Distribution on the British Coasts. By C. TATE REGAN, M.A.

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[Plate I.]

IN 1907 (*Annals*, (7) xx. p. 403) I placed on record the occurrence on the Cornish coast of *Raia undulata*, *Lacep.*, a species not generally regarded as belonging to the British fauna, although it was known to Couch, who described it as a variety of *R. microcellata*. The Cornish specimen, presented by the late Mr. Harcourt Powell in 1880, was the

only example of this species in the British Museum collection in 1907, but since then Mr. Boulenger has obtained specimens from Brittany, and in May of the present year Mr. J. O. Borley brought me one taken in Rye Bay, Sussex; quite recently Mr. Anthony Belt has sent for identification a photograph of another example, captured off Hastings last February; with Mr. Belt's kind permission I am using the photograph to illustrate this paper; it represents a specimen about 18 inches long and 11 wide.

*Raia undulata* is so noticeable on account of its characteristic markings, and so different in appearance from our other English Rays, that it is difficult to believe that it occurs regularly on our southern coasts and has hitherto been overlooked; the alternative is to suppose that it has extended its range to the coast of Sussex only in the last few years.

*R. undulata* is closely related to *R. clavata*, differing especially in coloration and in the greater smoothness and more rounded form of the disc; the teeth are not quite the same and are nearly alike in both sexes; a full description follows.

#### *Raia undulata.*

*Raia undulata*, Lacep. Hist. Nat. Poiss. iv. p. 675, pl. xiv. fig. 2 (1802); Müll. & Henle, Plagiostom. p. 134 (1841); Duméril, Hist. Poiss. i. p. 538 (1865); Moreau, Poiss. de France, i. p. 434 (1881).  
*Raia mosaica*, Lacep. l. c. pl. xvi. fig. 2.

Disc broader than long; anterior margin slightly undulated; extremity of snout projecting as a short process, broadly rounded in the young, pointed in the adult; outer angles of pectorals rounded. Vent nearly equidistant from tip of snout and end of tail (adult) or nearer the former (young). Length of snout (præocular) about  $\frac{1}{5}$  the width of disc; interorbital width  $2\frac{1}{4}$  (adult) to  $2\frac{3}{4}$  (young) in length of snout, about equal to length of eye and spiracle; diameter of eye  $1\frac{1}{3}$  to 2 in interorbital width. Internasal width  $\frac{2}{3}$  to  $\frac{3}{4}$  (young) or more (adult) of distance from end of snout to fold connecting nasal valves. Teeth close-set, keeled, the middle ones small, pointed in adults; 36 to 48 rows in the upper jaw. A border of asperities along anterior margin of lower surface, not extending to angles of pectorals, present except in very young; lower surface otherwise quite smooth; upper surface nearly smooth in

very young, but except in these spinulose on tail, near middle line of disc, and near its anterior margin. 1 or 2 spines in front of and behind each eye; usually 1 or 2 pairs of scapular spines; a median series of spines numbering from 22 (young) to 60 (adult) from head to first dorsal fin; usually 1 or 2 spines between the dorsals; adult with a short series of spines on each side of anterior part of tail. Brown, orange, or yellow, with blackish or brownish undulating stripes, usually margined by series of small white spots; larger white spots scattered on disc; underside white, in the young sometimes dusky on tail and at margins of disc.

This description is based on the examples in the British Museum collection, 8 in number, from Brittany, Cornwall, and Sussex, measuring from 275-800 mm. in total length. According to Moreau, the species attains a length of 1200 mm. and is found on all the coasts of France, Mediterranean, Atlantic, and Channel\*.

Moreau has evidently seen a good series of specimens; he says that in large fish the scapular spines may be wanting and the median series may be confined to the tail. As to coloration, the white spots may be absent, and in adults the stripes may be indistinct and the spots, if present, greyish; he has seen a young male with the whole lower surface blackish.

In the following table are given measurements in millimetres: A, width of disc; B, length from snout to vent; C, length from vent to end of tail; D, length of snout; E, diameter of eye; F, interorbital width; G, præoral length (to fold connecting nasal valves); H, internasal width. In I is given the number of teeth in the upper jaw and in K the number of spines in front of the dorsal fin.

	A.	B.	C.	D.	E.	F.	G.	H.	I.	K.
♂. Cancale . . . .	500	400	400	95	22	42	75†	65†	46	60
♂. Cornwall ..	295	195	..	55	15	21	53	37	38	..
♂. Rye Bay ..	245	170	200	50	12	17	45	28	40	23
♂. Roscoff . . . .	200	140	160	40	11	15	37	24	36	22

\* Günther. Cat. Fish. vi. p. 459, refers a young male from Madeira to this species; but this is an error, the specimen being an example of *R. asterias*.

† Owing to distortion of mouth and snout these figures are approximate only.

VII.—Notes from the Gatty Marine Laboratory, St. Andrews.  
—No. XXXIV. By Prof. M'INTOSH, M.D., LL.D.,  
F.R.S., &c.

[Plates II. & III.]

1. On *Pionosyllis alternosetosa*, De St. Joseph, and its relation to *Syllis armillaris*, O. F. Müller.
2. On the British *Maldanidæ*.
3. On the *Maldanidæ* dredged in the 'Porcupine' Expeditions of 1869 and 1870.
4. On the *Maldanidæ* dredged in the Gulf of St. Lawrence, Canada, by Dr. Whiteaves.
5. On the *Maldanidæ* procured by Canon Norman in Norway.

1. On *Pionosyllis alternosetosa*, De St. Joseph, and its  
relation to *Syllis armillaris*, O. F. Müller.

CONSIDERABLE doubt was felt in regard to certain Syllids, such as *Pionosyllis alternosetosa* and *Syllis brevicirrata*, in the Ray Society Monograph; and further examination has shown that the former is only *Syllis armillaris*, which is common on the shores of the Channel Islands—not very distant from the region at which De St. Joseph worked, and which appears to have been unfamiliar to him and also to Major Elwes at Torquay. There is no character, indeed, by which the one may be separated from the other, and in this view Mr. R. Sothorn, who is doing excellent work on the Polychæta of Ireland, agrees. In comparing the two forms the external coloration is the same. The head, palps, eyes, and tentacles are identical, and the presence of an additional eye-speck or two in the southern form is of secondary importance. The same structure is found in the proboscis, proventriculus, and the rest of the alimentary canal. The cirri have the same arrangement in both, those with more numerous articulations being confined to the anterior region, and in both forms they are carried alternately horizontally and erect. The foot has a like structure in both (*cf.* Ray Soc. vol. ii. pt. 1, pl. lxx. fig. 14, and vol. ii. pt. 2, pl. lxxvii. fig. 12). About a dozen of the anterior bristle-tufts have longer terminal pieces, and the same feature is noticed in those of the caudal segments. The typical bristles in each have the same structure (*cf. op. cit.* pt. 2, pl. lxxx. figs. 8 & 9, and pl. lxxxvi. fig. 3).

It may be noted that De St. Joseph correctly draws attention to the presence of a simple dorsal bristle in the terminal

feet of his *Pionosyllis alternosetosa* thus :—" dans le 9 à 14 segments postérieurs, et il vient s'y joindre aux sept derniers segments une soie simple dorsale, fine, un peu courbe, sans crochet terminal." These simple bristles occur equally in *Syllis armillaris* and have precisely the same structure and arrangement. They are not compound forms which have lost their tips, but are comparatively stout, simple, curved bristles which taper to a point.

In regard to *Syllis brevicirrata*, besides its alliance with *Syllis gracilis* it has certain close relationships with a variety of *Syllis armillaris*.

## 2. On the British Maldanidæ.

Much has been done since the days of Savigny for this group, especially by the elder Sars, Cuvier, Milne-Edwards, Grube, De Quatrefages, Claparède, Malmgren, Ehlers, Wirén, Tauber, Verrill, Parlin Johnson, Moore, Treadwell, De St. Joseph, Fauvel, Racovitza, Lo Bianco, and others; but in regard to the arctic and Scandinavian forms the recent treatise of Arwidsson surpasses all previous publications in its extent and in its detailed treatment of each species, and the accompanying figures are also excellent. Thus, whilst Malmgren had only nine northern species (1867), Arwidsson has twenty-seven named, and five unnamed under two genera. The following is a preliminary account of the forms hitherto met with in Britain, and various changes and additions will probably soon occur, especially from the western waters of Ireland and the southern waters of England\*.

The only species of this family entered by Dr. Johnston in his 'Catalogue of Worms in the British Museum' † is *Clymene borealis*, a form which from Dalyell's description and habitat probably refers to *Nicomache maculata*, Arwidsson. Yet the specimen in the British Museum has some resemblance to *Clymene ebiensis*, Aud. & Edwards, and the example was dredged in the North Sea off the Shetland Islands. In the Supplement to the above work a second species is entered ‡, viz. *Clymene lumbricalis*, Aud. & Ed., which is described as having the head-plate broad, projecting from the sides, and the papillæ of the funnel thirty-six in number, alternately longer and shorter. Of this form two examples are in the British Museum, the first of which is referred to

\* The present is only a preliminary notice of the family.

† P. 233.

‡ P. 345; Cuv. Règne An. éd. Crochard, Annél. pl. xxii. fig. 2.

in the Catalogue and was dredged in mud in deep water off Cumbræ by Dr. D. Robertson. It appears to be an *Axiiothella*. The second (also called *Clymene lumbricoides*) was procured by Laughrin in 40 fathoms off the coast of Cornwall. In this the posterior margin of the cephalic rim has very few crenations, and two papillæ occur in the central line in front. It also resembles an *Axiiothella*.

Since the date of the Catalogue various species have been added to the British fauna by the expeditions of Dr. Gwyn Jeffreys. Messrs. Cunningham and Ramage mentioned *Nicomache lumbricales* = *N. maculata*, Arwidsson, and *Axiiotheca catenata*, both of which had long been familiar.

No mention of the family occurs in the Plymouth list of 1904, but two are entered by Major Elwes in the littoral fauna of Torquay, viz. *Clymene ærstedii* (?), Claparède, and *Leiochone clypeata*, De St. Joseph.

The first example of the group is *Rhodine loveni*, Malmgren, which was dredged off the Hebrides by Dr. Gwyn Jeffreys in June and July 1866; whilst abroad it occurs in Swedish waters and the Atlantic coast of the United States. As, however, only fragments have been procured in the British seas, the following summary is partly drawn from Arwidsson's\* description.

The head is bluntly conical in front, forming a short cone when viewed from the dorsum and a flattened beak when seen laterally. The nuchal grooves run forward by the side of the short keel and then curve outward and slightly backward to the margin. When the proboscis is partly extruded it forms a larger anterior and a smaller posterior region, each with papillæ. The body is about  $4\frac{1}{2}$  inches in length, and may have forty bristled segments, the first of which is not separated from the peristomial and is comparatively long; the second is shorter, and so with the third and fourth. These bear only bristles. The fifth and sixth are nearly equal in depth and bear in the middle bristles and hooks. The eighth has its foot rather in front of the middle, whilst in the connate eighth and ninth segments the foot is near the segment-junction. The segments 11 to 15 are nearly equal, with the foot near the posterior border of each; but the sixteenth and seventeenth are longer, the latter being nearly twice as long as the eleventh. The last bristled segment ends in a free collar, from the centre of which a short segment with a constriction posteriorly projects, the region beyond expanding into the smooth anal cup with its central

\* 'Studien über die skandinavischen u. arktischen Maldaniden.' Upsala, 1906.

vent. Skin-glands abound throughout the body, forming considerable and symmetrical areas anteriorly. Double hook-rows occur from the fifth to the fifteenth, and the hooks gradually increase from forty to sixty, the maximum being reached in the sixteenth, and thereafter they diminish to six in the fortieth segment in a large example. The capillary bristles form two groups in each segment from the first to the ninth; the bristles of the anterior or first tuft have fairly broad wings and a tapering tip. About the tenth segment are bristles with a bolder curve and somewhat narrower wings. The posterior group consists of longer forms with a very narrow wing and finely tapered tip. The typical hooks have a comparatively short shaft which dilates as it passes upward, the head being curved backward at a considerable angle to the shaft, and the neck is broad. The posterior outline presents a process or spur, and above the large and sharp main fang are a series of smaller teeth which diminish in size superiorly. The anterior edge has a concavity below the fang, then a pointed process slanting to the great fang, and an incurvation below it, followed by the blunt process from which the ventral border passes with a very slight curve. Arwidsson finds fault with the figure in the 'Transactions of the Royal Society of Edinburgh'\*, but that was drawn by aid of the camera lucida. Any peculiarity therefore is due to nature, and affects the rounded prow at the ventral end of the shaft, which he shows somewhat less rounded. A reference to the preparation demonstrates that the early figure is accurate, the ventral line presenting little curvature behind the prow. Whether a closely allied but not identical form therefore exists in the Hebridean seas is a possible question, but so far as the hooks go there may be only variation. The fragments secured are so indefinite that they are useless for minute discrimination. The tube of secretion and mud is somewhat small, rather soft, and varies a little according to size.

The second species is *Nicomache maculata*, Arwidsson †, a form frequently confounded with the more northern *N. lumbriculis*, O. Fabr. It is abundant between tide-marks at St. Andrews, and indeed appears to occur all round the British shores. The anterior end is somewhat bluntly truncated, rounded in the living form, but in the preserved condition it presents inferiorly a somewhat shovel-shaped short

\* Trans. Roy. Soc. Edin. vol. xxv. pl. xv. fig. 16.

† Proc. R. Irish Acad. vol. xxix. p. 209 (1911).



projection. Viewed from the front the pigmented peristomial segment terminates dorsally rather abruptly, the pale cephalic keel passing downward and forward from this and being lost on the symmetrically expanded snout on each side. The nuchal grooves occupy the sides of the ridge and curve outward at their anterior ends, and the madder-brown pigment in its symmetrical disposition often mimics an eye on each side. The minute eye-specks, however, are situated in a row on each side of the anterior border, between the tip of the nuchal groove and the ventral edge. The fusion of the pro- and peristomial segments is close, and both would seem to take part in the formation of the anterior process, for the symmetrical furrows from the mouth occur on its under surface. The mouth forms a transverse furrow posteriorly, whilst in front a median and two lateral furrows pass forward to the snout. In examples in which the head has been recently regenerated the parts are pale, the anterior process or prow is shorter and has a median dimple.

In contrast with the foregoing the snout in *N. lumbricalis* is less produced anteriorly, a condition very evident in a lateral view (Pl. II. fig. 8). Moreover, antero-posteriorly *N. lumbricalis* has a more rounded and less elevated crown, whereas in *N. maculata* the crown is higher and narrower. There is no specialization of pigment in separate touches as in *N. maculata*, though the dorsal half is reddish brown and the lower whitish. The nuchal grooves in *N. lumbricalis* have a similar trend to those of *N. maculata*, curving gently outward and separated by a flattened ridge. The snout in the large Canadian *Nicomache* (?) (Pl. II. fig. 4) diverges still more, for behind the median ridge is a deep fold of the segment, the ridge itself commencing by a rather broader base, and, slightly narrowing, slopes downward and forward to within a short distance of the anterior edge. In lateral view the middle is convex. The nuchal groove closely follows the somewhat narrow ridge, and thus they converge, since the ridge itself is narrower in front. The groove turns sharply outward on each side, making a small angle with the main furrow, and thus differs from either *N. lumbricalis* from Northern Europe or *N. maculata* from Britain, in both of which the curve is bold and rounded.

Immediately behind the mouth is a transverse furrow, indicating the anterior border of a narrow segment devoid of bristles. It is marked by a distinct band of pigment on the dorsum, an interval separating it from that at the anterior border of the peristomial segment. The next three segments are each distinguished by having dorsally a tuft of bristles

and ventrally a single powerful golden spine close to it on the ventral side. The dorsal tuft consists of a few capillary bristles with tapered tips, some of the longer and more delicate tips having opposite spikes. The ventral division has a single spine or two of a fusiform outline, the tip tapering to a strong and rather blunt point of a deep yellow colour by transmitted light. The central and inferior regions are closely striated and in some marked by transverse lines, and the fine striæ pass upward almost to the tip. Powerful muscles are attached to the spine, sloping from the base of the organ obliquely outward. The three sets of hooks or spines project prominently outward each on a papilla almost midway between the dorsal and ventral borders.

Dorsally the anterior end in *N. maculata* is pale, with madder-brown specks, or speckled with white on a brownish ground. A transverse S-shaped figure of white occurs on the snout dorsally, the ends meeting in the middle line. The fourth bristled segment is often crimson, whilst in others the whole anterior region is so. The general hue of the body behind is dull orange, marked dorsally by the median blood-vessel. Most show a tendency to a whitish belt between the seventh and eighth segments. The anal funnel is dotted with whitish grains internally. Those at Lochmaddy had a dark brown snout, this tint fading into straw-colour posteriorly at the anal funnel. The latter has a series of short and somewhat triangular processes or cirri nineteen to twenty-one in number and of general uniformity, though variations occur, one example presenting a continuous series of eight or nine smaller cirri. The cup slopes evenly to the centre, in which is the anus. Viewed laterally the dorsal slope of the funnel is the shorter. In front of the anal funnel are two narrow rings. The bristles are in a double group, a ventral series of stronger capillary bristles with wings and a dorsal of more slender finely tapered forms with opposite spikes and a smooth shaft. The first three bristled segments have a dorsal series of the usual kinds, and a short distance beneath a single strong spine, which appears to be of special service to the annelid in its movements of extension beyond the tube. The strong sharp point would instantly anchor the body by impinging on the tough lining of the tube or other hard surface externally. The fourth and fifth feet also occasionally have two of the strong spines, and the former has a few hooks which differ from the typical form behind in the greater proportional size and elongation of the great fang and the upright position and blunt condition of the spikes on the crown. The fifth foot has a larger number

of hooks. As a rule the spines rarely extend beyond the fourth foot. The gular tuft is close to the base of the great fang in such hooks, and the general outline of the neck, shoulder, and the shaft (which is short) differs from the type. In the sixth and seventh segments the bristles and hooks are anterior, and there is no furrow between the seventh and the eighth. In the following segments the bristles and hooks are posterior, and they continue so to the fourth segment from the end of the series. The last three are short segments, and they bear their bristles and hooks in the mid-lateral region. Most show a single ring between the last bristled segment and the anal cup, but one shows two. The bristles of the last segments consist of rather strong capillary bristles, with distinct wings and tapered tips devoid of spikes, and a few more slender forms with long, fine, hair-like tips and opposite spikes.

The typical hook differs from that of *N. lumbricalis* or Arwidsson's var. *borealis*. The great fang makes a smaller angle with the neck, and five teeth occur on the crown above it. The backward inclination of the neck is as great as in var. *borealis*, but the neck is longer and the shoulder beneath it is, perhaps, better defined. The gular tuft is separated from the great fang by an interval as great as in var. *borealis*. The hooks form a single row in each case, the rows being short in the anterior segments, but at the seventh bristle-tuft each lies in the centre of a long, elevated, glandular mass on the ventral surface, those following gradually becoming ventro-lateral in position and separated from each other by a groove in the mid-ventral line. The hooks project from the surface, and thus give most efficient anchorage when in action. By the elevation of the pads the hooks in projection form a curved ridge of golden points, and in life this can always be accomplished by muscular agency. When loosened in their surroundings they entangle delicate forms like the Ampharetidæ, and it is difficult to remove these without rupture.

In the large example of *Nicomache lumbricalis* procured by the 'Valorous' Expedition in 1875 the neck of the hook is shorter and more uniformly broad, the striæ are confined to the distal or basal region, the great fang makes a larger angle with the neck, and only three teeth are usually visible on the crown in lateral view and they are more erect. This hook makes a close approach to Arwidsson's var. *borealis*. The large Canadian species, again, has a hook which shows a much longer shaft, longer neck which widens distally at the striated region; the great fang has a similar (right) angle

with the neck, and two teeth and traces of a third occur on the crown, those in the front of the body being considerably altered, and there are no gular bristles.

The variety of *Nicomache maculata* with four spine-bearing segments and the pigment on the head simulating eyes approaches Arwidsson's *Nicomache quadrispinata*. Few examples are collected in a perfect condition, and regenerated anterior and posterior ends are common. The intestine is filled with the greyish mud of its habitat, containing sand-grains, sponge-spicules, diatoms, radiolarians, and other débris.

The third British form is *Proclymene mülleri*, which was dredged in 78 fathoms off the Outer Skerries in 1868 by Dr. Gwyn Jeffreys, and which also was found by Prof. G. S. Brady off the coast of Northumberland. In this the head is distinguished from that of *Praxillura* by the narrow rim of the cephalic plate, a condition which renders the anterior process of the keel prominent. The plate slopes from behind forward and downward, and terminates anteriorly in the median process, which is as well developed as in *Praxillura prætermisssa*, but, instead of being bounded by the fissure between it and the cephalic rim, it is continuous at its base with an accessory fold on each side within which the anterior curve of the nuchal organ is situated. Arwidsson\* makes no differentiation of the base of the anterior process, so that something depends on the preparation if variation does not occur. From the median process a short and narrow keel passes backward, but it does not reach the middle of the cephalic plate. On each side of the keel is the short though deep nuchal groove, which terminates anteriorly by curving outward and being lost behind the accessory fold on each side of the central process. The rest of the surface of the cephalic plate is smooth. The margin of the slightly hollowed cephalic plate is comparatively thick, but is little elevated, and, though slightly crenate, it has no distinct notch; yet in the preparation a shallow groove runs from one of the crenations in the mid-lateral region, and also extends to the first bristled segment. The fused prostomial and peristomial region is narrow dorsally but wide ventrally, and has the mouth as a somewhat triangular opening beneath the median process, which is grooved by the anterior depression from the mouth. The posterior lip is transverse and prominent.

\* Skandinav. u. arktische Maldan. Taf. iii. fig. 93.

The body is rounded dorsally, slightly flattened ventrally, and marked by a ventral streak. Arwidsson gives 165 mm. as his longest example. The largest British form is imperfect, consisting of eleven anterior bristled segments, and it measures 70 mm., so that it would not be much shorter than Arwidsson's. The characteristic funnel was dredged by Dr. Gwyn Jeffreys 10 miles off Balta in 60 fathoms, having been severed close to the base, no trace of the adjoining segments remaining. Twenty-eight of the shorter, conical, flattened cirri, which are flexible and comparatively large, occur on the margin, a slightly convex portion occupying the rim between the two longer on each side of the mid-ventral line. Each of these longer forms has a larger flattened base than the ordinary cirrus, and the tip is filiform, with a probe-point. Fine lines radiate from the central anal opening, but they are much more numerous than the notches between the cirri. A slight ridge passes from the low anal cone to the mid-ventral line, and outside, in front of the anal cone, is another ring. As regards colour, Arwidsson mentions that the fourth and fifth bristled segments are dotted with yellowish-red points, and the sixth with more distinct touches.

The first bristled segment is narrow and carries laterally a strong spine or two and a tuft of short bristles near its anterior border. The space has a striated central region, increases in diameter from the base to the shoulder, and then diminishes to the hard golden point. The second bristled segment is longer, has a fold toward its anterior border, behind which (fold) the spine or spines and bristles are placed. The third segment is slightly shorter, has its fold somewhat nearer the segment-junction, and also bears a spine or two and bristles on each side immediately behind the fold. The fourth segment is similar in regard to the bristles and spines, and they are placed near the anterior third. A change occurs in the fifth bristled segment, in which a short row of hooks is found in a pit on the ventral surface on each side close behind the segment-junction, and the same occurs in the sixth and seventh bristled segments. The eighth presents elevated glandular ridges at the anterior border for the hooks, the bristle-tuft being at the dorsal end, and so with the ninth segment. The tenth foot is somewhat peculiar in position, appearing at what seems to be the segment-junction. The eleventh, however, is clearly at the posterior end of the segment, which in this case was the end of the fragment.

The setigerous process bears a group of powerful golden

capillary bristles, which have a nearly cylindrical shaft and a tapered tip with well-marked wings, and a few slender translucent forms which taper terminally without traces of wings (the anterior of Arwidsson). The hooks, which commence on the fifth bristled segment, are distinguished by their great size, the length and curvature of the shaft, which gradually dilates from the base to the slight shoulder from which the long, straight, distal region or neck curves off, and as it again dilates a little distally, it is narrowest in the middle. The great fang passes off at more than a right angle, and a knob occurs on the throat immediately below, whilst on the crown above it are five teeth, though they are not always visible. The gular bristles arise at the base of the great fang and the sides of the knob, and slope, or rather curve, forward and upward. The centre of the shaft is longitudinally striated, and the upper part of the neck is boldly striated obliquely, the striæ in the middle and lower part of the neck being less oblique. Little difference is noticeable in the structure of the hooks, though in the first series one or two may be imperfect.

Arwidsson describes the tube as formed either of fine sand, or of shell-fragments, fragments of *Echinus* spines, Foraminifera, and larger sand-grains.

The fourth species is *Pseudoclymene arstedii* (?), Claparède, which De St. Joseph considered to be the *Clymene digitata* of Grube. It was procured in sandy tubes under stones at Guernsey and Herm. In this the cephalic plate is somewhat like that of *Praxillella*, with a conical median frontal process, slightly marked lateral notches, and median posterior notch. The rim of the plate is moderately developed, and its outline is elliptical, more elongated antero-posteriorly than any form hitherto observed in Britain, a feature partly due to the continuation of the narrow anterior border into the median frontal process. When the proboscis is included the surface is slightly convex, but when the organ is extruded it is somewhat hollow. The keel is long and well-marked, commencing a little in front of the posterior rim and running forward to the base of the median process. The nuchal grooves appear to go along the whole length of the keel and to pass outward anteriorly on each side of the median process. The arrangement thus differs from that in *Pseudoclymene*, which has very short nuchal grooves. The slightly marked lateral and median posterior notches of the rim, as well as the fusion of the outline of the median frontal process

with the narrow anterior end of the cephalic plate, distinguish it from *Praxillella*. Eyes were present in the living form, but unfortunately they are now invisible. The proboscis has the usual outline of a globular button on extrusion, and appears to be smooth.

The body is comparatively small, with a slight constriction anteriorly, and then continues of a nearly uniform diameter to the posterior end. The first seven segments are shorter than those which follow, and their feet are in front of the middle of the segments, whereas those behind them have the feet towards the posterior border of the segment. The last two bristled segments are shorter than those immediately in front, and behind them are four segments devoid of bristles, viz. a short urn-shaped segment with glandular ridges at the end and three closely aggregated rings with traces of lateral glandular thickenings in two, the last bearing the funnel. The usual median ventral ridge runs from the anterior to the posterior end, where it is opposite the longest cirrus, which is flattened and not much tapered. The long and the short cirri are arranged more or less alternately, one or two of the short occurring between the long. In the centre is a flattened anal cone with the anus in the middle. The number of cirri varies from seventeen to twenty-three.

The first three segments are spinigerous and have besides the usual tuft of bristles. The first foot has two minute spines, one slightly curved and tapered from base to apex, the other with a shoulder and blunt tip. The second foot has on one side spines of the foregoing shape and on the other a modified hook, which has a shaft narrowed at the base but thereafter nearly cylindrical to the shoulder, and with a short slightly tapered neck. The main fang is rather long, makes more than a right angle with the neck, and has several rudimentary teeth on the flat crown behind it. The third foot has on one side spines and on the other a single large hook similar to that in the foregoing foot, but with a more distinct curvature of the shaft and enlargement below the shoulder. The fourth foot shows a series of nearly normal hooks, which are smaller than those of the third, have a marked curve of the shaft which tapers from the base to the shoulder, the neck being narrowest immediately beyond it, for it dilates thereafter to the crown, the height of which is characteristic. The great fang leaves the neck at a little less than a right angle, and in lateral view has four or five teeth above it, sloping downward from the high crown. Almost immediately beneath the great fang the

gular bristles pass forward and curve above the tip of the fang. The neck is slightly striated obliquely, but though the enlargement below the shoulder is somewhat opaque, striæ are indistinct. The hooks vary very little from the typical form, those of the last row in front of the funnel being perhaps somewhat smaller, but having the same high crowns with at least five teeth above the great fang in lateral view.

The bristles consist of the usual two groups, viz. those with stouter straight shafts and tapered tips with distinct wings and a dense group of more slender forms with fine hair-like tips, which in the preparations are coated with particles and probably are minutely spiked in the fresh example.

The small cylindrical tubes are formed of secretion coated with sand-grains, minute fragments of shells, and an occasional foraminifer, whilst one or two are anchored by the secretion to a small pebble.

The fifth representative of the family is *Isocirrus* (D) from Shetland and the Hebrides. So far as a softened though large example from the Hebrides shows the cephalic plate, while having a general resemblance to that of *Praxillella prætermissa*, differs from it in the crenate condition of the margin, and in the shallow nature of the notches both lateral and posterior. Yet in some large examples of *P. prætermissa* a crenate margin is also present. The keel, nuchal grooves, and frontal process are similar. No example is perfect, but accompanying the anterior region is a detached funnel and adjoining unarmed segments (four) which apparently pertain to a form of similar size, and which has twenty-seven equal or nearly equal short conical cirri. The funnel is much softened and no anal cone is visible. In another fragment of the posterior end of a smaller example a similar funnel occurs with a nearly similar number of cirri of like shape. An anal cone, slightly pentagoual in form and somewhat eccentric in position, is present in this case. In a funnel from the Skerries, Shetland, of similar size to the last, only twenty-three cirri occur, and the anal cone is slightly marked. A feature in all the examples is the massive condition of the ring at the base of the caudal funnel, for it forms a firm projecting shelf from the centre of which the base of the funnel arises. The cirri, moreover, stand stiffly out.

The body is typical in form, the first eight bristled segments anteriorly being furnished abundantly with glands in belts,



and the fourth segment has a collar anteriorly. The first three segments are provided with spines, which show a curvature of the shaft, and the tip is rather acute, especially in the third set. In the fourth segment is a characteristic row of hooks, which differ from the typical chiefly in the greater length of the shaft, the diminished breadth of the neck distally, and in the rudimentary condition of the gular bristles. The great fang also makes a larger angle with the neck. The typical hook has a somewhat short curved shaft, a well-marked elliptical shoulder which gradually enlarges from below and diminishes above toward the neck, the latter then gently dilates into the broad distal region with the moderately high crown. The feature most distinctive, however, is the semicircular notch below the great fang and its termination inferiorly in an eminence from which the gular bristles spring, then slope obliquely upward to the tip of the fang, and curve above it. The sharp main fang has a marked distal curvature and stands nearly at a right angle to the neck. At least six teeth occur in lateral view on the moderately elevated crown behind the great fang, and the neck is boldly and obliquely striated, whilst the somewhat slender shaft is longitudinally striated. The stronger bristles have nearly straight shafts with tapered and often curved tips and distinct wings. The slender forms have very finely tapered hair-like tips.

Another form of *Isocirrus* (DA), of which only fragments of the posterior end with the funnel come from Montrose Bay, April 1869 (*Dr. Howden*); and along with *Praxillella prætermissa*, off Cape Guardia, in the 'Porcupine' Expedition of 1870. Both belong to large forms of about the same size. Both have an elevated ventral streak which passes to the edge of the funnel, and both have short, stiff, conical cirri, which in that from Montrose Bay are thirty in number, whilst in the more beautiful specimen from the 'Porcupine' there are thirty-seven more acutely conical cirri. A slight anal cone is also present in the latter, but this is due to difference in contraction in life. Minute processes surround the anal aperture. The firm rim or shelf from which the caudal funnel arises is the same in both, and it has in front of it two unarmed segments with lateral glandular areas.

The hooks are comparatively large in the posterior region, the shafts are but slightly bent, the shoulder moderately developed, and the neck long. Moreover, the form of the neck is diagnostic, since the prominence from which the

strong gular bristles spring is removed from the base of the great fang by nearly its own length, the tuft curving to the tip of the fang and then above it. Whilst the posterior outline of the neck (which is slightly bent backward) is smooth, that in front has the bold prominence of the gular tuft with the long smooth sinus running to the fang above it. The crown is not high and has four teeth above the great fang, the first starting at an angle to the great fang. The neck is obliquely and the shaft longitudinally striated.

The seventh form has been long known as *Clymene ebiensis*, Audouin and Edwards, and is apparently near *Leiochone*. It was dredged both in Zetlandic waters by Dr. Gwyn Jeffreys and off the coast of Durham by Prof. G. S. Brady, and a similar form was obtained in Loch Alsh by Mr. Assheton.

The anterior end forms a smoothly rounded and somewhat pyramidal or clavate mass with a pointed frontal process—the prostomium, peristomium, and perhaps the first (unarmed) segment entering into its composition, the two former being separated by a ring from the latter. Dorsally a narrow median keel commences at the ring just mentioned and passes forward to the mid-frontal process. On each side of the keel is a sharp vertical ridge or lamina which accompanies it to the frontal process, where it ends, a frontal view presenting the ends of the ridges on each side of the frontal process, a deep groove (probably the nuchal) separating them and debouching on each side of the frontal process. This arrangement recalls the condition in the cephalic plate of other forms. In the fresh example a dense series of minute dark brown eyes are visible from the dorsum on each side of the snout, but disappear by passing under the pointed tip, where they extend forward to the apex. These vanish in specimens long preserved in spirit. Similar groups of eyes are observed in the aberrant *Branchiomaldane vincentii* of Langerhaus\* as lately described by Dr. Ashworth †.

The mouth opens in the usual position ventral and posterior to the frontal process. The body is of considerable length, viz. 5–6 inches, rounded, with a distinct mid-ventral ridge which is continued backward to the edge of the anal funnel and has twenty-two bristled segments and four devoid of bristles posteriorly. The first bristled segment is about a third longer than the cephalic lobe in a good preparation, and bears about a fifth from its anterior border a small tuft of

\* Nova Acta Cæs. Leop.-Car. Bd. xlii. no. 3, p. 116, figs. 21 a &c.

† Proceed. Roy. Soc. Edin. vol. xxxii. p. 62, with plate (1912).

bristles and ventrally three hooks, the crowns of which are less elaborately formed than in the posterior hooks and are devoid of gular bristles. The second segment is more elongated, and, like some of the segments which follow, is distinguished by an anterior whitish glandular region, the bristles and hooks being at the posterior border of the latter, viz. about the anterior fourth of the segment. The two succeeding segments (third and fourth) are similar, but the fifth and sixth are somewhat shorter and thicker—all, however, in the preparation showing the free fold of the anterior border, which in a manner ensheaths the posterior end of the preceding segment. The third segment has a tuft of bristles and four hooks, the tips of which are also rudimentary, and the throat devoid of gular bristles. The fourth, on the other hand, has a considerable number of hooks, viz. nineteen or twenty, with normal crowns and a tuft of gular bristles. The seventh has also the free and densely white glandular anterior margin, intensified by the dark hue of the region behind, and the bristles and hooks are similarly placed. Behind the foregoing a change in the structure of the segment-junction occurs, since the densely whitish glandular region of the eighth segment passes slightly forward on the seventh ventrally, so that the free margin so characteristic of the preceding segments is lost. The anterior border of this curved white region, however, really marks the segment-junction, though in a specimen from Jersey this feature is not so distinct as in the others, probably from less perfect preservation. The foot of the eighth segment with its bristles and hooks is situated posteriorly, and thus a change in the position of the organs is inaugurated, the segment-junctions immediately succeeding the bristle-tufts from the ninth inclusive. The last five or six bristled segments are considerably elongated. The posterior end appears to be composed of six segments, four of which have slight glandular elevations to indicate the position of the bristle-tufts and hooks of the other segments, for they are absent in these. The terminal rim or funnel is much expanded, but its edge is perfectly smooth, and the anal cone is in the centre. The whole somewhat resembles the anal funnel of Théel's *Praxilla polaris*.

The stronger bristles have stout shafts and finely tapered, slightly curved tips, with distinct wings. The hooks are remarkable for their comparatively straight shafts (only a slight curvature being present), for the rather indistinct shoulder, for the shortness of the main fang which comes off nearly at a right angle to the neck, which increases in

breadth from the shoulder to the crown, and for the flatness of the latter. The main fang is rather short, but acute, and the gular bristles are separated by a short interval from the base, curve to the tip, and then rise above it. Six teeth (as usual in lateral view) occur on the crown behind the main fang, but there is little elevation: the bristles and hooks of segments 13-23 are best developed.

The tube, which is figured by the original authors, is, in the Zetlandic example, somewhat firm though friable, and is composed of sand-grains and minute fragments of shells attached to a central lining of secretion.

In the edition of the 'Règne Animal' by the disciples of Cuvier, Audouin and Milne-Edwards introduced as the type of the "Climènes," Savigny (an abbranchiate setigerous group which they associated with the Lumbrici), a new form which they termed *Chymene ebiensis*. No description further than the explanation of the six figures and a footnote is given; but the form is recognizable, and is characterized by the pyramidal form of the cephalic segment and the absence of cirri on the anal funnel. In the plate the annelid with its tube of the natural size, two views—dorsal and ventral—of the cephalic lobe, and a figure of the posterior end of the body are given, besides four of the hooks magnified. The cephalic region is diagnostic, but the posterior end, or, as it is called, "extrémité anale," represents only the ruptured constricted region between two preanal bristled segments, while the figure of the hooks is scarcely diagrammatic. The tube is evidently composed of sand-grains cemented to a lining of secretion.

Another *Leiochone* (probably *L. chypeata*, Orlandi) was dredged in 100 fathoms in St. Magnus Bay, Shetland, by Dr. Gwyn Jeffreys. The anterior end is characterized by the stiff—almost transversely truncate—condition of the cephalic plate, only a very slight inclination downward and forward being noticeable. The surface of the plate is somewhat ovoid, and the rim is only slightly developed, being erect all round, and with a shallow excavation in the place of the lateral notch on each side. A short, bluntly conical, median frontal process is continuous with the keel—a narrow ridge which passes backward nearly to the posterior border. The nuchal grooves appear to commence near the posterior end of the keel, and diverge a little as they run to the anterior border, debouching on each side of the median frontal process, and at a greater distance from each other than usual, indeed that on the right side cuts off a special

section of the rim. Viewed antero-posteriorly the anterior or cephalic region is narrower than the second or buccal part, and in lateral view the same condition exists, for the mouth is prominent, three folds characterizing the outline behind the median frontal process.

The body is nearly cylindrical behind the cephalic plate (having been preserved in its tube), with the exception of the slight posterior diminution toward the caudal funnel. Nineteen bristled segments appear to be present and apparently only one unarmed ring posteriorly. The anterior eight are richly supplied with glands, those following, especially the posterior ten, being less so, the wall being more or less translucent. The median ventral streak is faintly indicated, indeed, in the posterior fragment, it is not easy to distinguish the dorsal from the ventral surface at first sight, though on subsequent minute inspection a slight ridge is seen on the ventral aspect of the funnel. The most characteristic feature about the body is the flattened moniliform condition of the last nine bristled segments, which are narrow and vase-shaped, the wide end being posterior. So far as observed, no other British Maldanid presents a similar conformation. Behind the foregoing are two rings, the funnel arising with a broad base from the second, and showing a slight constriction before reaching the rim, thus giving the outline of a dice-box to the funnel. Six of the subulate cirri of the funnel are alike and moderately long, the seventh or mid-ventral being a very little longer, though externally the caudal funnel seems to be long; the anal aperture is in the centre of a shallow distal cup and has no cone.

The bristles are in two groups, pale yellow stronger forms nearly straight and with tapered tips and wings, and slender bristles with very fine attenuate tips, apparently smooth. The first three segments have rather long spines, slightly curved striated organs, with a conical tip which may have a slight constriction below it. The fourth foot has a row of hooks with somewhat long curved shafts, a bold shoulder, beyond which is the constriction of the short neck, which curves backward and enlarges to the crown. The great fang leaves the neck at a little less than a right angle, and four teeth at least occur on the crown behind it, though it has not yet reached full height. There are no gular bristles. The neck is obliquely and boldly striated, and an opaque region of the shaft behind the shoulder is probably likewise striated.

The typical hook is characterized by its comparatively short curved shaft, high crown, and the broad strongly

striated distal region with the teeth. The opacity behind the shoulder shows faint striæ. The great fang leaves the neck at considerably less than a right angle, and from the neck, immediately below its base, is a tuft of gular bristles, which pass to the tip and bend upward on each side of the fang. The crown is now high, and there are seven teeth above the great fang. The lower and the central regions of the neck are strongly striated\*.

The tube is fragile, the inner layer being composed of a thin layer of secretion to which sand-grains, minute fragments of shells, and Foraminifera are attached externally.

A very similar form was dredged by Dr. Gwyn Jeffreys in 90 fathoms off North Unst, on July 15, 1868. If the two fragments in the bottle belong to the same specimen, and they so far agree, the number of the segments would thus be twenty-three—a larger number than usual in the group. The funnel has fourteen cirri, that over the ventral ridge being only a little longer and broader than the others. As they are set on the rim at intervals their arrangement is characteristic. The hooks and bristles seem to correspond with the foregoing. A high power does not show fine spikes in the delicate hair-like tips, but the preparation had long been preserved. The tube in this case is composed of somewhat coarse fragments of shells, fragments of a tube of *Ditrypa*, and sand-grains attached to the secretion.

Arwidsson records two mutilated examples of *Praxillella affinis*, Sars, the ninth species, from the south coast of Ireland, Stat. R 31 (8, p. 127), or six miles S.E. of Mine Head, 53 m. One fragment consisted of the third to eighth setigerous segments, and the other had from the third to the seventeenth. "Besides there is a posterior extremity possibly belonging to one of the foregoing. Amongst other things are found the specially developed setæ on the tenth and eleventh setigerous segments." (*Arwidsson.*) †

The tenth British Maldanid is *Praxillella gracilis*, Sars, which was dredged in 100 fathoms in St. Magnus Bay, Shetland, by Dr. Gwyn Jeffreys.

The *head* has the cephalic plate somewhat more oblique than in *P. pratemissa*, so that the anterior border is more acute in lateral view, especially as the filament and anterior process thus appear as a continuous narrow appendix. In

\* Arwidsson also describes a *Leiochone*, to which he gives no name, in Proc. R. Irish Acad. vol. xxix. p. 214 (1911).

† Proceed. Roy. Irish Acad. vol. xxix. p. 215 (1911).

the median line anteriorly is the flattened conical prow seen in the form above mentioned, but it has distally the filiform process so characteristic of the species. From the basal process the long and rather narrow glandular keel passes backward almost to the posterior border. The long nuchal organs lie at each side, and they slightly bend outward anteriorly, but do not reach the margin, which has two broad lateral flaps in front of the notches, and a narrower and often more or less erect border between the notches. The fused pro- and peristomial segments have the large aperture of the mouth ventrally, and it is usually marked by a series of radiating furrows, which are somewhat regularly arranged on the prominent posterior lip. Anteriorly a ridge runs forward to the notch on each side of the flattened base of the anterior process. In partial protrusion the proboscis forms a button-shaped papillose organ, but in full extrusion a considerable bladder-like smooth region with a terminal fissure occurs beyond it. The papillæ on the basal region in extrusion are bluntly conical, large, and prominent, four or five papillæ occurring in each row anteriorly, and nine or ten occurring, as Arwidsson observes, in each row posteriorly. Reddish mud oozed from the mouth on the slightest pressure. The fine mud swallowed by the annelid contains many organic elements, besides spicules of sponges and minute sand-grains. An occasional larval annelid occurs.

The body is more or less rounded dorsally, slightly flattened behind the anterior third ventrally, and marked by a median streak, which becomes a ridge posteriorly. A distinct constriction behind the cephalic region, affecting three or four segments, occurs anteriorly. There are nineteen bristled segments, and four without bristles posteriorly. Large forms exceed 100 mm. in length, and the walls of the body posteriorly are thinner than in *P. prætermissa*, so that from flattening the diameter of large examples is 4-5 mm. The anal funnel is comparatively small, has a prominent anal cone with a valve, a long ventral cirrus, and twenty-two to twenty-five (Arwidsson gives twenty-seven) shorter cirri, which vary in length in different specimens. Pigment is usually absent in spirit-specimens, but in one the anterior region is mottled with brownish red. The anterior bristled segments from the first to the anterior part of the eighth are glandular, but the glandular elevations at the row of hooks thereafter are absent. Arwidsson gives in detail the arrangement of the glands in the various parts. The segmental organs occur in bristled segments six to nine. The first, second, and third segments are, as mentioned,

firm, rounded, and glandular, the ventral streak forming a ridge rather than a groove. Each has a short row of hooks and a tuft of rather long bristles. The bristles are in two groups—a stronger golden series, with nearly cylindrical shafts, except the somewhat narrowed region at the base, tapering and slightly curved tips, with narrow wings; and a more delicate series, having slender tips with a trace of wings. The hooks of these three segments differ from the succeeding hooks in the absence of the gular bristles, in the great size of the main fang, and in the rudimentary condition of the spikes on the crown, all these features, with the comparatively narrow distal region, being conspicuous in those of the first bristled segment. The main fang leaves the neck at more than a right angle and its distal outline is sinuous so as to resemble a foot. A slight swelling occurs on the throat at its base. In these segments (three anterior) the bristles and hooks are in front of the boundary of the anterior third and lateral in position.

The fourth segment is equally glandular, though short, and its row of hooks is longer. The shafts of the hooks still retain their great length and curvature, increasing in size from the somewhat slender basal region to the broad shoulder, then contracting at the neck, which slightly widens in its passage forward to the crown. The great fang comes off more nearly at a right angle than in the anterior feet, is proportionally less, is evenly curved on its distal margin, and has four teeth on the crown above it. Moreover, the gular bristles spring from the throat immediately beneath the great fang, curve forward to its tip, and bend upward above it. The distal region has straight striæ superficially at the end, oblique striæ in the deeper part of the neck, and the shaft is longitudinally striated. The hooks remain for the most part similar in the fifth, sixth, and seventh, except that in some a tendency to differentiation of the crown with its four smaller teeth and a differentiation in the trend of the posterior outline are observed. The typical hook shows a narrower neck above the prominent shoulder, a shorter distal region or neck, which is broad at the crown and has at least five (six, *Arwidsson*) teeth behind the great fang, but the gular bristles retain their position close to the base of the great fang and without differentiation of the outline at their base. The hooks of the small form from St. Magnus Bay have a higher crown than those from Canada, thus resembling those from the posterior region of large examples.

The posterior hooks, for instance those of the last row, differ chiefly in their smaller size, the shafts being shorter.



the smaller great fang, and the more prominent condition of the crown with the smaller teeth, four of which are evident as in front. The gular bristles have the same arrangement. The bristles of this region retain the structure of those in front. As a rule, the number of the hooks increases at the fourth segment, and at the sixteenth there may be sixteen or seventeen in each row (*Arwidsson*). The same author found in an example from Lofoten the tips of the posterior (teuth) bristles feathered with fine lateral fibres, a condition not yet observed here. *Arwidsson* met with one reproducing the terminal segments without bristles.

The tube consists of mud and sand-grains round a central lining of amorphous secretion, and is free. It readily yields to pressure applied externally. Occasionally the translucent secretion projects beyond the external coating of mud and sand.

In the Irish collection *Arwidsson* met with *Praxillella affinis*, Sars, in the form of two mutilated examples dredged off Mine Head. He found the specially developed capillary bristles on the tenth and eleventh segments.

The twelfth species, *Praxillella prætermisssa*, Malmgren, has long been known in the northern parts of Britain, and has a wide distribution elsewhere. The cephalic plate is sloped from above downward and forward, and has a median ridge from its posterior to its anterior border, where it ends in a flattened conical process which curves forward and slightly upward. The rim of the plate has a median notch posteriorly, a deep lateral notch a little more than a third of the distance forward, whilst its edge is rounded off on each side of the anterior median process. The rim in small examples has an entire margin throughout, but in large a series of notches—about five in number on each side—cut the border between the lateral notch and the median posterior into segments. The deep part of the rim is the anterior section on each side. The nuchal grooves occur on each side of the median ridge, widening a little in their passage forward as they run into the notch or angle at the base of the median process. The mouth opens as a transverse slit on the ventral surface a little behind the median process of the cephalic plate, and occasionally the proboscis is extruded as a flattened button covered with small reniform papillæ, or in full extrusion as an ovoid sac or bladder.

The body is of moderate length, more or less rounded throughout, thicker in front and diminished toward the anal

funnel, the posterior region, moreover, being for nine or ten segments moniliform. A median streak marks the ventral surface, which, further, is in parts somewhat less rounded than the dorsal. There are nineteen bristled segments and four without bristles posteriorly.

The fused pro- and peristomium form a thickened mass, broad in front and constricted behind, where it joins the first bristled segment. The first three bristled segments are nearly equal in length, the first being the stoutest in the preparations, and each bears a tuft of bristles and a golden spine, which in large examples is very powerful though not long. It has a stout striated shaft, enlarges from a slightly narrowed base, and again diminishes to the tip, which is likewise finely striated (longitudinally) internally and often has a distinct curvature at the tip. The bristles of these segments are in two groups, the larger being capillary bristles with fairly stout shafts and somewhat narrow wings at the finely attenuate tip. The other group consists of capillary bristles with more slender shafts and more finely attenuate tips. In the example from St. Magnus Bay the last tuft of bristles in front of the funnel had a mere trace of a wing with the edge faintly serrated.

The first three bristled segments do not present marked glandular areas, but the fourth has a narrow ring at the anterior part of the segment and in front of the bristle-bundles. The fifth, sixth, seventh, and eighth segments have broader belts of glandular tissue which occur in the same part of the segment and envelop the ridges for the hooks. The ninth foot occurs at the posterior part of the segment, and is glandular, as are those which follow, as far as the nineteenth. Each of the four terminal segments has a glandular ridge on each side, the last forming, by nearly coalescing with its neighbour, a kind of ring.

The six segments in front of the terminal funnel differ in shape from the preceding, being narrow in front and wider posteriorly, the elevations for the hooks or the corresponding glandular areas without hooks being placed on the prominent angles posteriorly. The seventeenth and eighteenth bristled segments—that is, the first two of this series—are, as a rule, those best marked, though the condition varies in the preserved examples.

The anal funnel appears to vary considerably in regard to the number and the shape of the cirri, those with few cirri having them broad at the base and more distinctly conical, whilst in those in which the cirri approach thirty in number they are more filiform, though in one from North Unst the

sixteen separate cirri are filiform. The elongated cirrus is in the mid-ventral line. The anal cup is comparatively shallow, with the anus often on a slight cone in the centre. In two large Hebridean examples the cirri of the funnel are all short and twenty-seven in number. In another large form, procured in the 'Porcupine' off Cape Guardia, the funnel had no long cirrus, the number of cirri is thirty-seven, and the anal process is conspicuously ridged or folded. A small specimen from St. Magnus Bay (100 fathoms) had a very long filiform mid-ventral cirrus. Occasionally the vent projects as a conical process, similar to what Arwidsson shows in his *P. affinis*.

The hooks have a long curved shaft, tapered at its base and dilating as it passes upward to the shoulder, which forms a prominent hump posteriorly and a slight one anteriorly. It then contracts to the neck, above which the distal region dilates, and ends in a broad heavily armed crown. The great fang leaves the throat nearly at a right angle, curves slightly downward, and ends in a sharp point. Six to seven teeth in a diminishing series occur above the latter on the crown. The interior of the shaft is striated, and the striæ are continued into the neck, where they are somewhat oblique inferiorly, but longitudinal toward the crown. The gular bristles come off close to the great fang and curve forward and upward on each side of it. The anterior hooks differ from the typical forms in their shorter and less boldly curved shafts, shorter necks which are less dilated distally, in the larger angle made by the great fang and the neck, and in their much flatter crowns, three or four teeth only being visible behind the great fang, and the gular bristles are rudimentary, passing obliquely upward close to the great fang. The first hook of the row in the third foot is even more rudimentary, as shown by the blunt tip of the large fang, the fusion and indistinctness of the teeth on the crown, and its short and nearly straight shaft. Such may, however, be an undeveloped or developing form. The hooks of the last row (nineteenth) retain much of the typical structure, though their shafts are shorter. Five or six teeth are visible on the crown above the great fang, and the shoulder is largely developed. The bristles of this region consist of the two groups, the stronger having narrow wings, and the slender forms are few in number and extremely attenuate.

A large though softened and fragmentary example dredged by Dr. Gwyn Jeffreys off the Hebrides in 1866 has hooks which differ from the foregoing not only in their great size

but in the presence of a distinct ridge or process for the gular bristles. There are twenty-seven short cirri on the funnel, but no longer process, though one is double. The same condition is seen in certain forms dredged at nos. 35 and 36 and in 125 fathoms off Cape Rosier, Canada, 1873. Further investigation of these is necessary.

A large example from the Outer Haaf, Skerries, Shetland, had the rim of the cephalic plate less developed and the antero-lateral margins slightly crenate, but otherwise it does not seem to differ. A specimen of medium size again, from a depth of 90 fathoms off North Unst, presented a very long process for the dorsal bristles in several of the posterior segments (even to the third from the anal funnel), so that the foot at first sight appeared to have a short cirrus.

The tubes are composed of sand with a lining of tough secretion. They are comparatively soft, though in small specimens from the Outer Haaf, Skerries, the minute grains of sand and shells clung tenaciously to the lining. Fragments of shells and of *Ditrypa* tubes are attached to some from the same region.

*Axiothella zetlandica*, the thirteenth British species, was dredged by Dr. Gwyn Jeffreys in St. Magnus Bay, Shetland, in 100 fathoms. The cephalic plate slopes downward and is concave rather than convex, and has a remarkably wide and somewhat thin margin, and a minute central process in front, the general form of the surface being rounded rather than ovoid. From each side of the minute median process the broad and thin antero-lateral flaps pass backward to the notch, which is, though pronounced, superficial, that is, it is confined to the outer half of the flap, and its direction is slightly forward. The postero-lateral margin behind the notches is differentiated by its striæ and crenate edge. Six larger marginal crenations are divided into two, three, or four subdivisions. This margin is narrower than the antero-lateral and stands more or less erect, whilst the antero-lateral is procumbent. The very narrow keel arises a little behind the middle and posterior to two nearly transverse grooves which run inward from the margin, and by a slight enlargement from the anterior edge of a rounded area. It widens as it approaches the median frontal process, again contracts as it joins it, so that its outline is somewhat clavate; or, if the posterior area is considered, like the gymnastic club o—o. On each side is a long, slightly narrower ridge, which ceases at the enlargement of the keel in front, but springs from the side of the keel in front of the

posterior rounded area. A deep groove lies between the keel and the lateral ridge, and another less pronounced to the exterior of it. The former probably represents the nuchal groove, which debouches anteriorly on each side of the minute frontal process. The groove outside the ridge runs forward in the same direction, but appears to have a less definite termination. The proboscis forms a somewhat globular grooved mass, with rows of rather long conical papillæ.

The body is, as usual, narrowed behind the anterior end, and again increases at the eighth segment. Anteriorly the feet arise nearer the anterior than the posterior border of the segment, but posteriorly they are close to the posterior edge. The number of bristled segments is uncertain.

The last setigerous process and row of hooks is followed by three narrow non-bristled segments, bearing rudimentary homologues of the feet in the shape of glandular enlargements, the last forming the prominent ring (Arwidsson's callus-ring) from which the caudal funnel projects. On the ventral surface a ridge runs from the first bristled segment to the edge of the caudal funnel. The body does not diminish much posteriorly, and has a broad circular shelf in front of the funnel, from which the latter projects like a fluted vase—that is, it has a constriction immediately above the base and then gradually dilates to the rim bearing the cirri, which, like those of *Axiothella catenata*, are more or less alternately long and short, one of the longer occurring in the mid-ventral line or close to it. The grooved condition of the tunnel is a prominent feature—three cirri generally being included in each space, though a narrow one may have only two. One had forty-four flattened cirri, of which twenty were long. The anal cone forms a rounded button at the base of the vase, with the central (anal) aperture surrounded by minute papillæ.

In contrast with *A. catenata* the anterior bristled segments are more glandular, segments 1-8 showing glandular rings, especially anteriorly. The bristles of this region also are more prominent than in the other species.

The first three bristled segments bear spines, the first having two or three, and the second and third four of the same character. The spines are curved at the strong tip, and the shaft is striated internally up to the tip. The spines of the third segment are longer. The fourth segment has a considerable row of hooks (about twelve), with long curved shafts, a well-marked shoulder from which the neck dilates to the crown. The great fang arises nearly at

a right angle to the neck and is rather long. Four teeth occur on the crown behind it, and a short tuft of gular bristles springs from the throat immediately beneath it. They do not reach the tip of the great fang. The crowns of these hooks are little elevated, and thus differ from the typical forms which those of the fifth foot more nearly resemble. The bristles form conspicuous pale yellow tufts in each foot, and one group has stout shafts, tapered tips with wings; the other translucent, slender, and with greatly elongated hair-like tips and extremely minute serrations, the wings being slightly developed. In the middle and posterior regions of the body they are borne on long setigerous processes which form a feature in the outline. The typical hook, as at the eighth segment, has a remarkably high crown, and neck and shaft are nearly equal in length. The shaft dilates from the base up to the shoulder, then the neck is constricted off and again dilates to the toothed hatchet-shaped crown, which, with its six or seven teeth, rises high above the great fang. The latter makes less than a right angle with the neck, and has a distinct indentation of the throat beneath it, opposite which, on the side of the hook or at the notch in the throat, a comparatively short tuft of gular bristles on each side slopes upward and forward instead of curving gently outward and bending round the tip of the great fang as ordinarily seen under a cover-glass. The neck is obliquely striated, and longitudinal striæ occur at the upper end of the shaft. Posteriorly little change takes place in the structure of the hook, the proportions of shaft and neck being nearly the same, but in the last row the number of teeth above the crown is greater.

The tube appears to be free and to be composed of sand, minute fragments of shells, foraminifera, and secretion.

This species, in 1868, was confounded with *Axiothella catenata*, Malmgren, and hence the differences between them as indicated in a former paper\*. Malmgren's description and figure of *A. catenata* are excellent.

The fourteenth species is *Axiothella catenata*, Malmgren, in which the head, with the cephalic shield, is of average obliquity, that is, sloped from above downward and forward, and in lateral view the centre of the plate is somewhat convex, whilst the anterior border droops a little. A small process with a rounded anterior border occurs in the middle line anteriorly—separated by a furrow on each side from the

\* Trans. Roy. Soc. Edin. vol. xxv. p. 420.

lateral flaps of the rim, which extend backward to the notch. Behind the notch the rim in some is considerably less developed, forming a slightly raised smooth margin which in lateral view is at a lower level. The keel varies a little in different examples, but it is generally narrow and arises almost at the posterior rim, bending (for it is curved in the middle) forward to the central median process, which is slightly under the keel, and in one a little papilla occurred at the base of the process. The nuchal grooves commence posteriorly almost in a line with the lateral notches, slightly approach each other in their passage forward to terminate in the furrows at the side of the central process. No eyes were observed in the preparations. The mouth opens as a transverse slit on the ventral surface a short distance behind the median frontal process, the prominent posterior lip being marked by a regular series of longitudinal striæ.

The body, which extends to 105–110 mm. and is 3–5 mm. in diameter, is distinguished by the enlarged cephalic end, the constricted anterior region, and the conspicuous and somewhat urn-shaped segments posteriorly, terminating in the characteristic funnel, with its somewhat alternate arrangement of long and short cirri. The ventral streak is in the form of a ridge which extends from a little behind the mouth to the posterior end. The combined pro- and peristomial region is often reticulated after the manner of crocodile skin, and this condition occasionally occurs dorsally on the anterior border of the first bristled segment, which bears on each side a vertically elongated tuft of bristles, and after an interval ventrally a short row of hooks. The bristles agree with those of the following segments—having long stout shafts, tapered tips, which have distinct wings, and end in slender extremities with minute spikes at the sides. These are readily seen at the end of the wings, but in the filamentous continuations are less easily noticed.

The spines of the first segment are large and strong, with nearly straight striated shafts, which slightly increase to the shoulder, the neck being short and a little constricted in the middle, dilating distally in lateral view, and each has a great fang with a sinuous distal edge, the angle with the neck being greater than a right angle. Four hooks occur in lateral view behind the great fang. The neck is longitudinally striated at its distal end, and has a projection (in front) below the great fang, but though short striæ exist on each side of the base of the fang no gular bristles are present. The same description applies to the hooks of the second and third bristled segments, the rows of which are also

comparatively short. The hooks of the fourth segment have shafts which are more distinctly curved and tapered at the base, have longer necks, which are broader distally, and more distinct shoulders. The great fang comes off almost at a right angle, the distal outline is nearly a continuous curve, and three teeth are on the crown behind it. Moreover, a few have short gular bristles, and no distinct enlargement occurs on the throat at the base of the main fang. The typical hook, for instance, at the eighth segment has a long curved shaft, which is tapered from the shoulder to the base, and dilates from the shoulder to the crown. The main fang has a smooth curve distally and comes off at a right angle to the neck. After a brief interval a tuft of gular bristles springs from the front edge, curves to and rises above the tip of the fang. The neck is striated obliquely, and the shaft longitudinally. The posterior hooks are somewhat smaller, but they retain the chief features above mentioned, the four teeth on the crown behind the great fang being especially distinct.

From the first to the eighth the bristles and hooks are situated laterally and ventrally toward the anterior part of the segment, but in the ninth it is toward the posterior border of the segment, and the glandular elevation for the hooks is more pronounced. The posterior bristled segments, as mentioned, are somewhat urn-shaped, the narrow end being in front and the broader, with the elevated ridges for the hooks, being posterior. In the posterior segments the hooks slope to the dorsum, and their great fangs point forward. The segments from the ninth to the sixteenth are comparatively long, but the last two are shorter. Four diminishing unarmed segments follow, each with a lateral glandular elevation, the homologue of the ridge for the hooks. The anal funnel springs from the last and its edge is fringed with a series of long and short cirri, a long one occurring in the mid-ventral line, and long and short alternating, but with occasional irregularity. Their number varies from twenty to thirty-eight (Canada), small examples having fewer, as a rule, than the large; Arwidsson gives the number as twenty and thirty-four, and the long cirri as from nine to twenty-eight in the northern examples. In a large specimen from Gaspé Bay, Canada, there were forty cirri, some, however, being mere points. The cirri generally vary considerably in breadth at the base and in length, those having broad bases being fewer in number. In the centre of the funnel is the anal cone, which in contraction forms a



raised button with radiating lines. When relaxed, however, the aperture is surrounded by about thirty pointed papillæ.

The tube is of sandy mud lined by secretion and is readily broken by pressure.

The fifteenth species is *Pseudochymene quadrilobata* Sars, which was dredged in the Outer Haaf, Skerries, Shetland, by Dr. Gwyn Jeffreys, of whose successful labours in Zetlandic waters mention has so often been made. In this form the cephalic plate is distinguished by the prominence of the lateral margin on each side of the small mid-frontal process, approaching *Aviothella* in this respect, though the lobes are less and the frontal process larger. The margin, indeed, is conspicuous all round, and in place of the deep notch of *Praxitella* a shallow notch and a fold occur laterally, whilst posteriorly the margin dips downward gently to a median notch, which is thus less abrupt than in *P. prætermissa*. The outline of the cephalic plate is ovoid, and the keel arises rather behind a line between the lateral notches, and passes forward as a narrow ridge to the mid-frontal process. A furrow exists on each side of it, but the nuchal grooves proper seem to be short and anterior in position, forming two curved furrows, with the convexity outwards, which anteriorly debouch on each side of the mid-frontal process. On the ventral aspect behind the latter is a dark band, but no distinct eyes are now observable. The mouth forms a transverse slit with prominent furrowed lips anteriorly and posteriorly, and radiating grooves laterally. Arwidsson describes the proboscis as provided with papillæ.

The bristles consist of stronger forms with straight shafts, tapered tips, and distinct wings, the wing running distally into a peculiar flattened region which ends in the tapered tip, but no serrations could be made out. The delicate slender forms taper to a hair-like tip, but spikes could not be seen in the preparation.

The first seven segments and the anterior part of the eighth are markedly glandular, all having prominent belts in front, and the ventral streak is distinct from the mouth backward. The first three segments bear strong spines, with curvatures of both shaft and tip, the tip of the spike of the third segment being most distinctly hooked. The fourth has a row of hooks with long curved shafts, the great fang makes a larger angle with the neck than in the typical form, and the gular bristles seem to be rudimentary, yet the hook has much of the character of the type. The latter, as at the

eighth segment, is distinguished by the great breadth of the distal end of the hook, the large angle made by the great fang with the neck, the close application of the gular bristles to the lower border of the fang, apparently almost springing from the basal edge of the fang itself, and the numerous and small teeth on the crown behind it, yet the crown is rounded off instead of being high. The shaft is of moderate length, striated longitudinally, gently curved, and the slope from the slight shoulder to the neck is gradual, then the neck dilates in its progress distally and is boldly and obliquely striated.

Arwidsson\* has recently described from Blacksod Bay and other Irish waters a sixteenth form, viz. *Cesicirrus neglectus*, gen. et sp. n., and he identified it with the *Axiiothea catenata* of Cunningham and Ramage †. The anal funnel has seven longer cirri, with several shorter between each.

The seventeenth species, *Asychis biceps?*, Sars, was dredged by the 'Knight Errant' in 35-37 fathoms off Castle Walker, Loch Linnhe.

In this species the cephalic plate slopes downward and forward as in allied forms, but the entire border as well as its surface differs from that of its allies. Thus the frontal margin is almost the breadth of the body and is entire, and behind it ventrally is the mouth in the form of a longitudinal slit, from the anterior edge of which a line slopes backward and outward on each side. Three large serrations occur on each side between the cleft at the margin of the ventral edge and the deep lateral fissure, one of these processes occasionally being bifid. The deep furrow from the fissure proceeds as far as the first bristle-tuft. The rest of the lateral margin and the posterior edge of the cephalic plate are cut into a continuous series of small serrations about eighteen in number. In small examples there are fewer, viz. from eight to twelve. The surface of the cephalic plate has a flat ridge in the centre, but it does not reach either the anterior or the posterior border. The nuchal organ forms on each side a slightly flattened semicircle, commencing anteriorly at the cleft of the frontal plate, then curving

\* *Op. cit.* p. 217, pl. xvii. figs. 1-9, pl. xviii. figs. 10-12, and pl. xix. figs. 20-26.

† Unfortunately this form has not yet been obtained for critical examination.

inward and running parallel to the median ridge, and again bending outward to the groove at the deep lateral fissure.

Immediately behind the mouth is a broad rectangular band of glands bounded laterally by the groove from the deep fissure of the cephalic plate. Glandular tissue also appears around the mouth. The next segment has a collar with a free edge in front of the bristle-tuft, a narrow ring behind completing the segment. Both are glandular dorsally and ventrally.

*Asychis biceps?* is a large form measuring in its incomplete condition 110 mm. and probably exceeding 5 inches in length, and having a diameter of 3 or 4 mm. The anterior region is, however, absent or represented only by a small papilla projecting forward from the cicatrizing end of the trunk. Judging from the appearance of the specimen and the condition in other forms only a single bristled segment with the head and peristomial segment are absent, this making the total number of bristled segments nineteen.

The anterior region has somewhat the same arrangement of the glandular tissue as in *Maldane sarsi*, though, of course, it is only present in the specimen from the second bristle-tuft. The second and third bristled segments have a glandular ventral surface which is continuous with a nearly complete dorsal investment. Dorsally, however, a blank occurs from the anterior border of the fourth segment, which has a thin glandular streak, backward. A thick streak also occurs dorsally opposite the bristles of the fourth segment, but the great glandular belt from the ventral surface appears at each side dorsally in the second ring of the segment at the bristle-tuft. The first ring of this segment ventrally is less thickly glandular than the second, which has a lozenge-shaped area with fewer glands in the mid-ventral line. The great (fifth) segment shows dorsally the thick bifid lateral pads on each side of the bristles, whilst ventrally it has a semicircular patch in front, the thin ends being visible dorsally, and a broad and continuous belt behind. The sixth has a glandular streak dorsally between the bristle-tufts of opposite sides, and the ends of the ventral belts are seen in front and at the feet, as in the previous segment. Ventrally the anterior only exhibits a fissure, wider laterally, between it and the continuous and broad posterior belt of glandular tissue. The next (seventh) segment has anteriorly the dorsal ends of the glandular area of each foot, as well as a small portion of the anterior ventral belt seen at the sides. Ventrally a somewhat semicircular glandular area lies in front, its posterior edge in the prepa-

ration being somewhat indefinite. The glandular belt at the feet is also continued from side to side. Thereafter, as a rule, the bifid glandular areas at the feet are alone visible from the dorsum. Ventrally the belt between the feet is distinct at the eighth, ninth, and tenth, is more or less interrupted on the eleventh, twelfth, thirteenth, and at the succeeding feet the glandular tissue is confined to the sides of the feet, forming prominent ovoid enlargements in each case. A median streak occurs in the mid-ventral line from end to end. The proboscis is a flattened bladder-like organ with papillæ.

In the general form of the body this species approaches that of *Maldane sarsi*, though in the large example the last four bristled segments were more prominent and closer together. They are followed by a narrow ring and then the anal plate. The first six bristled segments are comparatively short, whilst those following are longer, and the fourteenth and fifteenth are again somewhat shorter. The last four diminish progressively, and in the prominent and broad glandular feet agree with the figure of *Maldane biceps* given by Malmgren. A single narrow ring devoid of bristles follows the nineteenth bristled segment, and it has a glandular area at each side. The anal segment has dorsally the transversely ridged eminence for the vent, with its valve-like plug behind at the opening, a process passing off from this toward the median fissure of the anal cup. The latter is broader dorsally than ventrally, with an acute fissure in the mid-dorsal line and a more obtuse one in the mid-ventral line, the lateral slit at each side penetrating deeply and having a gaping opening at the bottom. The dorsal edge of the anal plate is indented by shallow notches, which, however, are not quite regular, for on the right six teeth and a flat area at the lateral fissure occur, while on the left four teeth and two flat areas are found. The ventral half of the cup shows three or four shallow indentations on each side of the mid-ventral notch. Between the dorsal and the ventral notches is a median line, but no ridge. The anal plate presents therefore small differences from the descriptions of Malmgren and Arwidsson, but these would appear to be due chiefly to the more distinctly marked notches on the border. A dimple occurs at the base of the caudal plate behind a slight ring, which on this surface is between the first non-bristled segment and the caudal rim. The segmental organs, according to Arwidsson, occur from the seventh and ninth segment.

The anterior bristles are for the most part absent in the example, but, so far as observed, they agree with the descriptions of Malmgren and Arwidsson, viz. those with broader and shorter wings and a curved tip, and those with narrower wings and longer tips. The posterior bristles have much elongated slender tips, with opposite spikes. The same kind of bristle occurs in the posterior third, each bristle having a well-marked curve and the tip forming a very long, delicate, serrated hair.

The hooks of this form appear to be longer than those figured by Arwidsson; indeed, if his figure (Taf. x. fig. 34<sup>o</sup>) is perfectly typical for *Asychis biceps*, then doubt remains as to the specific identity of the British specimen. The example from the 'Knight Errant' differs in having the spikes on the crown less elevated above a line passing from the lower border of the great fang backward, and thus the hook has a different character in that region. The same difference from Malmgren's figure is observed. The smaller teeth on the crown appear to pass on each side of the base of the great fang; at any rate raised striæ are there. The opaque striæ running from the crown along the neck to the shaft are much more strongly developed than in the hook shown by Arwidsson. The curvature above the capillary bristles of the throat differs, the neck itself is proportionally longer, and the outlines of the neck to the shoulder are not in agreement. The great length and curvature of the shaft is not fully indicated by either author, so that this point remains uncertain.

The tube is a massive structure of grey mud 7-8 mm. in diameter, and at one end tapered to a blunt point which is closed. The interior, which has a diameter of 4 mm., is smooth, being lined by a somewhat firm membrane secreted by the glands. Arwidsson gives in detail the number of the hooks in each segment, the chief feature being that they appear to increase with size and probably age.

### 3. *On the Maldanidæ dredged in the 'Porcupine' Expeditions of 1869 and 1870.*

In the Expedition of 1870 *Praxillella prætermissa* was procured at various stations, e. g. off Cape Guardia. This species was also procured in 1869 in 358 fathoms at Station no. 8, and at Station 17 a, 9 miles off Cape Finisterre, in 795 fathoms.

*Praxillella gracilis*, Sars, occurred in 81 fathoms off Cape

Finisterre; *Isocirrus* D off Cape Guardia; a fragmentary *Leiochone* near B in 795 fathoms at Station 17a; and *Pseudochymene* I in 25 fathoms in Bono Bay. Ehlers\* mentions a fragment of a Maldane, *Praxilla mulleri*, Sars, and *Praxilla nigrita*, sp. n., as occurring in this Expedition. The latter form appears to be allied to *Leiochone*, but the figures of the hooks are indefinite, and one of the bristles of the posterior feet differs from most forms in so far as the spikes on the terminal region point backward.

The first of these is a fragmentary *Praxillura?* (A), dredged in the Expedition of 1870 at Station 8, lat. 48° 13' N. and long. 9° 11' W., at a depth of 257 fathoms on the Channel slope in the midst of a northern fauna.

The cephalic region of this small form is abruptly truncated, the frontal edge being produced into a flattened and somewhat spathulate snout with a rounded anterior border. A slight keel occurs on the truncated surface. The anterior end is flexed in the example, and behind the mouth is a deep furrow. The body is long, slender, and apparently brightly coloured in life, and terminates posteriorly in a somewhat tapered tail which ends in a blunt cone with the anus dorsal. About three or four unarmed segments occur posteriorly. So far as could be observed, only three segments anteriorly bear hooks and bristles, the third pair of hooks being remarkably strong for a form so slender.

The typical hook (Pl. II. fig. 1) is minute, with a moderately long curved shaft, a marked shoulder, proportionally large great fang which makes rather less than a right angle with the neck, a single gular bristle which arises after an interval from the throat, and four teeth on the rather elevated crown. The line between the base of the great fang and the origin of the gular bristle is incurved, and the neck has a considerable inclination backward from the shaft. The bristles consist of stouter winged forms with tapering tips and more slender bristles with hair-like tips. So far as could be seen, both had smooth edges. The tube consisted of secretion with grains of sand and minute fragments of shells.

*Praxillella prætermissa*, var. ?

A form dredged in the 'Porcupine' Expedition of 1870 in 25 fathoms in Bono Bay differs from the ordinary type in its smaller size and in the shape of the anal funnel. It is in a tube of sand-grains loosely connected to a central lining of

\* Zeitschr. f. wiss. Zool. Bd. xxv. p. 63, Taf. iv. figs. 12-17.

secretion. The anterior region is absent. The anal funnel rises abruptly from a broad ring at the base and presents a series of long cirri seven in number, alternating with two or three shorter ones, the largest and broadest (so that it is strap-shaped) being mid-ventral. Another peculiarity is the presence to the left of the segment next the funnel of a short, lateral and proportionally thick cirrus, whilst on the right are two shorter processes, one opposite the former and another a little behind it somewhat longer. The latter separated during the examination.

Another fragmentary form had no lateral cirri in front of the funnel, which had a shorter strap-shaped mid-ventral cirrus and about the same number of longer cirri alternating with the shorter.

So far as could be observed, the bristles (Pl. II. fig. 2) agreed with those of *P. pratermissa* in being smooth. The hooks, though smaller, are similar to those of the common species, with a high crown of six teeth above the great fang and a gular tuft of bristles close beneath.

Two fragments, viz. a funnel and a segment of a form—apparently a *Euclymene* (A)—or forms unknown, were dredged in the 'Porcupine' Expedition of 1869 in 370 fathoms in muddy sand off Ireland. The funnel, which may belong to a different form from the other fragment, has thirty-four cirri, that opposite the vertical ridge being about double the length of the others. All are conical flattened cirri. The rim is only slightly wider than the base, and no constriction occurs in the middle. The basal rim from which the funnel arises is sloped, and a single unarmed segment is attached to it. The separate segment has bristles and hooks. The latter (Pl. II. fig. 3) have moderately long curved shafts, increasing in diameter from the base to the shoulder, then narrowing at the neck, which increases in breadth distally, and with a somewhat high crown which has six teeth behind the great fang. The latter makes less than a right angle with the neck, and a curved gap (concavity) with a slight eminence exists between it and the origin of the gular bristles, much less, however, than in the hook of *Isocirrus* D.

The bristles are strong and straight, with tapered tips and narrow wings. Beyond the wings in some is a flattened region, ending in the delicately tapered tip. The more slender forms do not show traces of wings.

#### *Heteroclymene* ? AB.

A beautifully formed anal funnel, with only a fragment

without bristles, was dredged in 100 fathoms, 30 miles west of Cape Monday, in the 'Porcupine' Expedition of 1870. It is comparatively large, measuring 4.5 mm. in diameter. Viewed laterally it resembles an elegant urn in miniature, with the ventral ridge passing up to its edge and to the longest and largest cirrus. The free edge is neatly cut into minute, rigid, conical cirri, except in the case of three which are subulate and longer. Two of these are symmetrically placed, four short cirri separating each from the long ventral cirrus, whilst on the right five short cirri separate the odd long cirrus from that adjoining. The total number of cirri is fifty-nine, and of these, as indicated, only four are long. The distal cavity is shallow, a fine series of grooves radiating from the central anus to the spaces between the cirri. The ring from which the funnel arises is rounded and only moderately prominent, whilst externally the wall of the funnel is quite smooth.

#### *Maldane sarsi?*

A minute form in a tube of secretion coated with fine sand was dredged in Bono Bay by the 'Porcupine' in 1870. In external appearance, viz. in the slope and structure of the cephalic plate and in the truncated and notched anal plate, it closely resembles *M. sarsi*, though perhaps the latter (anal plate) is more circular. The hooks also appear to correspond, having in lateral view two teeth behind the great fang and indications of a third.

A fragmentary form near *Asychis?*, dredged in the 'Porcupine' Expedition of 1870, 9 miles off Cape Finisterre, in 81 fathoms. Two segments from the middle (?) region of a large species having thin body-walls. Each segment measures about 16 mm. in length and fully 4 mm. in diameter, with the feet at the posterior border. The bristles are (1) strong golden forms with straight shafts and tapered tips with wings, and (2) translucent slender forms with opposite spikes. The hooks are large, with long, curved, striated shafts, a well-marked shoulder, and rather long necks, which are constricted at the commencement, dilate in the middle, and again are somewhat narrowed in the throat. Viewed antero-posteriorly the neck is fusiform. The strong and sharp great fang leaves the neck at a little less than a right angle, and a long straight edge occurs between its base and the anterior projection of the neck from which the gular bristles arise. These are powerful fibres which curve upward and over the tip of the great



fang. The long straight gap at the throat differs from the condition in *Asychis biceps*, and so with the general structure of the hook. The neck is obliquely striated. The intestine is distended with grey mud, which shows through the translucent body-wall.

4. *On the Maldanidæ dredged in the Gulf of St. Lawrence, Canada, by Dr. Whiteaves.*

Besides the species specially mentioned hereafter, *Praxillella prætermissa* was procured off Pugwash, Nova Scotia, No. 59, 1873; in 125 fathoms off Cape Rosier, and at Stations 35 and 36; at No. 28; in Gaspé Bay in 30 fathoms, at Stations A<sup>c</sup>, 37, and 42, 1873. *Praxillella gracilis* occurred in Gaspé Bay, 30 fathoms, and at Stations 35-36 and 46, 9 miles off Souris Head, Prince Edward Island. A form closely allied to *Axiothella catenata* comes from 100-212 fathoms off Anticosti (1871); A, No. 6, 1872, 30 fathoms in Gaspé Bay; and Nos. 37-42, 1873.

*Nicomache* (?) *canadensis*.

Dredged off Port Hood, Cape Breton, and other parts of the Gulf of St. Lawrence by Dr. Whiteaves in 1873, at a depth of 175 fathoms.

The anterior end (Pl. II. fig. 4) of this large form is obliquely truncated and marked by a prominent ridge like a nose in lateral view, and this roughly distinguishes it at first sight from the large northern examples of *Nicomache lumbricalis*. When seen antero-posteriorly the cephalic ridge starts posteriorly from a transverse furrow, narrows a little as it passes downward and forward to terminate in the pre-oral arch of the snout. The nuchal groove on each side begins a little in front of the posterior end of the ridge, keeps closely to its edge, and turns rather abruptly outward, and becomes lost on the surface. The curve is quite different therefore from that of *N. lumbricalis* from Finmark or other northern area, and besides the flatness of the slight elevation between them in the northern form is diagnostic (Pl. II. fig. 8), for in the latter the curve is bold and rounded, as it also is in *Nicomache maculata*.

The mouth (Pl. II. fig. 5) opens just behind the posterior border of the snout as a puckered orifice with a transverse line posteriorly, and having a wrinkled area between the latter and the depressed groove bounding the peristomium posteriorly.

The body is one of the largest in the group, measuring about 250 mm., broader in front, nearly cylindrical throughout the greater part of its extent, and only tapering a little toward the posterior end. In spirit the peristomium is marked by transverse wrinkles, the most posterior of which pass to the ventral surface and form a depressed band or groove a short distance behind the mouth. On the ventral surface a deep groove commences behind the transverse line just indicated, and is continued to the posterior end, where it ceases at the terminal cup. This groove is bounded by the rounded and prominent elevations of the ventral longitudinal muscles, which are likewise marked off on each side dorsally by a longitudinal groove, which is a continuation of the depression running backward from the median cephalic region. The first three segments bear simple bristles which form a short vertical tuft above and slightly in front of the simple spines in these segments. The spines (Pl. III. fig. 9) are powerful, simple, and nearly straight structures, and usually occur singly, though two may be found in the middle segment, whilst in another example the first and second on one side may be double, the rest single. The tips of the spines are often truncated from abrasion, as in the figure. These three segments are differentiated by the fact that the anterior edge ensheaths that in front, though this condition is rudimentary in the first. A glandular area surrounds the bristle-tuft and spine (the representatives of the foot), and they lie in the middle of each segment. The fourth bristled segment is about the same length as the foregoing, and its glandular anterior edge likewise ensheaths the segment in front. It presents a dorsal bristle-tuft in the line of the lateral groove and the spines in front, and a prominent crescentic pad bearing hooks which have long, slightly curved, and striated shafts gently tapering from the shoulder to the base, whilst the posterior edge or neck above the shoulder is concave and the anterior slightly convex, the throat being devoid of hairs. The great fang leaves the neck at more than a right angle, and two curved teeth occur on the crown, which has below it a posterior convexity boldly striated internally. When viewed antero-posteriorly the distal part is narrowed above the shoulder, slightly increases in diameter at the striated region beyond, whilst the crown beyond the main fang is a short blunt cone. The axis is straight in such a view. These bristles and hooks occur a little in front of the middle of the segment, the lower border of the uncinigerous row touching the ventral edge. The fifth bristled segment is somewhat longer than the fourth,

and its glandular anterior edge ensheaths the latter. The foot has moved forward so as to be considerably in front of the middle of the segment, and whilst the bristle-tuft remains in the lateral groove, the uncinigerous pad has so increased in size that one half lies on the ventral surface. The sixth bristled segment is fully a third longer than that in front, and the foot has moved forward, lying immediately behind the white glandular belt, which partly ensheaths the preceding segment. The bristle-tuft retains the same position, but the uncinigerous pad stretches further inward on the ventral surface, the inner edges thus being nearer. The hooks (Pl. III, fig. 6) in these offer no noteworthy point of distinction from those of the fourth bristled segment. Posteriorly this segment is not distinguished from its successor by a glandular belt and collar, the foot with its bristle-tuft and uncinigerous pad alone indicating the segment, and the transverse elongation of the hook-pads has brought their inner edges still closer. The hook-pad, moreover, forms a more elevated ridge, so that the armature boldly projects, and the succeeding feet show similar features, though the hook-ridges gradually come nearer each other in the mid-ventral line as they attain full development. The specimens available for minute description were incomplete, so that the exact number of bristled segments is uncertain, but it probably is twenty-two or twenty-three. The last two present a slight change, in so far as the bristle-tuft is above the lateral groove, the hook-ridges are less elevated and shorter, and have a larger median interval, the last being separated by a larger interval than its predecessor. In these the median ventral groove shows an opaque white line, which can be traced backward to the edge of the anal funnel. The articulation between these short segments differs, for dorsally a lozenge-shaped area at the junction is occupied by a transversely ringed belt, which is continued ventrally. These segments are followed by two narrow unarmed rings without the dorsal groove present in the two preceding segments, but with a shallow lateral groove on each side, and the opaque mid-ventral line. A constriction separates the base of the funnel from the preceding, the opaque ventral line passing into the groove and along the funnel to terminate at the mid-fissure of the two ventral cirri. The ventral outline of the cup is slightly longer than the dorsal and forms a less angle with the axis of the body. Each cirrus forms a low cone with a terminal process or papilla, and there are fifteen of nearly equal size. On the inner or posterior surface each is separated from its neighbour by a line which converges to

the central anus at the bottom of the funnel, the aperture being thus surrounded by a regular series of folds. The gut was filled with the reddish mud amongst which the animal dwells, and the massive tube was formed of the same material with secretion.

The tubes are massive, like those of *Maldane sarsi*, and composed of mud lined by secretion.

A fragmentary *Isocirrus*? which was dredged by Dr. Whiteaves in 1872, in 125 fathoms off Capa Rosier, Gulf of St. Lawrence, Canada, appears to agree with the *Isocirrus* D in the structure of the hooks. The presence of the anterior end, however, shows certain differences which call for remark. The anterior end is characterized by its obliquity, the cephalic plate commencing far back dorsally, and sloping gently to the median frontal process, which is short and broad. The rim is not much developed, and instead of a notch has a lateral fold behind, which the unbroken margin has a tendency to fold inward on the plate. Nearly opposite the lateral incurvation of the rim a furrow passes transversely inward to the keel, which is chiefly developed in front of it, though there is a trace behind it. The keel dilates a little behind the mid-frontal process which it joins. The nuchal grooves pass forward by the sides of the keel, and debouch at each side of the mid-frontal process. The surface of the cephalic plate behind the transverse furrows is marked by transverse lines. The mouth is partially open as an ovoid area, having in the centre two lateral processes of the proboscis with a longitudinal slit between them.

The first segment is short, though a tuft of bristles of the two kinds is present, but no spine could be seen on either side. The second foot bears a short row of hooks which agree with the typical form, except that the gular bristles seem to be absent. The third and fourth also has well-developed hooks and bristles. The intestine of this form contained fine greyish mud in which were diatoms, radiolarians, and other débris.

A form (*Praxillella collaris*, Claparède) dredged off Orphan Bank, Gulf of St. Lawrence, in 1873, differs from *Praxillella prætermissa* in the structure of the cephalic plate. Thus the central anterior process is thicker and more rounded than in the species mentioned; the rim between it and the lateral notch is more prominent in comparison with the posterior border, which, moreover, is crenate and has no median notch. The crenations are broad and blunt in

some, narrower in others. The median keel which runs backward from the central process is, perhaps, scarcely so long as in *P. prætermissa*, but the nuchal grooves are deeper and they run forward to the edge on each side of the median process. No trace of eyes is present. The proboscis forms a smooth ovoid mass in extrusion, and, so far as could be observed, is devoid of papillæ.

The body, which in the examples seemed to reach about 40 mm., somewhat resembles that of *P. prætermissa*, yet it is easily distinguished by the presence of a distinct collar at the fourth bristled segment, which ensheaths the posterior part of the third segment. It has a shallow notch on the median line dorsally, or occasionally a similar notch appears in the mid-ventral line. The number of segments is nineteen, and the last five bristle-bearing segments are somewhat urn-shaped, the dilated posterior end of each—from the elevations for the rows of hooks—corresponding to the lip of the urn. The median ventral streak is elevated as a ridge, which projects as a low cone at the border of the cicatrix formed after rupture. The two terminal segments are devoid of bristles, the anal funnel projecting like a vase from the prominent rim of the adjoining segment at its base. The number of the cirri on the edge varies a little, twenty to twenty-one or thereabout; in the former case one being double. The cirri or processes of the rim are of moderate length and have the shape of elongated blunt cones, one occasionally being shorter than the others, or a broad one is bifid at the tip. Reproduction of the tail readily occurs, the terminal funnel being well formed, though small, at an early stage. Its cirri increase in number as it develops.

The bristles are similar to those of *P. prætermissa*, viz., a group of stronger forms with tapered tips and distinct wings and a group of more delicate bristles with only a trace of wings. No barbs occur on the tips of either. The hooks of the first bristled segment (Pl. III. fig. 7) are distinguished by their great length and comparatively slight curvature. The shoulder is fairly marked and the neck short. The great fang is largely developed and stands straight out, and the teeth on the crown behind form a flattened surface so different from the posterior hooks. Those of the second segment have a similarly flattened crown (four or five teeth), but the shafts are somewhat shorter. In both the hooks are few in number. In the fourth bristled segment the crown of the hook is higher, three or four prominent teeth being visible, whilst the great fang is curved downward at less than a right angle. The shoulder is better marked, and the shaft shorter and more distinctly curved.

In the middle segments the shaft and the crown of the hook are about equal in length, the former increasing from the narrow base to the broad shoulder, beyond which it is very markedly constricted (Pl. III. fig. 8). It then curves forward and again backward—dilating in its progress to the crown, which is very high and has five distinct teeth above the great fang, which curves downward at considerably less than a right angle to the neck. So far as could be observed, no gular bristles occur in this species. The neck has oblique striae internally, and longitudinal striae are in the upper region of the shaft. In the posterior segments the crowns of the hooks are perhaps a little less elevated, but four or five teeth are still visible. The tube is free, composed of secretion coated with reddish mud.

This form differs from *Praxillella affinis*, Sars, in the rim of the cephalic plate, which in the latter is “nach hinten zu fast geschieden,” whilst in both the nuchal organ is long. Eyes are present in Sars's species, absent in this. The proboscis is smooth, whereas in *P. affinis* it has papillæ. The number of bristled segments, of unarmed caudal segments, absence of gular bristles in the hooks, and the structure of the bristles also diverge.

Claparède (1868) describes his *Praxilla collaris* as having a cephalic lobe with a large “collar,” by which he means the rim, the anterior end of the ridge projecting far forward like a conical prow. The vascular rings extend from the fifth to the ninth segment. The hooks of the first three segments differ from the others. There is nothing in this to connect it with the present form, except that he says the fifth segment is shorter than those in front and behind, but it is also larger. It bears two vascular bands (ceintures). He says nothing about ensheathing, nor does his figure show this.

No species of the family is more abundant in the Gulf of St. Lawrence than *Maldane sarsi*, Malmgren, which swarms in the greyish mud of Gaspé Bay, and on similar ground in 125 fathoms off Cape Rosier. In regard to size, moreover, some of the examples exceed any of those mentioned by Arwidsson in his excellent treatise on the Scandinavian and Arctic forms. Thus one from Station 9, 1873, is over 90 mm. in length, and yet a portion of the anterior end and the cephalic plate are absent.

The cephalic plate is very uniform in structure throughout the series, and corresponds with Arwidsson's figures\*, the

\* Skandin. u. arktischen Maldan. Taf. vi. figs. 194 & 197.

general form being somewhat ovoid, with the posterior edge more rounded and elevated into a collar, which curves inward at the notch on the border about a third forward. Bending outward from the front of the notch it passes forward, then flattens outward as it approaches the nuchal organs, the furrow from each of which runs to a slight notch in the margin, the thin plate being continued forward in the median line as a bluntly conical process above the mouth. A little within (*i. e.*, in front of the collar posteriorly) a prominent median ridge, with a converging oblique muscle on each side, curves upward and passes forward to the thin conical anterior plate, upon which it is lost. In some the ridge is distinctly notched in lateral view. On each side of its base anteriorly are the nuchal grooves, a line from which passes to the notch on the margin. In the majority of specimens slight grooves, which run obliquely forward and outward from the median ridge, give a resemblance to a leaf with its midrib and veins. The mouth opens a short distance behind the anterior border of the cephalic plate, and appears as a puckered dimple, often with a groove in front in ordinary preparations, which often have the snout bent at an angle to the trunk, the mouth being thus carried outward. The peristomial segment is covered dorsally by the cephalic plate and is thus pushed ventrally. It bears no bristles or hooks.

The body is continued behind the cephalic plate as a more or less cylindrical region, though much depends on its preparation. Thus some removed from their tubes are quite cylindrical, whilst others, killed in the free condition, show numerous segmental contractions and dilatations. Slight diminution occurs just in front of the caudal disc when viewed from above downward, but, on the other hand, a distinct dorsal increase, terminating at the vent, is evident in lateral view. The dorsum is generally convex throughout, but the ventral surface is more or less flattened, especially after the anterior fifth, where it is ringed and marked by a median line (nerve-cord), which toward the terminal fourth is sunk in a groove, rising, however, toward the caudal plate. The anus terminates dorsally at the end of a ridge, and the margin is slightly crenate. Moreover, a separate papilla just in front of the caudal plate aids in its closure. Occasionally a prolapse of the gut occurs as a flask-shaped hernia, with the narrow neck at the vent. In this the circular and longitudinal fibres of the gut, as well as a thin chitinous layer, are conspicuous. The caudal plate is slightly oblique with regard to the axis of the body, sloping from

above slightly downward and forward. In large specimens the most conspicuous rim is the ventral, which forms a collar as far upward as the median notch on each side, above which is a smooth edge, and then the ventral edge is marked by about six crenations. Each of these is comparatively broad, with a dimple or depression in the middle of the free edge. They are best seen in large examples. It continues upward as a slightly oblique collar, which has a tendency to be flattened out at the dorsal edge, where it is also somewhat narrowed, though in a large example this is not evident. The general shape is ovoid with a tendency to a somewhat narrower dorsal end. A slight median ridge occurs from the dorsal to the ventral edge, stopping short of the collar in each case.

The peristomial segment has no feature of note except the presence of a lateral furrow on each side, from the notch on the cephalic plate. This groove passes backward to the sixth bristle-series running above the glandular elevations and hook-rows; and in some it may be traced a little further backward. The first bristle-bearing segment, like those adjoining, is shorter than those in the centre of the body and more deeply pigmented. Moreover, as Arwidsson has shown, it is largely supplied with glands, and also has non-glandular streaks. The bristles occur as a tuft on each side, and have fairly stout shafts with a short wing distally on the tapering tip (Pl. III. fig. 1), which is comparatively short and peculiarly curved. This and the next five segments are shorter than those in the middle of the body.

The following segment has a bristle-tuft and an elevated pad or ridge with a short row of hooks, the elevation meeting its fellow of the opposite side in the mid-ventral line. In large examples, however, this ridge is less evident, the whole ventral area being glandular, and the same occurs with the third and fourth segments, the rows in these having a gradually increasing number of hooks. The fifth and the sixth segments likewise have a thick glandular coating ventrally and ventro-laterally, the long row of hooks and the bristle-tuft in each being at the dorso-lateral edge. A differentiated glandular area lies between the sixth and seventh setigerous regions, the ventral surface being glandular as before. At the eighth the glandular area stretches from the setigerous region of one side to the other, and thus characterizes it, for the eighth segment has only a small triangular patch in front, the ventral surface being devoid of glands until the ninth setigerous area, which is glandular ventrally and laterally up to the bristle-tuft. In the lateral



region, between the eighth and ninth setigerous region, is a transversely striated glandular band as between the seventh and eighth segments, and this band continues to the last setigerous process. In the large examples the glandular setigerous region at each side is connected by a ventral band of the same tissue, and often an accessory central piece behind it, but toward the tail these are less marked. Two elevations on each side in front of the caudal plate have no hooks or bristles, but they seem to be glandular.

The bristles project from the dorsal end of each row of hooks, and consist of two groups, viz., an anterior with a marked curve after the appearance of the wing (Pl. III. fig. 2) and with a finely tapered tip, and a posterior group which in the first foot have a similar shaft with a straight tip, with narrow wings and a few distinct spikes on the finely tapered extremity (Pl. III. fig. 3). In the next bristled segment (second) the anterior bristles with the curved tips and broad wings have the tapering tips furnished with one or two pairs of spikes which arise opposite each other. The long posterior (or inner?) bristles have narrow wings with long hair-like tips, the stronger series of which do not show spines thereon. A more slender series, however, has the very long hair-like extremity minutely and symmetrically spinous. The succeeding feet present bristles with larger and longer hair-like tips in both series, and these delicate extremities are all similarly spinous, that is, the sides are armed with symmetrical pairs of spikes. Toward the posterior extremity, as in the last two bristled segments, the bristles are very long, yet each group retains certain of the characters observed in front; the anterior series showing the curvature of the tip, and both having long and attenuate spinous prolongations, the posterior, however, far exceeding the other in length. The hooks (Pl. III. fig. 4) are characterized by a long curved shaft which gently enlarges from the base to the shoulder and is striated and tinted. The tip is contracted beyond the shoulder, is paler, then gently dilates to the neck and crown, the centre being also striated longitudinally. The great fang leaves the neck at somewhat less than a right angle, and has a little below it a tuft of stiff hairs, which often curve upward beyond the fang. The great development of the spines behind the main fang makes the crown broad, though only two spines can clearly be made out in lateral view. In antero-posterior view, in all probability, additional points may be seen.

Arwidsson notes that the segmental organs extend from the seventh to the ninth segment.

This author also gives a table showing the number of hooks in the rows from the second to the nineteenth, and, so far as can be judged, they seem to increase, as a rule, with age and size. In the majority of the setigerous processes, that is after the fourth, they are in a double row.

In various small examples a triangular shield-shaped elevation occurred on the dorsum between the fifth and sixth bristled segments, with the broad end in the front or bold transverse folds. In large examples transverse folds in this region are not infrequent: such appear to be due to contraction in preparing.

The tubes are formed of greyish mud and are rounded and generally cylindrical. They retain their shape in the preparations, though when pressure is applied by the fingers they readily crumble. Some present transverse elevations or ridges, and arenaceous foraminifera are included in the thick coating of mud over the central tube of tough secretion. A few of the large tubes are much more consistent, since small stones and tough secretions enter largely into their structure, whilst others have a very firm (brittle) outer layer of secretion and brown mud, whilst the thicker interior layer is softer. Moreover, the tube may be slightly moniliform with an enlarged ring toward one end, which tapers to a thin termination. Such brownish moniliform tubes are coated with grey mud, showing that either a change of site or a selection of materials had been made, unless it is to be supposed that the secretion affects the hue of the mud. In a few, hard flinty grains cause the firm tube to have a surface like sand-paper.

This is a northern form, abundant in the colder areas, but, so far as known, it has not hitherto occurred in the British area. A variety (*M. sarsi*, var. *antarctica*) has recently been described by Arwidsson \*, from Graham's Land, South Georgia, and other parts of the Antarctic region; so that the distribution of this species is noteworthy.

##### 5. *On the Maldanidæ procured by Canon Norman in Norway.*

The widely distributed *Praxillella prætermisssa*, Malmgren, occurred at various stations, *e. g.* 38; a fragment of *Praxillella gracilis*, Sars, was also met with in Long Fjord, East Finmark. *Nicomache lumbricalis*, O. F. M., came with fragments of *Axiothella* from 301 and other stations; *Pseudoclymene quadrilobata* from Nos. 402 & 466; and *Asychis biceps* from Station 44, 1879.

\* Schwedischen Südpol.-Exped. 1901-3, Bd. vi. 6, p. 32.

*Heteroclymene robusta*?, Arwidsson.

A fragment of the posterior end with the funnel was dredged in Norway in 1879, Stations 33 & 34.

The anterior end of this form somewhat resembles *Praxillella*, but the median frontal process is less. Two lateral notches and a median posterior notch occur in the border of the cephalic plate. There are nineteen bristled segments and five unarmed posterior segments. The funnel has a large number of cirri, most being conical and short, but others long. In a series Arwidsson gives from thirty short and seven long to fifty short and five long, the latter, however, sometimes reaching ten or twelve. In the present case there are a total of thirty-five short and seven long. The stout bristles have very narrow wings, and the tapered tips are spinous. The more slender—which Arwidsson seems to call the posterior (“hinterin”)—are still more distinctly spinous. The hooks have curved shafts (Pl. III. fig. 5), boldly marked shoulders, and rather long necks, the strong great fang making nearly a right angle with the neck, and a small interval occurring between its base and the gular bristles. The moderately high crown has six to eight teeth—Arwidsson says even ten.

From Norway also comes a dried form somewhat resembling *Axiothella*, but the anal funnel appears to differ, resembling rather that of *Heteroclymene*, having a large number (about fifty-two) of small conical teeth, with about eight longer cirri at intervals. Moreover, the funnel is finely grooved internally. The hooks have a high crown with eight or nine teeth above the great fang, and the gular bristles arise close to the base of the latter and curve boldly forward and upward.

## EXPLANATION OF THE PLATES\*.

## PLATE II.

- Fig. 1.* Hook of *Praxillella* A, Station 8. ‘Porcupine.’ × Zeiss oc. 4, obj. D, with 2 in. draw-tube.  
*Fig. 2.* Bristle of *Praxillella* near *prætermissa*, Bono Bay. × oc. 4, obj. D.  
*Fig. 3.* Hook of *Euclymene* A, off Ireland. × oc. 4, obj. D.  
*Fig. 4.* Lateral view of the anterior end of *Nicomache* (?) *canadensis*. Somewhat enlarged.  
*Fig. 5.* Ventral aspect of the snout showing the mouth. Somewhat enlarged.

\* I am indebted to the Carnegie Trust for artistic aid with these Plates.

- Fig. 6.* Funnel of the foregoing viewed laterally.  
*Fig. 7.* Internal aspect of the same. Enlarged under a lens.  
*Fig. 8.* Lateral aspect of the anterior end of *Nicomache lumbricalis* from the 'Valorous' Expedition to Greenland in 1875.  
*Fig. 9.* Anterior end of *Praxillella gracilis*, with protruded proboscis, from Canada. Enlarged.

## PLATE III.

- Fig. 1.* Bristle of the first foot of *Maldane sarsi*. × Zeiss oc. 2, obj. D.  
*Fig. 2.* Winged bristle of the second foot with peculiar curvature. × Zeiss oc. 4, obj. D.  
*Fig. 3.* Spiked bristle of the same annelid. × Zeiss oc. 2, obj. D, with draw-tube.  
*Fig. 4.* Hook of the foregoing. × Zeiss oc. 2, obj. D.  
*Fig. 5.* Hook of *Heteroclymene robusta*. Norway. × Zeiss oc. 4, obj. D.  
*Fig. 6.* Hook of *Nicomache? canadensis*. × Zeiss oc. 2, obj. A.  
*Fig. 7.* Hook of the first bristled segment of *Praxillella collaris*. × Zeiss oc. 2, obj. D, with draw-tube.  
*Fig. 8.* Typical hook of the foregoing (no gular bristles). × Zeiss oc. 4, obj. D, with draw-tube.  
*Fig. 9.* Spine from the third segment of *Nicomache? canadensis*. × about 30 diam.  
*Fig. 10.* Bristle from the second foot of the same form. × Zeiss oc. 4, obj. D.

VIII.—On some rare Amazonian Mammals from the Collection of the Para Museum. By OLDFIELD THOMAS.

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By the kindness of the authorities of the Para Museum I have again been permitted to examine some rare mammals which have come into the possession of that institution either from their collectors or from the Para Zoological Gardens, which are kept in conjunction with the Museum.

Notable among these latter is the truly remarkable form, intermediate between the monkeys and marmosets, described as *Callimico snethlageri* by Ribeiro, and referred to below under the heading of *Callimico goeldii*.

The new genus of bats—*Cyttarops*—is also a most interesting discovery.

1. *Callicebus remulus*, Thos.

♂. 1. Cussary, south bank of Amazon between mouths of Xingu and Tapajoz. Coll. O. Martins.

♂. 12. Tamucury, same region, 2 hours distant by canoe.

*C. remulus* was described in 1908 on a specimen from Santarem presented in 1876 by Mr. Wickham. The present exact record of the occurrence of the species is of value, as Santarem might have been merely the place to which the type had been brought from elsewhere. Now, however, it is clear that the species occupies the area between the Amazon, Xingu, and Tapajoz, at the north-western corner of which Santarem is situated.

The new specimens agree with the type in all essential respects.

## 2. *Callimico goeldii*, Thos.

♀. Para Zoological Gardens. Type of *Callimico snethlageri*, Ribeiro.

In the 'Brasilianische Rundschau' for December 1911, p. 21, Dr. A. de Miranda Ribeiro, of Rio Janeiro, described a new genus and species of monkey, *Callimico snethlageri*, which he stated to be "intermediate between *Callicebus* and *Mico*," on a specimen then living in the Para Zoological Gardens. This specimen has since died and has been sent over for examination.

At the first glance it is evident that, as to the species, it is identical with my "*Midas goeldii*" described in 1904\* on a specimen which had also been kept alive in the Para Gardens, but of which the skull had unfortunately been mislaid, my reference of the species to the genus *Midas* being avowedly provisional.

Dr. Ribeiro formed his genus *Callimico* purely on the external characters, which, whatever they may have appeared on the living animal, are by no means very striking on the skin; and it has therefore been with much interest that I have examined the skull of the present specimen.

This proves to be of extraordinary interest, for it seems to show that *Callimico* is really intermediate between the two great Neotropical families Cebidæ and Callitrichidæ, as suggested by Dr. Ribeiro.

Externally the animal is like a marmoset, having similarly long, curved, compressed claws and doubtfully opposable pollex. It should, however, be noticed that the "nails" of many Cebidæ, notably of *Saimiri*, are as compressed as in the marmosets, the only difference being in their length.

On the other hand, the skull is provided with six cheek-

\* Ann. & Mag. Nat. Hist. (7) xiv. p. 189 (1904).

teeth in each jaw, exactly as in the Cebidæ, while the invariable formula of the Callitrichidæ is PM.  $\frac{3}{3}$ , M.  $\frac{2}{2}$ .

In its general shape the skull resembles that of a small *Saimiri*, the brain-case being high and rounded and the upper profile, from tip of nasals to occiput, evenly convex, with no resemblance to the flattened forehead and prominent brow-ridges of the marmosets. The orbits are not as slanting as in *Saimiri*, more so than in *Callithrix*. Malar part of zygoma broadly expanded vertically. Anterior part of base of skull deeply concave between the pterygoids, with a narrow mesial septum. Pterygoids shaped quite as in marmosets, the ectopterygoid not so broadened as in most Cebidæ. Lower jaw with the well-marked chin and comparatively vertical incisors of the Cebidæ instead of the slanted symphysis and incisors of the marmosets. Coronoid and condylar processes nearer together than in either of the related forms.

Molars, although less narrow, essentially of the triangular type of those of marmosets, the internal cingulum well developed, but with no distinct hypocone, the development of this cusp being what causes the characteristic square form of the molars of the Cebidæ and other monkeys, including man. In *Saimiri* the cusp is less developed than in other Cebidæ, but is nevertheless always present. Lower incisors and canines of normal relative proportions, not specialized as in the genus *Callithrix*.

*Callimico* thus proves to be almost exactly intermediate between the otherwise well-defined families Cebidæ and Callitrichidæ, and it is quite a doubtful question as to which of them it should be referred to. On the whole, in spite of its marmoset-like claws and the structure of its molars, I am inclined to place it with the Cebidæ, of which it would form a special subfamily.

We should thus get the following arrangement of the New-World monkeys:—

- |   |                                |
|---|--------------------------------|
| A. Molars $\frac{3}{3}$ . Skull rounded, forehead not flattened. . . . .  | Fam. <i>Cebidæ</i> .           |
| <i>a.</i> Molars with hypocones. Digits with shortened nails (often compressed) . . . .   | Subfam. <i>Cebinæ</i> .        |
| <i>b.</i> Molars triangular, without hypocones. Digits with long claws . . . . .  | Subfam. <i>Callimiconinæ</i> . |
| B. Molars $\frac{2}{2}$ . Skull with flattened forehead. Molars triangular, without hypocones. Digits with long claws . . . . . | Fam. <i>Callitrichidæ</i> .    |

It is to be noted that the difference in structure between molars with hypocones and those without is not so abrupt as

it sounds, for there is almost a perfect series of gradations from (1) the marmosets, which have no trace of hypocones, through (2) *Callimico*, which has a slight rise in the cingulum that might be called a potential hypocone, to (3) *Saimiri*, which has small and simple hypocones, and is itself again separated from (4) *Callicebus* and other monkeys which have complicated square molars with large hypocones and connecting commissures.

### 3. *Centronycteris maximiliani*, Fisch.

♀. Utingu, near Para.

This is the first example of the typical Brazilian *C. maximiliani* (*Vespertilio calcarata*, Wied, nec Raf.; *C. wiedi*, Palmer) which I have had the opportunity of examining, as the only specimen of *Centronycteris* that the British Museum possessed, one from Panama, now proves to be separable (see 'Annals,' December 1912, p. 638).

Members of the genus *Centronycteris* seem to be exceedingly rare in collections, Wied's type from Espirito Santo, a female from Peru in Berlin, and the above-mentioned specimens from Para and Panama being the only ones of which I can find any record.

### 4. *Cormura brevirostris*, Wagn.

*Myropteryx pullus*, Miller.

♂. 4; ♀. 5. Ananindena, near Para.

I am not prepared to accept Mr. Miller's separation\* of the Surinam bats collected by Kappler from Wagner's *Cormura brevirostris*, to which Peters, the author of the genus *Cormura*, himself referred them.

By the great kindness of the authorities of the Berlin and Vienna Museums I have been allowed to examine (1) two (adult and immature) of the four specimens from Surinam typical of *Myropteryx pullus*; (2) the original type of *Cormura brevirostris*, unfortunately now without skull; and (3) the specimen from Baraneiva, Matto Grosso, referred by Miller also to his *Myropteryx pullus*.

Although the loss of the skull of the type of *Cormura brevirostris* makes it impossible to be absolutely certain in the matter, I have come to the conclusion that, at least for the present, these various specimens should all be referred to a single form.

Miller's chief reason for distinguishing *Myropteryx* was its

\* P. Biol. Soc. Wash. xix. p. 59 (1906).

asserted want of a hypocone to the molars; but although the hypocone is low it appears to me fully as much developed as it is in many specimens of *Peropteryx*, or, if it is smaller, the difference is only in degree and not in kind. Perhaps Mr. Miller's examination was made before the skulls were as completely cleaned as is now the case.

The only difference between *Myropteryx* and *Cormura* that might result in the resuscitation of the former is in the shape of the posterior palate, a point in which none of the specimens I have seen really agree with Peters's plate of *Cormura*. But the slightest damage to the most delicate part of the tiny skull, or even insufficient cleaning and consequent inexact drawing\*, might have resulted in such a figure as is published by Peters, and I am therefore not prepared to consider this point as of sufficient importance to counterbalance the other evidences of identity.

A specimen of this same bat was obtained on the Rio Inambari, Peru, by the late P. O. Simons, and two others at Para by A. Robert.

While all the adult specimens of this bat have no basisphenoid septum, as figured by Peters, it is worthy of remark that the immature example received from Berlin has a well-marked septum. Whether this is due to youth or is an individual abnormality I am not at present able to say.

#### 5. *Cyttarops alecto*, gen. et sp. nn.

♂. 10. Moejatuba, near Para, 10th May, 1912. Coll. F. Lima. B.M. no. 12. 11. 4. 5. *Type*.  
 "Caught in garden."

#### CYTTAROPS, gen. nov. (*Emballonuride*—*Diclidurine*.)

Colour normal. Tail without terminal modification, its tip just projecting on the upper surface of the interfemoral. Skull not so highly modified as in *Diclidurus*, the muzzle not bent upwards; a frontal cup present, but its boundaries and the junction of its floor and walls less sharply angular. Slender postorbital processes present. Palate ending opposite last molar. Basisphenoid pit barely defined, practically continuous with roof of mesopterygoid fossa, not divided by a mesial septum. Tibia grooved on plantar aspect, as in *Diclidurus*.

Dentition practically as in *Diclidurus*. Canines without, but incisors with, a supplementary terminal posterior cusp.

\* Possibly worked up from a specimen of *Peropteryx*.



Posterior lower premolar \* contracted antero-posteriorly, the two premolars crushed between the canine and first molar.

Type:—

*Cyttarops alecto*, sp. n.

General appearance that of a medium-sized *Saccopteryx* or *Peropteryx*.

Fur rather long, thin and loose; hairs of back about 6 mm. in length. Colour above and below uniform dull smoky grey, a little browner than Ridgway's "mouse-grey"; the bases of the hairs inconspicuously paler than the tips on the fore-back, darker on the hind-back. Membranes naked, except that the median proximal portion of the interfemoral is more or less hairy. Ears of medium length, broadly rounded, a hair-covered ridge running up the thin anterior surface to the tip, cutting off their anterior third; front edge strongly convex, tip rounded, outer margin convex. Tragus very remarkable in shape, its inner edge of medium length, straight, inner terminal corner angular, outer rounded; lower half of outer margin occupied by a proportionally enormous angular lobe, no such lobe being known in any other bat, the most similar being that on the inner side of the tragus in *Megaderma*. Wings to the outer side of the tarsus. Calcar long, without postcalcareal lobule.

Skull and teeth as defined above.

Dimensions of the type (the starred measurements taken in the flesh by the collector):—

Forearm 46 mm.

Head and body \*50; tail \*20; hind foot \*8; ear 10; tragus on inner edge 2·8; third finger, metacarpal 4·5, first phalanx 9·5; lower leg and foot (c. u.) 27; calcar 15.

Skull: greatest length 12·6; basi-sinual length 10·1; zygomatic breadth 8; interorbital breadth 4·5; length of postorbital process 2·5; intertemporal breadth 3·7; breadth of brain-case 7; height of brain-case from between bullæ 5·6; palato-sinual length 3·1; breadth between outer corners of  $m^2$  6; front of canine to back of  $m^3$  5·5.

*Hab.* of type as above. Another specimen from British Guiana.

This bat forms a most remarkable and interesting discovery, owing to its relationship to the aberrant *Diclidurus*, which it tends to connect with the ordinary members of the Emballonuridae. In appearance it is just like an average sac-wing

\* This tooth is peculiarly abnormal on both sides in the type, the above description being based on Mr. McConnell's specimen.

bat, such as *Peropteryx*, but closer study shows that it is unquestionably related to *Diclidurus*, with which it shares the peculiar frontal cup and grooved tibia. I have been able to find no trace of an antebrachial sac, nor of any caudal modification, but spirit-specimens will be necessary before the absence of these or other analogous characters can be verified.

The first discovery of this bat is to be credited to Mr. F. V. McConnell, who presented in 1908 an example obtained on the Mazaruni River, British Guiana, by his collector Cozier. Owing, however, to the specimen being an imperfect skin, with just the front of the jaws dried in it, it was put away in the collection as a "*Succopteryx*," to some members of which group *Cyttarops* has so strong a resemblance.

Imperfect as it is, this specimen, which was recognized by the unique shape of its tragus, has, however, now been useful in checking some of the characters observed in the Para example, and notably in its indication that the lower premolars of the latter are abnormal in structure.

It is to be noticed that in his description of "*Vespertilio caninus*" Wied states that "Der Schadel hat zwischen den Augen einen tiefen Eindruck," which suggests the frontal cup of *Cyttarops*. But, besides the fact that Peters examined the type, the figure of the tragus in the 'Abbildungen' is sufficient to prove that Wied's bat was really a *Peropteryx*.

#### 6. *Holochilus nanus*, Thos.

♀. Para.

This rare dwarf species of *Holochilus* was described in 1897 on a specimen from the island of Marajó sent to me by Dr. Goeldi.

#### IX.—On small Mammals collected in Jujuy by Señor E. Budin. By OLDFIELD THOMAS.

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By the kind assistance of the Hon. N. Charles Rothschild, the British Museum has received as a donation a collection of small mammals made by Señor E. Budin during March and April 1912 in Central Jujuy, North Argentina, a region from which but few mammals had previously been obtained.

Unfortunately Señor Budin's notes on the localities have

not come to hand, but it appears from the labels that the specimens were collected at (1) Maimara, 2230 m., and (2) Cerro de Lagunita, E. of Maimara, 4500 m., both places being situated near Umahuaca (or Humahuaca), in the centre of the province of Jujuy.

A study of this collection reveals a very striking similarity between the fauna of Jujuy and that of the Eastern Bolivian highlands for some four hundred miles further north. For the general facies of the collection is very like that of the series obtained by the late P. O. Simons in the country round Cochabamba \*, quite a number of the species being absolutely identical, and a very similar fauna extends north-westwards at least as far as La Paz.

The collection contains fifty-four specimens belonging to fourteen species and subspecies, of which five are new. Some notes by Señor Budin on the habits and native names of the species are inserted below.

### 1. *Conepatus ajax*, sp. n.

♂. 21, 42. Maimara. 2230 m.

*C. rex* group.

Fur not specially rich. Direction of hairs on nape variable, running forwards in two specimens and backwards in the other three. White marking consisting of a long narrow oblong from the nape to the middle of the back, slightly forked posteriorly, and divided anteriorly by two or three median black spots or lines, together forming a broken line corresponding to the strong continuous median black line found in most of the allied species. No white on posterior back or base of tail; terminal half of tail consisting of a mixture of black and white hairs.

Skull smaller than in *C. chorensis*, larger than in *C. porcinus*. Last molar decidedly small.

Dimensions of the type:—

Head and body 370 mm.; tail 200; hind foot 67; ear 30.

Skull: condylo-basal length 71; lambda to gnathion 77; greatest breadth 47; interorbital breadth 24; intertemporal breadth 18.5; mastoid breadth 41; palatal length 30.5; breadth between outer corners of  $m^1$  27.5; front of canine to back of molar 23;  $m^1$  9.2 × 9.

*Hab.* Jujuy and Salta, N. Argentine. Type from Maimara, Jujuy.

\* Cf. Thos. Ann. & Mag. Nat. Hist. (7) ix. pp. 125 & 222, Feb. & Mar. 1902.

*Type.* Adult male. B.M. no. 12.12.12.1. Original number 21. Collected 12th March, 1912.

Besides the two specimens of this species obtained by Sr. Budin, there are in the Museum three skunks from Cachi, Salta, collected by Herr J. Steinbach, two at least of which are clearly referable to the same form. The third is much more extensively marked with white, but is probably only one of the aberrations which have to be set aside in studying this difficult and variable group.

### 2. *Mus musculus*, L.

♂. 32, 33, 35; ♀. 34. Maimara. 2300 m.

"Caught in meadows far from houses, in thorn hedges. Not common, either in fields or houses."—*E. B.*

### 3. *Eligmodontia laucha musculina*, subsp. n.

♂. 12, 13, 18; ♀. 4, 6. Maimara. 2230 m.

Very similar to S. Argentine *E. laucha*, but larger. General colour above rather paler, drab-grey; under surface greyish white, with a slight drabby tinge. White post-orbital patch less conspicuous.

Skull decidedly larger than is normal in *E. laucha*, though unusually large examples of the latter may just attain the size of small specimens of *E. l. musculina*. Supraorbital edges unbeaded, as in *laucha*, those of *E. callosa* having distinct beads.

Dimensions of the type (measured in flesh by collector):—

Head and body 100 mm.; tail 98; hind foot 21; ear 16.

Skull: greatest length 26; condylo-incisive length 23·5; zygomatic breadth 13·8; nasals 11·3; interorbital breadth 4; breadth of brain-case 11·1; palatilar length 10·8; palatal foramen 5·9; upper molar series 3·6.

*Hab.* As above.

*Type.* Adult male. B.M. no. 12.12.12.9. Original number 18. Collected 12th March, 1912.

I have been in some doubt as to whether this mouse ought not to be called a separate species, as its skull is so much larger than that of ordinary Buenos Aires specimens of *E. laucha*. But both forms seem to vary a good deal in size, while there are no other distinctions of importance, and therefore it may, for the present, be attached to *E. laucha* in order to emphasize its difference from the still larger *E. callosa*, in which supraorbital beads are developed in old examples.

Sr. Budin's skins of this mouse are unfortunately somewhat overstretched, so that at first sight the animal appears to be fully as large as *E. callosa*, but this impression is corrected by the skulls.

4. *Phyllotis wolffsohni*, Thos.

♂. 43; ♀. 1, 5, 7, 11, 17. Maimara. 2230 m.

Closely similar to the typical specimens from Tapacari, near Cochabamba, some 400 miles north of the present locality.

5. *Phyllotis arenarius*, Thos.

♂. 55. Cerro de Lagunita, E. of Maimara. 4500 m.

In determining these specimens of *Phyllotis*, and studying the characters of the allied genera *Phyllotis* and *Eligmodontia*, the following species has proved to need description:—

*Phyllotis elegantulus*, sp. n.

A small species allied to *Ph. amicus*, but with shorter tail.

Size and general characters about as in *Ph. amicus*. Colour somewhat modified on the specimen skinned out of spirit, but apparently as in *Ph. amicus*; the upper surface drabby grey, the under surface white with the bases of the hairs slaty. Feet slender, with naked soles, as in *amicus*. Tail conspicuously shorter than in that species, brown above, whitish on sides and below.

Skull of about the same size as in *Ph. amicus*, but readily distinguishable by the interorbital region being more evenly contracted, the narrowest point at about the middle of the frontals, instead of the posterior part being much broader than the anterior. Supraorbital edges smoothly square, not beaded. Bullæ rather smaller than in *amicus*.

Dimensions of the type (measured on the skin):—

Head and body 92 mm.; tail (vertebræ *in situ*) 70; hind foot 21; ear 17.

Skull: greatest length 27; condylo-incisive length 23.2; zygomatic breadth 2.5; nasals 11; interorbital breadth 4; palatal length 11.7; palatal foramina 6.4; upper molar series 4.

*Hab.* Pallatanga, Ecuador.

*Type.* Old male. B.M. no. 7. 1. 1. 113. Collected in 1859 by L. Fraser. Received with the Tomes collection.

This is Tomes's "*Hesperomys elegans*, Waterh.," of his paper on the Fraser mammals, P. Z. S. 1860, p. 213, but is

obviously not Waterhouse's species of that name. The specimen had hitherto been taken for an *Eligmodontia*, but a renewed examination shows that it is a *Phyllotis* allied to *Ph. amicus*, and distinguishable by the characters described above.

6. *Andinomys edax*, Thos.

♂. 10, 23, 26, 28, 41, 44; ♀. 9, 20. Maimara. 2230 m.

♀. 59. Cerro de Lagunita, Maimara. 4500 m.

This distinct rat had previously only been obtained by P. O. Simons, who got examples at La Paz and the neighbourhood of Potosi. The mammary formula proves to be 2—2=8.

"Lives in the branches of trees, where it makes its nest."—*E. B.*

7. *Akodon jucundus*, sp. n.

♀. 46. Cerro de la Lagunita, E. of Maimara. 4500 m. 27th March, 1912. B.M. no. 12.12.12.12. *Type*.

A medium-sized pale buffy species, with very small teeth.

Size rather less than in *A. albiventer*. Fur rather long; hairs of back about 10 mm. in length. General colour above pale buffy clay-colour, very much as in *A. andinus*, paler on the head, richest on the back; sides and under surface paler clay-colour (about as in *A. spegazzinii*), the bases of the hairs slaty as usual. Ears short, hairy, dark greyish, an inconspicuous whitish patch behind them. Hands and feet dull buffy whitish, the claws of normal length. Tail grizzled with black and greyish above, buffy whitish on sides and below.

Skull considerably smaller than that of either *A. andinus* or *albiventer*, about as in *A. puer*, low, smooth, rounded, with broad unbeaded interorbital region. Bullæ proportionally rather large. Molars very small, conspicuously smaller than in any of the allied species.

Dimensions of the type (measured by collector):—

Head and body 90 mm.; tail 62; hind foot 20; ear 15.

Skull: greatest length 23·8; condylo-incisive length 22; zygomatic breadth 12·3; nasals 9·5; interorbital breadth 4·1; breadth of brain-case 11·3; palatilar length 9·7; palatal foramina 5·6; upper molar series 3·3.

*Hab.* and *Type* as above.

This pale buffy-bellied *Akodon* is very like *A. andinus*, Philippi, externally, but its skull and teeth are markedly smaller than in the more southern species.

8. *Akodon albiventer*, Thos.

♂. 52. Laguna, Durazno, Maimara. 4500 m.

♂. 56, 61; ♀. 58. Cerro de la Lagunita, E. of Maimara. 4500 m.

Type locality, Lower Cachi, Salta (*C. Spegazzini*). Specimens also received from Challapata and Potosi, Bolivia (*P. O. Simons*). Evidently the common *Akodon* of the "*Octodontomys* area."

9. *Akodon bacchante sodalis*, subsp. n.

♂. 47, 54, 60; ♀. 49. Cerro de la Lagunita, E. of Maimara. 4500 m.

Similar to true *bacchante* in all essential characters, but rather paler throughout. Upper surface olive-grey, without the somewhat bistre tone of *bacchante*. Under surface more prominently white, the inguinal region snowy white. Hands white, the metacarpals scarcely tinged with fulvous. Feet lighter fulvous than in *bacchante*, the toes white or whitish.

Dimensions of the type:—

Head and body 115 mm.; tail 85; hind foot 25; ear 20.

Skull: greatest length 29.5; condylo-incisive length 26.8; zygomatic breadth 14.5; nasals 12.3; interorbital breadth 4.7; palatilar length 12.2; palatal foramina 7; upper molar series 4.3.

*Hab.* as above.

*Type.* Old male. B.M. no. 12. 12. 12. 19. Original number 60. Collected 11th April, 1912.

The type of *A. bacchante* having been collected out of the "*Octodontomys* area," at Choro, in the Securé Amazonian watershed, it is not surprising that its Jujuy relative proves to be subspecifically separable.

"Inhabits the high ground where the Vizcachas are found. But little common, and quite unknown to the inhabitants. Not strictly nocturnal, coming out for food about sunrise. Trapped with meat bait. Ordinarily lives on seeds."—*E. B.*

10. *Otenomys budini*, sp. n.

♂. 48, 53; ♀. 50, 51. Cerro de Lagunita, E. of Maimara. 4500 m.

A brown *Otenomys*, near *C. frater*.

Size rather larger than in *C. frater*. General colour above pale vandyke-brown, not unlike that of *C. tucumanus*, darker and richer than in *C. frater*. Muzzle and lips not darkened.

Under surface drab; axillary and inguinal white patches present or absent. Chin and a darker area across chest brown, separated from each other by an inconspicuous drabby collar. Hands and feet drabby whitish. Tail drabby or brown above, rather lighter below.

Skull smaller than that of *C. opimus*, larger than in *frater* and *tucumanus*. Nasals fairly broad, evenly narrowing backwards. Postorbital processes well marked. Interparietal distinct in all four specimens, its front edge evenly convex, its hinder edge more or less directly transverse. Bullæ, in shape and proportionate size, about as in *C. tucumanus*, smaller than in *opimus*, not so peculiarly narrowed as in *frater*. Ectocondylar processes of lower jaw scarcely developed.

[Beside these normal characters of the skull it should be mentioned that there are, on both sides in three specimens and on one in the fourth, small triangular supplementary bones at the front edge of the parietals, bordering the frontals. Presumably these extra bones are abnormal, but their nearly constant presence in the four specimens of *C. budini* renders them worthy of mention.]

Dimensions of the type (measured in the flesh):—

Head and body 210 mm.; tail 68; hind foot 33.

Skull: greatest length 48·3; condylo-incisive length 49; condylo-basal length 47·2; zygomatic breadth 31; nasals  $17 \times 8\cdot5$ ; interorbital breadth 11·8; breadth across brain-case behind zygomata 18·8; tympanic breadth 30; palatilar length 22·2; upper tooth-series (alveoli) 10·2.

*Hab.* as above.

*Type.* Adult male. B.M. no. 12.12.12.37. Original number 48. Collected 1st April, 1912.

This Tuco-tuco is most nearly allied to *C. frater* and *tucumanus*, but is readily distinguishable from the former by its more evenly swollen bullæ, from the latter by its greater size, and from both by its distinct interparietals. All four skulls of *C. budini* have this bone large and clearly marked, while it is absent in both skulls of *C. frater* and in four out of five skulls of *C. tucumanus*, the fifth having a very small one present.

Whether the peculiar extra fronto-parietal bones will prove to be a normal character of the species remains to be seen, but they may be simply a family character of the individuals sent home.

I have had pleasure in naming this distinct species after Sr. E. Budin, to whose labours this most excellent collection is due.



"Los Tojos. Inhabit the sandy parts of the tops of the rocky hillocks. Were captured in traps placed in the runs made below the soil, but the bait used, potato or maize, was not eaten. Come out of their burrows at sunrise and night-fall. Not very common, living isolated in small families."—*E. B.*

11. *Octodontomys gliroides*, Gerv. & d'Orb.

♂. 38; ♀. 30, 31, 37, 39. Maimara. 2600 m.

This is my *Neoctodon simonsi*, in the description of which I accidentally used a generic name preoccupied in beetles, and, as to the species, was deceived by a figure of the teeth of *Octodon degus* being put—without a word of explanation—on the plate of "*Octodon gliroides*," so that I too rashly supposed that the latter was really an *Octodon*.

This beautiful and conspicuous animal is by far the most characteristic form of what I have therefore ventured to call the "*Octodontomys area*." The type was obtained at La Paz; Mr. Simons got specimens at Oruro, Challapata, Livichuco, and Potosi, and Sr. Budin's specimens show that the species ranges into Central Jujuy.

"The 'Chozchori' are found in the broken rocks of the hills called 'Volcanoes,' or in the walls built of rough stones. Occur up to a height of 3000 m. Are not wild, and are easily shot. Diurnal, seen everywhere in the early morning and late afternoon. Common throughout the district of Umahuaca."—*E. B.*

12. *Viscaccia tucumana*, Thos.

♂. 24, 29. Maimara. 2230 m.

♂. 64. Cerro de Lagunita, E. of Maimara. 4500 m.

13. *Kerodon boliviensis*, Waterh.

♂. 22; ♀. 3, 14, 15, 25. Maimara. 2230 m.

"El Conejo. Common in rough and brambly ground: does much harm to cultivation."—*E. B.*

14. *Marmosa elegans pallidior*, Thos.

♂. 27, 36 (both immature). Maimara. 2230 m.

"Local name 'Achocaya.'"—*E. B.*

X.—*On some Specimens of Glauconycteris from the Cameroons.* By OLDFIELD THOMAS.

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AMONG some mammals from the Cameroons sent for determination by Prof. E. Lampe, of the Wiesbaden Museum, there occur three examples of *Glauconycteris*, representing three different species, one being new and the others of sufficient interest to deserve some notice.

Specimens of this genus are somewhat rare in collections, and any addition to our knowledge of them is very welcome.

The type of the new species and a selection of specimens of the other mammals represented (including *Crocidura dolichura*, Peters) have been generously ceded to the British Museum by the authorities at Wiesbaden.

1. *Glauconycteris argentatus*, Dobs.

♂. No. 23. Bibundi.

This fine species is distinguished from *G. variegatus* and *papilio* by its bicuspid \* inner incisors and less conspicuously marbled wings and interfemoral, in which, however, the ordinary venations are particularly well marked. In colour fresh skins show that the ends of the hairs are not grey, as Dobson (describing from a spirit-specimen) stated, but pale cinnamon or clay-colour.

The species ranges eastwards into British East Africa, where three specimens were obtained during the Rudd Exploration by Mr. R Kemp. Mr. Bates has collected it on the Benito in French Congo, while the present specimen is practically a topotype.

*Chalinolobus congicus*, Noack, from the Lower Congo, would appear to be a synonym of *G. argentatus*.

2. *Glauconycteris egeria*, sp. n.

♂. No. 22. Bibundi. B.M. no. 12. 12. 13. 3. *Type*.

Brown-winged; the ears very large.

Size about as in *G. poensis*, though the skull is longer. General colour uniform dusky brown, not lighter below. Membranes also all dark brown, the reticulations not specially prominent. Ears much larger than in the allied species, subquadrangular, the anterior basal lobule long, projecting backwards; anterior margin with its basal 6 mm. straight, then strongly projecting forward, almost to an angle; the

\* The figure in Dobson's Catalogue is incorrect, though the type has the secondary cusp less developed than usual.

upper half again straight; tip broadly rounded off; outer edge straight above, convex below; the outer basal lobe well developed, rounded. Tragus fairly large, its inner edge concave, outer convex; a well-developed angular external basal lobule. Lobes at angles of mouth rather small. Wings from the base of the toes. Calcar of medium length, a rudimentary postcalcareal lobule present.

Skull large in proportion to the size of the animal, its brain-case of the usual swollen shape, though not to so exaggerated an extent as in some species.

Inner upper incisors long, their distinct secondary cusp near their tips. Outer incisors minute, their tips reaching barely halfway to the secondary cusp of the inner pair. Lower incisors not markedly overlapping.

Dimensions of the type (measured on the spirit-specimen):—  
Forearm 38 mm.

Head and body 43; tail 41; ear, from notch 13·3, from anterior projecting angle 11; greatest breadth 13·5; tragus, length on inner edge 4; third finger, metacarpus 36, first phalanx 14·5; lower leg and foot (c. u.) 24; calcar 15·5.

Skull: greatest length 13; basi-sinual length 10; zygomatic breadth 9·2; interorbital breadth 3·8; breadth of brain-case 7·5; palato-sinual length 5·3; front of canine to back of  $m^3$  4·5; front of  $p^4$  to back of  $m^2$  2·2; breadth between outer corners of  $m^2$  5·5.

*Hab.* and *Type* as above.

This well-marked species is readily distinguishable from the other two brown-winged *Glauconycteris*, *G. poensis* and *beatrice*, by its much larger and less evenly rounded ears and by the length of its skull, which is 13 mm. in length as against 12 mm. in *poensis* and 11 mm. in *beatrice*.

Peters's *Vesperus kraussi*, from Yoruba, Lagos, appears to agree with *G. poensis* in all essential respects. Its locality is almost identical, as the type of *G. poensis* came from the Lower Niger, and not from Fernando Po\*.

### 3. *Glauconycteris beatrice*, Thos.

♀. No. 30. Isongo, near Bibundi.

This, the smallest species of the genus, is distinguishable from *G. poensis* by its short rounded skull, only 11 mm. in length, and its shorter and differently shaped  $i^1$ .

The type was obtained on the Benito River, French Congo, by Mr. G. L. Bates. Another specimen was collected in 1905 at Entebbi, Uganda, by Mr. E. Degen, and is now in the British Museum.

\* See Allen and Thomson, Exp. Niger, ii. p. 479 (1848).

XI.—A new *Oribi* from the Galla Country to the North of Lake Rudolf. By GILBERT BLAINE.

*Ourebia gallarum*, sp. n.

An oribi of large size, with long wavy hair and no trace of a dark patch on the forehead.

Colour of upper parts bright orange-fawn, richer along the dorsal line; the extremities of the hairs on the body fading to cream, their bases being whitish. Forehead orange-fawn, with no trace of a dusky patch between the horns. Bases of the hairs on face, forehead, and down the neck to the shoulders dusky grey, as in other oribis.

Skull very large and massive, characterized by the remarkable development of the bridge across the rostrum in front of the orbits and the consequent great convexity of the facial profile. Nasals depressed. Preorbital fossæ large and deep.

Horns short and stout, annulated at the bases only, inclined strongly backwards as in *O. montana*.

Skull-measurements:—Greatest length 180 mm.; basal length 152; breadth 84; length of nasals 67; length of frontal suture 47; vertical diameter of orbits 32; palatal length 95; upper dental series 52.

*Hab.* Lake Helene, one of a string of small lakes east of the head-waters of the Omo River, and about 60 miles south of Addis Abeba.

*Type.* Adult male. B.M. no. 6. 11. 1. 58. Collected by P. Zaphiro, and presented by Mr. W. N. McMillan in 1906. (Described from a single specimen.)

*Comparative Table of Skull-measurements, to differentiate this Species from O. cottoni and O. montana.*

	<i>O. gallarum.</i>	<i>O. cottoni.</i>	<i>O. montana.</i>
	mm.	mm.	mm.
Greatest length .....	180	171	179
Basal length .....	152	145	156
Greatest breadth .....	84	77	77
Length of nasals .....	67	61	71
Length of frontal suture ...	47	50	46
Vertical diameter of orbits ..	32	30	32
Palatal length .....	95	91	102
Upper dental series .....	52	50	52

This oribi presents some very striking characters. In the general shape and proportions of the skull it resembles the

neighbouring species *O. cottoni* of the Guas n'gishu plateau, but differs from that animal in the more backward inclination of the horns, in this respect resembling *O. montana*.

The hair is of a brighter and richer shade than that of *cottoni*, and differs totally from the grizzled fawn of *montana*. Its wavy texture is not unlike that of a reedbuck. The hair on the body is from 30–40 mm. in length, whereas other oribis have hair of an average length of 20 mm. and not exceeding 30 mm.

The hoofs of this species are larger than those of either *cottoni* or *montana*. Unfortunately no accurate body-measurements could be taken.

## XII.—A Revision of the Asilidæ of Australasia.

By GERTRUDE RICARDO.

[Continued from vol. x. p. 360.]

SINCE the last part of this paper was published in the 'Annals' in September 1912, Dr. Hermann, of Erlangen, has sent me his monograph on the Laphrinæ of South America, in which, however, he includes some species from the Australasian Region. The monograph was published apparently in the early part of last year, so that the names of his new species will have priority over mine. The title of the work is "Beiträge zur Kenntnis der Südamerikanischen Dipterenfauna," published in Nova Acta Abh. der kaiserl. Leop.-Carol. Deutschen Akademie der Naturforscher, Band xxvi. Nr. 1.

He forms four new genera for species from Australia and New Guinea (see p. 205), viz. *Cenochromyia*, *Epaphroditus*, *Adelodus*, and *Cyanonedys*.

*Cenochromyia* comprises two new species only, from New Guinea—*C. xanthogaster* and *C. guttata* (p. 115). *Epaphroditus* comprises *Laphria placens*, Wlk., from New Guinea (p. 118). *Adelodus* (p. 124) comprises two new species from Queensland and New South Wales, *A. rufipes* and *A. nigrocæruleus*; I have seen no examples of these.

*Cyanonedys* comprises three new species which I had placed in the genus *Clariola* (see 'Annals,' Sept. 1912, p. 357), viz. *Cyanonedys leucura* (p. 133: my *Clariola nigrescens*); *Cyanonedys lugubris* (p. 132: my *Clariola aureafacies*); *Cyanonedys hornii* (p. 133: my *Clariola albohirta*).

## ATOMOSIA, Macquart.

Dipt. Exot. i. p. 73 (1838).

Formed for species from America. No Australian species has been described as belonging to this genus so far, though one from New Guinea described by Walker under *Laphria* is placed here by v. d. Wulp; but a new species from Victoria appears to belong to this genus. I compared it with the type of *Atomosia affinis*, Macq., from Brazil, in the Paris Museum, and it appeared to agree with it in generic characters.

The genus belongs to the group with no curved spine on fore tibiæ, and has the cross-veins closing the discal and fourth posterior cells parallel.

*Atomosia australis*, ♂ ♀, sp. n.

Types from Dandenong Ranges, Victoria.

A small blue-black species, with white-haired tibiæ. *Wings* shaded on the cross-veins.

Length 9 mm. (♂), 8 mm. (♀).

*Face* with grey tomentum, brown in centre below the antennæ; no tubercle present; moustache consists of rather long, weak, black hairs, reaching entirely over face as far as the antennæ; one or two white hairs near the mouth (♀); in the ♂ the face is more widely brown and the moustache consists of long yellow hairs below and black above. *Antennæ* black, the first joint quite twice as long as the second, which is small, the third about one and a half times as long as the first two, with no end-bristle, the first two joints with black pubescence; back of head with long black hairs, beard and pubescence on lower part of head white. *Thorax* brownish, with short fulvous pubescence; *scutellum* similar, with long weak bristles posteriorly. *Abdomen* blue-black, shining, the same width throughout, finely punctuate; sides and apex with fine white pubescence; underside brown; some black bristles at apex of abdomen. The male has the abdomen somewhat darker, the genital organs distinctly visible on the underside. *Legs* black, coxæ reddish brown, the femora with white hairs below, the tibiæ covered with white pubescence on the upper side and with black bristles on each border, the tarsi with black bristles and pubescence. *Wings* clouded with brown on the cross-veins; the anterior branch of third vein curved; the subcostal cell closed in a point, the first posterior and discal cell narrow, the second and third wide, the fourth closed, the cross-vein closing it is

a little *below* the one which closes the discal cell ; the second and third posterior cells are exactly above the discal and fourth posterior cell. Halteres yellow.

*Aphestia chalybæa*, Röder.

Stett. ent. Zeit. xlii. p. 386 (1881).

The type (a male) was described from Peak Downs, Australia ; no specimen in Brit. Mus. Coll. or Mr. French's Coll. The genus is distinguished by the long third joint of *antennæ* and by the transverse veins closing the discal and fourth posterior cell being in a line. Röder describes his species as black. *Face* with white moustache and beard. *Abdomen* copper-coloured at base, steel-blue shining on posterior borders with white hairs ; the remaining segments shining copper-coloured. *Legs* steel-blue.

Length 7 lines.

Dr. Hermann suggests that this species may belong to his new genus *Adelodus* : see his remark, p. 125.

NUSA, Walker.

Dipt. Saund. i. p. 105 (1851).

*Andrenosoma*, Rond. Dipt. Ital. Prodrôme, i. p. 160 (1856).

*Elacotoma*, A. Costa, Atti R. Accad. Napoli, i. p. 49 (1863).

This genus is distinguished from *Laphria* by the closed or almost closed first posterior cell of *wing*. *Abdomen* more or less bare.

The only species recorded from Australia is *Nusa tectamus*, Walker.

*Nusa tectamus*, Walker.

List Dipt. ii. p. 374 [*Laphria*] (1849), et vii. Suppl. 3, p. 559 (1855) ;

Kertész, Cat. Dipt. p. 195 [*Laphria*] (1909).

*Andrenosoma vidua*, Bigot, Ann. Soc. Ent. France, (5) viii. p. 228 (1878).

Type (♀) from Port Essington, Arnhem Land, N. Australia (purchased from Mr. Gould), and a long series of males and females from Queensland (*Bancroft* and *Dodd*), and one male from Victoria. Mr. Froggatt records it from Queensland.

A large blue-black species with grey pubescence on *thorax* and base of *abdomen* and on *legs*. *Wings* clear, the first posterior cell closed at border.

Length 22–25 mm.

*Male*.—*Face* covered with dirty grey tomentum, silvery white at sides, and with long dirty grey hairs ; the tubercle,

which is large and takes up the greater part of face, is shining black in the middle and carries the moustache composed of long black bristles. *Palpi* blackish, with black bristly hairs. Beard whitish. Proboscis at base with long whitish pubescence. *Antennæ* blackish, the first joint two-thirds the length of the third joint, with white hairs and one long reddish-brown bristle at its apex; the second very short, not half the length of the first, with a long black bristle on each side; the third rather broad and flat, with no style. *Forehead* and hind part of head with whitish pubescence. *Thorax* blackish brown, with grey tomentum on shoulders and continued as stripes median and lateral; the pubescence on dorsum short, chiefly greyish, sides with longer hairs and with three or more black bristles above the base of wings and three weaker ones beyond; breast-sides with chiefly long greyish pubescence. *Scutellum* with grey tomentum and pubescence.

*Abdomen* metallic blue-black, the first two segments covered with long grey pubescence, which, however, does not attain the posterior border of second segment; the other segments bare; the anus with black hairs; sides of abdomen with two black bristles on the first segment and one each on the following four segments; underside with long pubescence black, except at the base, where it is greyish. *Legs* blue-black, with long greyish hairs on the femora and tibiæ, the tarsi armed with black bristles and a few bristly hairs; the posterior femora incrassate, with some stout black bristles on the apical half, the middle femora with two at the apex. *Wings* clear, veins brown, slightly shaded; the first posterior cell closed at border (in one male from Queensland it is almost open at the border and there is an appendix present); fourth and fifth posterior cells closed, the small transverse vein situated on the basal third of the discal cell.

*Female* is similar, but the pubescence at base of *abdomen* and on *legs* is much less, and on the hind femora, which are not so incrassate, it is largely black; the ovipositor long and pointed.

*Andrenosoma vidua*, Bigot, appears to me from the description to be identical with this species.

#### Maira, Schiner.

Verh. zool.-bot. Ges. Wien, xvi. p. 673 (1866).

This genus comprises blue-black metallic species with swollen hind femora, and all the legs, especially in the males,



with long pubescence; the head orbicular and much excised behind; the moustache confined, or almost so, to oral opening. The genus is chiefly confined to the Oriental and the Australasian Regions, but so far only three species have been described from Australia, Tasmania, and New Zealand.

The synonymy of some of the species is in the greatest confusion, largely owing to the difficulty of identifying Walker's species from his descriptions. Below is given what appears to be the correct synonymy for a few of the Walker species from the Australasian Region (Australia and New Zealand excepted) from examination of the types, but little can be done till the genus is thoroughly monographed. The species recorded from Australia and New Zealand are only two:—

*Maira ænea*, Fabr., Syst. Antl. p. 161 [*Laphria*] (1805). See Kertész's Cat. for full references.

*Maira auribarbis*, Macq., Dipt. Exot. Suppl. 3, p. 182 (1847), et Suppl. 4, p. 375 (♀) (1849).—*Lophria consobrina*, Proc. Linn. Soc. London, iii. p. 84 (1859); Bigot, Ann. Soc. Ent. France, (5) viii. p. 218 (1878); Kirby, Ann. & Mag. Nat. Hist. (5) xiii. p. 459 (1884).

### *Maira ænea*, Fabr.

A species widely distributed, recorded from New Zealand. No specimens from there or from Australia are in the Brit. Mus. Coll. or Mr. French's Coll. *Laphria comes* ♂ ♀, *censors* ♂, and *replens* ♀, Walker (this latter is *not* a synonym of *Macra spectabilis*, Guérin, as given in Kertész's Cat.), are probably synonyms of this species.

There is one male in Brit. Mus. Coll. from New Hebrides.

### *Maira auribarbis*, Macquart.

*Laphria consobrina*, Walker.

The male type was described from Java, and later Macquart recorded a female from Australia.

The type is apparently lost.

Macquart placed it under *Lumpria*, a genus confined to the American continent, with spines on underside of hind femora; in Kertész's Cat. it is placed under this genus.

In Brit. Mus. Coll.:—Walker's type (♀) from Waigiou (not Aru Islands), and other specimens from New Hebrides, New Guinea, Aru Islands, and a male and female from Queensland.

From Macquart's description this species is probably the same.

Macquart described his species thus :—Violet. Moustache and beard golden-coloured. Legs with yellow hairs. Wings half brown and half hyaline.

Length  $6\frac{1}{2}$  lines. ♂.

Related to *L. aenea*. Palpi black, with black hairs. Face and moustache golden-coloured, with long black bristles. Forehead with grey tomentum. Antennæ black, the first joint with yellow hairs and black ones below. Thorax with shoulders and sides golden tomentose. Abdomen without spots or segmentations. Legs black, with violet reflections; femora and tibiæ with long yellow hairs. Wings: the anterior half hyaline, posterior half blackish brown; neuration as in *L. aenea*.

From Java, my collection (Suppl. iii. p. 182).

Male has been described. A female is placed with it, which differs as follows :—Posterior femora less incrassate; tibiæ with much fewer long hairs. Wings brownish, a little paler towards the base. The first transverse vein is situated on the third instead of the quarter of the discal cell. It comes from New South Wales, whilst the male is described from Java (Suppl. iv. p. 375).

The *face* in Walker's species is bright golden yellow, with the same coloured hairs above tubercle, which latter is blackish with grey tomentum; the moustache composed of eight long black bristles, the golden-yellow hairs intermixed with them; the second, third, and fourth segments of *abdomen* have traces of white spots, and underside has white segmentations. *Wings* clear at base and on fore border as far as stigma; elsewhere brownish.

Length 17 mm.

The other specimens vary somewhat in colouring of *wing*; one specimen from Amboyna has them entirely hyaline and they vary in size from 12–22 mm.

### *Maira gloriosa*, Walker.

Proc. Linn. Soc. London, iii. p. 84 [*Laphria*] (1859).

*Maira kollari*, v. d. Wulp, nec Dol. Tijds. v. Entom. (2) vii. (xv.) p. 201 (1872).

? *Maira spectabilis*, Schiner (nec Guérin), Verh. zool.-bot. Ges. Wien, xvii. p. 381 (1867).

Type (♀) from Aru Island and two males from same locality, either of which may be the type.

A specimen from Key Island is labelled "*gloriosa*," but as the abdomen is covered with short golden pubescence, as in *M. paradisiaca*, Wlk., I conclude the labels have got transposed. The three typical specimens have the abdomen bare, shining, purple and green metallic.

*Maira spectabilis*, Guérin.

*Laphria congrua*, ♂, Walker.  
*Laphria consurgens*, ♀, Walker.  
*Laphria socia*, ♀, Walker.

These types all appear to be synonyms of the above.

*Laphria cærulea*, Boisduval, the female type, also labelled *L. iodisoma*, was seen by me in the Paris Museum, and appears to me to be the same as *M. spectabilis*; it is a large species, measuring 23 mm. Moustache of long black hairs, with some yellow ones below intermixed, and yellow hairs on face. *Antennæ* black, the third joint destroyed. *Thorax* dull blackish, with white spots on shoulders. *Abdomen* and *legs* metallic blue, the latter with long white hairs on all the femora and tibiæ, apices of latter with some black ones and the tarsi with long black hairs. *Wings* tinged brown, the fourth posterior and anal cell closed, the first posterior wide open.

*Maira paradisiaca*, Walker.

Proc. Linn. Soc. London, iii. p. 128 [*Laphria*] (1859).

Type (♂) from Key Island.

The species described by v. d. Wulp as *M. tomentosa* must be very near this species, if not the same.

To the Walker species under *Maira* in Kertész's Cat. the following should be added:—

*Laphria setipes*, from Gilolo.

*Laphria conveniens*, from Batjan and Gilolo.

*Laphria flagellata*, from Gilolo.

## LAPHRIA, Meigen.

Illiger's Magazine f. Ins. ii. p. 270 (1803)

This genus is distinguished from *Maira*, Schiner, by the thicker moustache, which is not confined to the oral opening, but extends upwards; face usually with a tubercle. The character of the head being not or only very slightly excised behind seems rather a doubtful one; indeed authors, v. d. Wulp in particular, seem to differ as to the characters of *Maira*, which was divided off from *Laphria*.

The following species of *Laphria* in *sensu stricto* are recorded from Australia and Tasmania:—

*Laphria telecles*, Walker, List Dipt. ii. p. 374 (1849), et vii. Suppl. 3, 559 (1855).

*Laphria rufifemorata*, Macq., Dipt. Exot. Suppl. 1, p. 201, pl. vii. fig. 16 (1846).

*Laphria fulviceps*, Macq., l. c. Suppl. 4, p. 376, pl. vii. fig. 5 (? New Holland) (1849).

- Laphria ornatipennis*, Macq., *l. c.* p. 377, pl. vii. fig. 4.  
*Laphria niveifacies*, Macq., *l. c.* p. 377, pl. vii. fig. 5; v. d. Wulp,  
 Sumatra Exped. Dipt. p. 231 (1881); Kertesz, Cat. Dipt. p. 203  
 (1909) [*Maira*].  
*Laphria flavifemorata*, Macq., *l. c.* p. 377, pl. vii. fig. 5.  
*Laphria calopogon*, Bigot, Ann. Soc. Ent. France, (5) viii. p. 226 (1878).  
*Laphria bancrofti*, sp. n.  
*Laphria fulvipes*, sp. n.  
*Laphria hirta*, sp. n.

- |  |                              |
|--|------------------------------|
| 1. Legs wholly black. Wings yellow, with dark apex and spots . . . . .                             | <i>ornatipennis</i> , Macq.  |
| Legs violet. Wings brownish, but with no dark apex or spots . . . . .                              | <i>niveifacies</i> , Macq.   |
| 2. Legs black and yellowish or red . . . . .   | 3.                           |
| 3. Abdomen bluish black, usually with white lateral spots . . . . .                                | 4.                           |
| Abdomen black, with fulvous lateral spots . .  | 6.                           |
| Abdomen bluish black, the apex reddish yellow.   | 7.                           |
| 4. Legs black, posterior femora yellow . . . . .   | <i>telecles</i> , Wlk.       |
| Legs black, all femora and tibiæ yellow at base.   | <i>fulvipes</i> , sp. n.     |
| Legs black, all femora more or less yellow . .   | 5.                           |
| 5. Wings clear. Small species. Moustache black. No white spots visible on abdomen . . . . .        | <i>flavifemorata</i> , Macq. |
| Wings brownish. Larger species. Moustache black and white. Abdominal white spots present . . . . . | <i>rufifemorata</i> , Macq.  |
| 6. Legs black, middle and posterior femora and all tibiæ yellow . . . . .                          | <i>hirta</i> , sp. n.        |
| 7. Legs black, femora and tibiæ reddish yellow at base . . . . .                                   | <i>bancrofti</i> , sp. n.    |

*Laphria telecles*, Walker.

Types (♂ ♀) from W. Australia and another male from New South Wales.

A species distinguished by the yellow swollen posterior femora, with a blue-black shining *abdomen*, with white lateral spots on the second, third, and fourth segments; pubescence on them and on sides white and dense; underside blue-black, with white pubescence. The *face* is black, with a black moustache on the tubercle and dense silvery white hairs above reaching *antennæ*, the first two joints of which have black pubescence. *Palpi* with black hairs. Beard white. *Legs* blackish, with dense white pubescence, thickest on the anterior and middle pair; some black hairs intermixed, and wholly black on tarsi. *Wings* brownish, paler at base; veins brown; the *neurination* as in *L. rufifemorata*.

Length, ♂ 19 mm., ♀ 13 mm.

*Laphria rufifemorata*, Macquart.

Type (♀) seen in Paris Museum, 12. 4. 11.

In Brit. Mus. Coll. are three females from Tasmania,

others from S. Australia (*Bakewell*) and Victoria; and in Mr. French's Coll. from Dandenong Ranges, Victoria.

Macquart omitted any mention of the white spots on abdomen.

A medium-sized black species, with blue-black *abdomen* marked with white spots. *Legs* black; femora yellow, the posterior pair much swollen and curved. *Wings* brownish.

Length, ♂ 13–16 mm., ♀ 9–17 mm.

*Face* black, with large prominent tubercle on lower part, some grey tomentum near eyes and under antennæ. Moustache of long black bristles on tubercle; above this some fine white or yellow hairs reaching to the antennæ. Beard of white silky hairs. *Forehead* black, with black pubescence, the hairs round the head black. *Antennæ* black, the first joint long, the second one very short, both with long black hairs; the third longer than the first two together, with no bristle at apex, nearly the same width throughout. *Thorax* blue-black, with silvery white tomentose shoulder-spots; pubescence black, even on the spots; sides of breast with silvery white tomentum and long white pubescence, tufts of white and black hairs intermixed near root of wings. *Scutellum* with two black bristles and white pubescence. *Scutellum* and *abdomen* shining blue-black or with purple reflections; on sides of second, third, and fourth abdominal segments is a silvery white spot; sides of abdomen with white hairs, in the ♀ they are black posteriorly; genital organs of ♂ prominent, in ♀ ovipositor pointed, sometimes visible and pointed, or covered by last segment; underside blackish. *Legs* black, the fore femora only yellow at base, sometimes only a mere spot at base or extending nearly halfway; middle and posterior pairs yellow for two-thirds of length, all somewhat swollen, but posterior pair more so than the others; the pubescence chiefly white and long; tibiæ with long black and white pubescence; tarsi with black pubescence and bristles. *Wings* hyaline, with a brown tinge round all veins, giving them a brown appearance; the first posterior cell is long and narrow, the small transverse vein being situated very near the base of discal cell, it is very slightly narrower at opening; fourth posterior cell closed some way from border of wing. Halteres yellow.

2 ♀ and 1 ♂ from Melbourne are identical but for the pubescence on the *legs*, which is chiefly black, not largely white as in the type, only pale-coloured on the light parts and black elsewhere.

*Laphria fulviceps*, Macquart.

In the description Australia is given with a query.

It is described as a black species with brown *wings*. *Antennæ* and *legs* fulvous.

Type is apparently lost.

*Laphria ornatipennis*, Macquart.

Type (♀) seen in Paris Museum, 12. 4. 11.

Moustache of stout black bristles, one or two yellow ones near mouth. Third joint of *antennæ* yellowish. *Scutellum* with long, black, fine bristles. Ovipositor with long yellowish hairs. No curved spines on fore tibiæ. *Wings* yellowish, with brown markings, situated at the apex, on discal, fourth and fifth posterior, and upper part of second basal cell; the apical marking does not extend beyond the base of fork of third vein, the second and third cells are only partially filled with brown, and the anal cell only in its upper half.

Macquart's figure of wing does not represent the brown colour very correctly.

In Brit. Mus. Coll. and Mr. French's Coll. male and female from Queensland.

A species easily recognized by the colouring of the *wings* yellow and brown and by the depressed, narrow, metallic bluish-black *abdomen*, with white lateral spots.

Length 17 mm.

The *wings* in these specimens are yellowish, the apex and posterior border brownish, the dark colouring extending to base of branch of third vein in a straight line from costal border to the posterior border to base of first posterior cell, continuing and occupying all the remaining posterior cells and most of the anal cell; base of wing nearly hyaline; the first posterior cell open, fourth closed, the small transverse vein on basal third of discal cell. The *scutellum* in male is armed with long bristles, yellow in the centre and black at the sides; in the female all are black. The ovipositor of female small, ending with long yellowish hairs. The third antennal joint in the female is wholly yellowish. The moustache in the male consists of golden, soft, long hairs.

*Laphria niveifacies*, Macquart.

This species, placed under *Maira* in Kertész's Cat., is more probably a species of *Laphria*, judging from the description of the moustache.

The type is apparently lost, as it was not to be found in the Paris Museum.

Macquart describes it thus:—

Violet black. Abdomen with white hairs. Moustache black. Legs violet. Wings half brown.

Length, ♀, 4 lines.

Beard white. Face with snowy white tomentum; moustache black, covering half the face. Antennæ: the first two joints black, the third wanting. Thorax and abdomen with blue, violet, and green reflections; hairs on sides white. Legs violet, with white hairs and black spots; posterior femora incrassate; posterior tibiæ swollen and curved. Wings: the anterior half hyaline, the posterior half brownish; neuration normal.

From Tasmania. Paris Museum.

In the figure of *wing* the small transverse vein is below the middle of discal cell, the first posterior cell narrower at border, the fourth and anal cells closed.

Wulp described a female specimen from Sumatra which he thought might belong to this species, measuring 6.5 lines. He placed it under *Maira*, on account of the incrassate posterior femora and metallic colour of the *legs*. The *wings* were black-brown at the apex, extending into the basal cells, and the white hairs at sides of abdomen were not apparent.

#### *Laphria flavifemorata*, Macquart.

Type (♀) seen in Paris Museum, 12. 4. 11.

A small species, measuring only 9 mm., blue-black in colouring, with yellow femora.

*Face* fairly broad, with a large prominent tubercle. Moustache composed of black bristles. Beard white. *Thorax* with some whitish tomentum at the sides and long soft black hairs at sides, with shorter ones on the dorsum. *Scutellum* identical. *Abdomen* bare, shining, no white spots visible, with short black hairs at sides. Femora below with white hairs, hind pair a little incrassate; tibiæ with long black hairs. *Wings* hardly brown, as Macquart describes, clear, with black veins, the first posterior cell narrowed at border, the fourth and anal closed; the small transverse vein very near the base of discal cell, just above the base of the fourth posterior cell.

This is a very much smaller species than *Laphria telecles*, Wlk., with which I compared it.

#### *Laphria calopogon*, Bigot.

A male from Australia.

Described as black, with long grey pubescence below *abdomen* and femora and on both sides of tibiæ. The borders of the second, third, and fourth segments of *abdomen* fawn-coloured or testaceous. Femora at base and fore tibiæ at base with red spots. *Wings* blackish.

*Laphria bancrofti*, ♀, sp. n.

Type (♂) from Mackay, Queensland (G. Turner).

Type (♀) from S. Queensland (*Bancroft*), and other females.

A species nearly allied to *L. fulvipes* and *L. hirta*, sp. n., but distinct from both, the bluish-black *abdomen* being reddish yellow at the apex.

Length, ♀ 11, ♂ 17 mm.

*Female*.—*Face* black, with yellow tomentum; the moustache consists of long, weak, black hairs, with shorter whitish hairs above and below. *Palpi* with black pubescence. Beard white. Hind part of head with black pubescence. *Thorax* dull black, with yellow tomentose spots on shoulders, one on each side on centre of dorsum, and a yellow border round posterior half of thorax; pubescence black, yellow posteriorly, with four long, red (in the other female white), bristly hairs between the scutellum and base of wings. *Scutellum* black, covered with grey or fulvous tomentum and some yellow pubescence. *Abdomen* blue-black, shining, with yellowish-white tomentose spots on the second, third, and fourth segments, the sixth and seventh segments wholly reddish yellow; the ovipositor blackish, with yellow and black hairs. *Legs* black, the posterior femora swollen and yellow on their basal half, on the others only yellow at their base, tibiæ widely yellow on the basal half; pubescence of legs long, white, on the tarsi short and black. *Wings* brownish, paler at the base; neuration as in *L. ruffemorata*, with the exception of the first posterior cell, which is considerably narrowed at opening.

*Male*.—Identical, but the four long red bristles on *thorax* are replaced by three black ones. The spots on *abdomen* are not visible, and only the sixth segment is reddish yellow, and on the posterior border only; the genitalia are shining black and prominent; the middle and posterior femora are not yellow on their basal half.

*Laphria fulvipes*, ♀, sp. n.

Type (♀) and two others from Mackay, Queensland (G. Turner).

A small species with black legs, distinguished by the femora being yellow on their basal half and by the yellow tibiæ, which are black at their apices on the middle and anterior legs and on the posterior pair more widely so. From *L. hirta* it may be distinguished by the less pubescent *legs* and by the white spots on the dull black *abdomen*. The *face* has a black moustache, with long golden-yellow hairs above reaching to the antennæ; pubescence on forehead and



on hind part of head black. *Thorax* and *scutellum* dull black like the abdomen; the white tomentose spots on the latter appear on the first four segments at sides and have yellowish pubescence. *Legs* with black sparse pubescence. *Wings* with the neuration as in *L. rufifemorata*, but the first posterior cell is very considerably narrowed at opening. In all other particulars it is the same as *L. hirta*.

Length 12 mm.

*Laphria hirta*, ♂, sp. n.

A species with blue-black abdomen, but fulvous at sides instead of having white spots; legs very hairy, yellow, fore femora almost wholly black, the others black at apices; tibiæ black at apices, tarsi black.

Length 15 mm.

Type (♂) from Australia, 59. 10. 3.

*Face* covered with long, bright, fulvous hairs, the moustache appearing as long, black, isolated bristles on tubercle. *Palpi* with black hairs. Beard white. *Antennæ* with black hairs on first two joints. *Forehead* with black hairs, which extend over hind part of head, becoming white below. *Thorax* blue-black, with the usual white tomentose spots on shoulders and traces of a whitish border posteriorly and across suture. *Scutellum* blue-black, with black hairs. *Abdomen* blue-black, the fulvous colour appearing on side of each segment; pubescence on sides of abdomen fulvous; genital organs shining black, prominent; underside dull fulvous. *Legs* hairy, the coxæ black, with grey tomentum and some fulvous pubescence; the femora all swollen, and with tibiæ have long fulvous pubescence on the yellow parts, paler on the fore femora, and long black pubescence on the black parts, the tarsi with wholly black pubescence. Halteres red-brown. *Wings* brownish; neuration as in *Laphria rufifemorata*.

The species in the *Laphria* genus from New Guinea and other parts of the Australian Region are very numerous.

Of the Walker species, on an examination of the types the following remarks are based:—

*L. ampla*, from Amboyna, appears to be identical with *L. vulcanus*, Wied.  
*L. argentifera* and *L. conveniens* probably belong to the genus *Maira*.

*L. declarata* appears allied to the genus *Atomosia*.

*L. aperta* and *L. tripars*, from New Guinea and Waigiou, appear identical; they are very small in size; Dr. Hermann places the latter in his new genus *Cenochromyia* (see p. 117). *L. pipunculoides*, also a very small species, has a striking character in the eyes, which take up nearly the whole of the head and are joined in the middle; Dr. Hermann places it in the genus *Clariola* (see p. 113).

The following species are from Celebes :—

- L. diocroides*, a very small species with a very narrow face, bearing a general resemblance to a *Leptogaster* species; Dr. Hermann places it in *Cenochromyia*, but incorrectly, the fourth posterior cell being open.
- L. partita* appears to be a species of *Maira*.
- Laphria disciplina*, from New Guinea, is very probably the same as *Laphria doryca*, Boisduval, Voyage de 'l'Astrolabe,' Entom. ii. p. 662, pl. xii. fig. 10 [*Dasyopogon*] (1835), seen by me in the British Museum. The thorax is covered with bright fulvous tomentum; the antennæ, face, beard, and legs are the same colour; on the sides of thorax and breast a brown median stripe appears. Abdomen dull brownish red. Wings brown, with white streaks—one at apex, another between the first and second posterior cells, and smaller ones in the cells. *Laphria concludens*, Wlk., from Celebes, appears very nearly related, if not identical.

### POGONOSOMA, Rondani.

Rond. Dipt. Ital. Prodr. i. p. 160 (1856).

No species are known from Australia itself. Two are recorded from Amboyna and Batjan I. by Doleschall and v. d. Wulp.

The genus is easily recognized by the presence of three cubital cells.

### ASILINÆ.

The genera as yet recorded from Australia, Tasmania, and New Zealand are :—

*Asilus*, L.; *Ommatius*, Wied.; *Blepharotes*, Westwood; *Promachus*, *Erax*, *Proctacanthus*, Macq.; *Philodicus*, *Cerdistus*, *Neoitamus*, Loew; *Glaphyropyga*, Schiner; *Dysmachus*, Wlk.; *Heligmoneura*, Bigot; *Neoratus*, Ricardo (*Aratus*, Wulp); and *Pararatus*, gen. nov.

From other parts of the Australasian Region occur species belonging to the genera *Pamponerus*, Loew; *Allocotosia* and *Emphysomera*, Schiner.

### Table of Genera.

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|---|--------------------------------|
| 1. Style of antennæ feathered . . . . .   | 2.                             |
| Style of antennæ bare . . . . .   | 4.                             |
| 2. Third joint of antennæ always considerably longer than the first two joints together.                        | <i>Allocotosia</i> , Schiner.  |
| Third joint of antennæ short, usually shorter than the first two joints together . . . . .                      | 3.                             |
| 3. Face with a tubercle . . . . .   | <i>Ommatius</i> , Wied.        |
| Face quite flat, with no tubercle . . . . .   | <i>Emphysomera</i> , Schiner.  |
| 4. Abdomen extremely broad, depressed, with tufts of hairs at sides. Ovipositor short, not compressed . . . . . | <i>Blepharotes</i> , Westwood. |
| Abdomen not extremely broad . . . . .   | 5.                             |

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|--|----|------------------------------|
| 5. Wings with three submarginal cells . . . . .  | 6. |                              |
| Wings with two submarginal cells . . . . .   | 7. |                              |
| 6. Second submarginal cell at most half as long as the first submarginal cell . . . . .  |    | <i>Promachus</i> , Loew.     |
| Second submarginal cell as long or only a little shorter than the first submarginal cell . . . . .                                       |    | <i>Philodicus</i> , Wlk.     |
| 7. Posterior branch of third vein curves forward to meet the costa at or before the tip of wing; an appendix sometimes present . . . . . | 8. |                              |
| Posterior branch of third vein terminates beyond the tip of wing; no appendix . . . . .  | 9. |                              |
| 8. Ovipositor cylindrical, with a terminal circlet of spines . . . . .   |    | <i>Proctacanthus</i> , Macq. |
| Ovipositor laterally compressed, without a terminal circlet of spines . . . . .  |    | <i>Erax</i> , Scop.          |

*Subgenera of Asilus.*

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|--|-----|--------------------------------|
| 9. Ovipositor laterally compressed . . . . .   | 10. |                                |
| Ovipositor conical . . . . .   | 17. |                                |
| 10. Third joint of antennæ unusually long and broad, flattened . . . . .   |     | <i>Glaphyropyga</i> , Schiner. |
| Third joint of antennæ normal shape, if long always very long . . . . .  | 11. |                                |
| 11. End lamellæ of ovipositor egg-shaped, wedged in; thorax with bristles disposed like a mane . . . . .   |     | <i>Dysmachus</i> , Wlk.        |
| End lamellæ of ovipositor free, style-like; thorax with bristles not disposed like a mane . . . . .  | 12. |                                |
| 12. Posterior border of eighth ventral segment in male more or less widened. Ovipositor in female not so long as in <i>Neoitamus</i> . . . . .   |     | <i>Machinus</i> , Loew.        |
| Posterior border of eighth ventral segment in male not widened . . . . .   | 13. |                                |
| 13. Legs prevailing shining yellow . . . . .   |     | <i>Heligmoneura</i> , Bigot.   |
| Legs prevailing black or light and opaque-coloured . . . . .   | 14. |                                |
| 14. Male genitalia club-like; ovipositor long, including the sixth and seventh segments. Male genitalia not club-like; sixth and seventh segments not included in ovipositor . . . . . | 15. |                                |
| 15. Large species; third posterior cell very wide. Tibiæ black . . . . .   | 16. |                                |
| Small species; third posterior cell not very wide. Tibiæ usually testaceous . . . . .  |     | <i>Pararatus</i> , gen. nov.   |
| 16. Face with a very small tubercle. Legs mainly black . . . . .   |     | <i>Neoitamus</i> , Ost.-Sack.  |
| 17. Large species; wing very much curved outwards at costal border in the male . . . . .   |     | <i>Cerdistus</i> , Loew.       |
| Wing not (or hardly) curved outwards at costal border in male . . . . .  | 18. |                                |
| 18. Abdomen with no bristles before the segmentations; large or middle-sized, usually bright-coloured species . . . . .  | 19. |                                |

19. Abdomen with short close pubescence, nearly bare. Wings not white at base. *Asilus*, Linn.  
 Abdomen with long fine outstanding pubescence. Wings usually white or pale at base ..... *Pamponerus*, Loew.

### ALLOCOTOSIA, Schiner.

Verh. zool.-bot. Ges. Wien, xvi. p. 845 (1866).

No species have been recorded in this genus from the Australian Region with the exception of three species from Celebes, viz. :—

*Allocotosia aurata*, Fabr., *scitula*, Wlk., and *vulpina*, Bigot; the Walker species has also been recorded by Schiner from Amboyna.

### EMPHYSOMERA, Schiner.

Verh. zool.-bot. Ges. Wien, xvi. p. 845 (1866).

The only species as yet recorded from the Australasian Region are *E. nigra*, Schiner, Novara Reise, Dipt. p. 195 (1868), from Gilolo; *E. peregrina*, v. d. Wulp, Tijds. v. Entom. (2) vii. (xv.) p. 253 (1872), from Ternate; and *E. spathulata*, Dol., Nat. Tijds. Nederl. Ind. (4) iii. xvii. p. 89 (*Ommatius*) (1858), from Amboyna.

Walker's species *Ommatius platymelas* is the same as *E. spathulata*. *Ommatius invehens* and *bacchoides*, Walker, both belong to this genus from I. Waigiou and Ceram; the latter type, a male, has the wing dilated on fore border as in *E. peregrina*.

The genus is easily distinguished by the flat face and club-shaped abdomen.

### OMMATIUS, Wiedemann.

Dipt. Exot. p. 213 (1821).

The following species are recorded from Australia and Tasmania :—

- Ommatius chinensis*, Fabr., Ent. Syst. iv. p. 383 [*Asilus*] (1794). For other references and synonyms see Kertész, Cat. Dipt. 1909.  
*Ommatius angustiventris*, Macq., Dipt. Exot. Suppl. iv. p. 293, pl. viii. fig. 10 (1849); Schiner, Verh. zool.-bot. Ges. Wien, xviii. p. 410 (1867).—*Ommatius corabus*, Wlk., List Dipt. ii. pp. 473 et 759.  
*Ommatius lema*, Wlk., List Dipt. ii. p. 472 (1849), et vii. Suppl. 3, p. 759 (1855).  
*Ommatius dimidiatus*, Macq., Dipt. Exot. Suppl. iv. p. 394, pl. viii. fig. 11 (1849).  
*Ommatius vitticrus*, Bigot, Ann. Soc. Ent. France, (5) vi. Bull. lxxxv. 2 (1876).  
*Ommatius mackayi*, sp. n.  
*Ommatius queenslandi*, sp. n.

*Ommatius chinensis*, Fabricius.

For synonyms see Kertész, Cat 1909, p. 306.

A male and female from Burpengary, Queensland (*Dr. Bancroft*), answer to the description of the above species, which is recorded from China, Japan, Corea, Java, Sumatra, &c., but not as yet from the Australasian Region. The above specimens are identical with others in the Brit. Mus. Coll. from Amboyna, only differing in the colour of the bristles on the femora, which are chiefly white instead of black.

It is a large robust yellowish species, with black *legs*, the tibiæ reddish yellow. *Face* with yellow hairs, moustache and beard the same colour.

*Ommatius angustiventris*, Macquart.

*Ommatius coræbus*, Wlk.

Macquart's type a male seen by me in Paris Museum, 12. 4. 11. A specimen of *O. coræbus*, Wlk. (from Vigers Coll.), is identical with it, the moustache more white than yellow, and the bristles on the hind femora all black, whereas in the Macquart type some are white.

Walker's types, male and female, from unknown locality (Hardwicke Bequest).

This is a black species with yellow tibiæ; the *wings* dilated in the male.

Macquart's description is as follows:—

Black. Thorax with golden stripes. Abdomen narrow, with ashy-grey subpubescence. Moustache yellow; tibiæ red. Wings dilated. Length 9 lines, ♂. Palpi with yellowish hairs. Beard yellowish white. Face not very prominent, rather narrow, golden yellow; moustache yellow, only reaching halfway up the face. Forehead rather narrow; anteriorly golden yellow, the rest black. Antennæ close together, black. Eyes with green reflections. Thorax: the spaces between the black stripes as well as the sutures a bright golden yellow; the intermediate stripe divided longitudinally by a brownish testaceous stripe; sides yellowish white; scutellum ashy grey. Abdomen narrow, black, with slight grey tomentum and short white hairs scattered on sides and segmentations; genital organs in male small, consisting only of two claspers horizontally opposite each other, shining black. Legs black, with short yellowish hairs and black bristles; tibiæ pale yellow, the anterior pair with no spines, the intermediate and posterior ones black at apex. Wings hyaline, grey on fore border and at apex; the outer border abruptly dilated; stigma testaceous.

From east coast of New South Wales. Paris Museum.

*Ommatius lema*, Walker.

Type (♀) from New South Wales (Haslar Hospital).

A blackish species; the tibiæ dull yellowish red on their outer borders, femora incrassate. Moustache yellow. *Wings* pale brownish.

Length 18 mm.

*Face* blackish, with grey tomentum. Moustache composed of long yellowish hairs and about seven long black bristles, four above the oral opening and three near antennæ. *Palpi* brown, with long whitish hairs. Beard yellowish. *Antennæ* black. *Thorax* black, with grey tomentum on shoulders and at sides, and as faint stripes on dorsum; two short black bristles above root of wings and two beyond, and numerous weaker ones on posterior part of dorsum. *Scutellum* with two black ones on its border. *Abdomen* blackish, a few black hairs at anus. *Legs* black; coxæ covered with grey tomentum; fore tibiæ obscurely reddish, the others only yellowish red on their outer borders; posterior and middle femora armed below with four black bristles; fore femora with whitish pubescence below. *Wings* pale brownish, nearly clear on posterior border, the small transverse vein placed on the apical third of discal cell; fourth posterior cell with a short stalk.

The type from which this description is taken is in a dirty faded condition. It is distinguished from *O. angustiventris* by the incrassate femora, armed with four, not two, bristles, and by the less highly coloured tibiæ.

*Ommatius dimidiatus*, Macquart.

Type apparently lost; not to be found in the Paris Museum.

A female in the Brit. Mus. Coll. from N. Queensland is probably nearly allied to this species.

Macquart describes it as follows:—

Black. Legs red, femora above and the tibiæ below black. Length 4 lines, ♀.

*Palpi* with black hairs. *Face* shining black, with a little grey tomentum; moustache composed of black and yellowish bristles. *Antennæ* black. *Thorax* with indistinct grey stripes. *Abdomen* with slight grey tomentum. *Tarsi* black; the first joint yellow, black at apex. *Wings* clear, the discal cell with a long stalk.

From Tasmania. Paris Museum.

*Ommatius vitticrus*, ♀, Bigot.

Described as dull brown. *Face*, beard, and moustache

grey, the latter with black bristles above. *Abdomen* with grey pubescence. *Wings* pale smoky. *Legs* testaceous, femora and tibiæ with a black stripe on outer border.

Length 15 mm.

*Ommatius mackayi*, sp. n.

Type (♂ ♀) from Mackay, Queensland (G. Turner, 1894).

A handsome yellowish species, with well-marked blackish stripes on *thorax*. *Legs* black, femora at base and tibiæ wholly yellow. *Wings* hyaline, in male dilated.

Length, ♂ 26, ♀ 20 mm.

*Male*.—*Face* blackish, with silvery white tomentum; tubercle not very prominent. Moustache reaching to quite the middle of face, which narrows considerably above, composed of long bristly white hairs, four long yellowish bristles conspicuous above. *Palpi* small. Beard white. *Antennæ* brownish, with the usual long feathered bristle. *Forehead* yellower than face; ocelligerous tubercle large, brown, with some yellowish bristles. Head much excised behind, the hairs at back yellowish. *Thorax* covered with bright fulvous tomentum, lighter on the shoulders, and marked with two central narrow black stripes and with shortened side-stripes; a few short black bristles appear in centre of dorsum anteriorly and some long fulvous hairs posteriorly; sides with pale yellow hairs and two strong black bristles above base of wing, two more below; breast-sides brownish, with white tomentum. *Scutellum* fulvous, bordered with some yellowish hairs.

*Abdomen* brownish, with bright fulvous tomentum on the first two segments; all segments with short, fairly thick, fulvous pubescence. Genital organs very prominent, blackish, sides with yellowish hairs, a tuft of long fulvous hairs on the first segment. *Legs* black, the coxæ covered with grey tomentum, the fore pair with long white hairs; the femora yellow below, the hind femora yellow at base; tibiæ yellow, hind pair black at apex; tarsi yellow on the first joint of fore and mid pair; pubescence of legs yellowish, bristles black. *Wings* much dilated on costal border, strongly rilled in the marginal and submarginal cells and less so in the first and second posterior cells; the small transverse vein beyond the middle of discal cell; veins brown.

*Female* identical; the stout bristles in moustache are darker in colour, hairs at back of head black and bristly, the bristles below base of wings are more in number. *Wings* not dilated and hardly rilled.

*Ommatius queenslandi*, sp. n.

Type (♂ ♀) from Stanuany Hills, N. Queensland (Dr. T. L. Bancroft, 1909).

A small black species; *abdomen* with some grey tomentose spots. *Legs* black, *tibiæ* yellowish. *Wings* clear, not dilated in the male.

Length, ♂ 9, ♀ 14 mm.

*Male*.—*Face* brownish, with yellowish-grey tomentum. Moustache composed of long, yellow, bristly hairs. Tubercle not very prominent, but reaching to antennæ. Beard silvery white. *Antennæ* black, with long feathered bristle. *Fore-head* reddish brown, with black pubescence. Back of head with black hairs curved inwards. *Thorax* blackish brown, with grey tomentum on shoulders and at sides, on middle suture, and on posterior part of thorax; on this last appear numerous black bristles and white pubescence; some black pubescence on dorsum; sides with whitish hairs and two stout black bristles above base of wings; breast-sides covered with ashy-grey tomentum. *Scutellum* covered with grey tomentum, with yellowish hairs on border. *Abdomen* blackish brown, with grey tomentose side spots and very scattered grey pubescence; genital organs not very prominent, black hairs on last segments. *Legs* black; *tibiæ* yellow below, posterior pair yellow at base; femora with white pubescence and bristles black, which, however, are yellow on posterior incrassate pair; *tibiæ* with black bristles and yellow or whitish hairs. *Wings* hyaline; veins brown, small transverse vein beyond the middle of discal cell; cells anteriorly rilled.

*Female* identical. *Abdomen* with incisions of some segments ashy-grey tomentose; the grey pubescence is white and more abundant.

The following species have been recorded from New Guinea and other parts of the Australasian Region:—

*Ommatius annulatus*, *cnemideus*, Bigot; *aruensis*, *excurrans*, *fulvimanus*, *infernus*, *schlegelii*, *serenus*, *suffusus*, Wulp; *minimus*, *minor*, Dol.; *canus*, *discalis*, *lucifer*, *nanus*, *retrahens*, Walker. Of these last, *canus*, *nanus*, *retrahens* (and also *strictus* from Celebes) have no tubercle on face, but the abdomen is not club-shaped as in *Emphysomera*; the type of *discalis* appears to be missing.

[To be continued.]



XIII.—*A new Galago from German East Africa.*

By Dr. EINAR LÖNNBERG, F.M.Z.S., &amp;c.

THE R. Nat. Hist. Museum, Stockholm, has recently obtained from Mr. K. Kittenberger a *Galago* which was collected at Ukina, near Schirati, east of Victoria Nyanza, German East Africa, in March 1911. The specimen is an old male with especially the upper canines well worn. It is remarkable for its light-coloured fur and its large and heavy skull. So far as I know, it is not described, and I propose to name it

*Galago argentatus*, sp. n.

With regard to certain relative dimensions, this *Galago* belongs to the *Otolemur*-group, and, in most cases, the difference is quite plainly pronounced: the diameter of the orbit (20 mm.) is larger than the distance from the anterior margin of the *foramen infra-orbitale* to the gnathion (about 18 mm. to the most prominent point); the length of the nasals (27.5 mm.) is subequal or a little longer than the distance between the anterior brim of the orbit and the gnathion (27 mm.); the length of the ears (about 51 mm.) is less than the length of the hand (55.5 mm.), and also less than two-thirds the length of the head (the greatest length of the skull being 84 mm.).

The general colour is very light grey, and may be called light silvery grey. It is very little darker along the back, and in some lights a very faint buffish tinge may be discerned in some places. The forehead has a slight brownish tinge due to brown tips to the hairs. The outer sides of the legs are coloured like the sides of the body. The feet are pale brownish mixed with pale grey. The sides of the head and neck are dirty white. The lower parts are pure white along the middle line, somewhat greyish towards the sides. The tail is white, rather sharply set off from the grey of the back and very little obscured by dark tips to the hairs on the proximal two-thirds, a little more dusky towards the end.

The fur is soft and thick. Its length on the middle of the back is about 35 mm. More than the proximal half of this length is very dark grey, but the distal portion is white. The scattered long hairs produce the silvery-grey colour by being blackish with or without white subterminal rings. Along the middle of the lower parts and on the inner sides of the thighs the fur is pure white to the base. On the sides of the belly and breast the fur is lead-grey at the base.

Length of head and body (approximately from skin) 36 cm. (probably a little more in the flesh). Length of tail about  $42\frac{1}{2}$  cm. Length of ear (softened) about 51 cm. Length of hind foot (softened) 95 mm.

	mm.
Occipito-nasal length of skull . . . . .	82·5
Condyllo-incisive length of skull . . . . .	75·5
Basal length of skull . . . . .	69
Zygomatic width of skull . . . . .	55
Width of brain-case . . . . .	33·5
Postorbital constriction . . . . .	17
Interorbital width . . . . .	16·5
Breadth across canine alveoles . . . . .	22·3
Length of nasals . . . . .	27·5
Length of upper molar series . . . . .	24·5
"    "    tooth series, including the canine . . . . .	31
"    "    lower molar series . . . . .	20·9
"    "    tooth series, including the canine . . . . .	46
Palatal length to front of incisors . . . . .	33·5

The *crista sagittalis* is well developed and extends forward over the whole parietal and posterior portion of the frontal.

The cranial measurements of this species appear to be considerably larger than in any other species of this group, and as the colour as well is very distinct, it seems to be a very easily recognized animal.

#### BIBLIOGRAPHICAL NOTICE.

*Index Zoologicus No. II. An Alphabetical List of Names of Genera and Subgenera proposed for Use in Zoology, as recorded in the 'Zoological Record,' vols. 38-47 inclusive (1901-1910), and the Zoology Volumes of the 'International Catalogue of Scientific Literature,' Annual Issues 1-10, together with other Names not included in previous Nomenclators.* Compiled (for the Zoological Society of London) by CHARLES OWEN WATERHOUSE, I.S.O., and edited by DAVID SHARP, M.A., F.R.S., Editor of the 'Zoological Record.' London, 1912.

MR. C. O. WATERHOUSE'S 'Index Zoologicus,' published by the Zoological Society in 1902, is known to every systematic zoologist as an indispensable supplement to the indispensable "Scudder," and he has once again earned the gratitude of the zoological world by his 'Index Zoologicus No. II.,' covering the years 1901-1910. Like the former volume, this is far more than a mere combination of the indexes of successive volumes of the 'Zoological Record.' A very large number of names omitted from previous nomenclators have been included, with, in nearly all cases, a reference to the original source. No fewer than 774 of these omitted names have been discovered by Mr. Waterhouse himself. From the editor's preface we learn that the total number of generic and subgeneric names proposed for use in zoology is estimated at 140,000, of which about 62,000 are indexed in Mr. Waterhouse's two volumes. These figures give some measure of the extent to which he has lightened the burden of future bibliographers.

# THE ANNALS

AND

## MAGAZINE OF NATURAL HISTORY.

[EIGHTH SERIES.]

No. 62. FEBRUARY 1913.

XIV.—*The Osteology and Classification of the Teleostean Fishes of the Order Scleroparei.* By C. TATE REGAN, M.A.

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THE Scleroparei or Loricati may be defined as acanthopterous physoclists with anterior pelvic fins, each of a spine and five or fewer soft rays, and with the second suborbital typically produced across the cheek, forming a "stay" for the præoperculum. The group is a natural one, and so large and varied that it may be accorded ordinal rank, whilst recognizing that the most generalized family, the Scorpenidæ, is not very remote from generalized Percoids, such as the Serranidæ.

Jungersen has recently expressed the opinion that both the Thoracostei (Gastrosteidæ) and Hypostomides (Pegasidæ) should be added to the Scleroparei. The osteological researches on which this opinion is based have not yet been published, and it is not my intention in any way to anticipate them; in the case of the Gastrosteidæ it has long been recognized that the suborbitals have the Scorpenoid arrangement, and they have been separated from the Scleroparei mainly because the pelvic bones are not attached to the cleithra; as a result of recent studies of the order Percomorphi, I conclude that this character has not the importance which has been attributed to it, and I readily accept the

Gastrosteoids as Scorpænoïds in which the attachment of the pelvic bones to the cleithra has been lost. On the other hand, after making a study of the osteology of *Pegasus* and *Parapegusus* I am unable to appreciate the supposed relationship to the Scleroparei, and I regard the Hypostomides as a distinct order.

Recently Allis has issued a beautifully illustrated memoir on the cranial osteology of *Scorpana*, *Myoxocephalus*, *Trigla*, *Peristedion*, and *Dactylopterus* ('Zoologica,' Stuttgart, Ivii. 1909, pp. 1-219, pls. i.-viii.). Berg's memoir entitled 'Die Cataphracti des Baikal-Sees,' published in 1907, includes an excellent account, with figures, of the osteology of several Cottid genera and of *Comephorus*. Starks has given a complete description of the skeleton of *Sebastolobus* (Proc. Calif. Acad. i. 1898, pp. 361-370, pls. xxii.-xxiv.). Garman has monographed the Cyclopteridæ (Mem. Mus. Comp. Zool. xiv. 1892). Gill has paid particular attention to the mail-cheeked fishes, and has supplemented an essay on the classification of the group (Proc. U.S. Nat. Mus. xi. 1888, pp. 567-592) with papers dealing with particular genera or families, viz.: *Dactylopterus* (Proc. U.S. Nat. Mus. xiii. 1890, pp. 243-248, pl. xix.), Cyclopteridæ (*t. c.* pp. 361-376, pls. xxviii.-xxx.), *Hemitripterus* (*t. c.* pp. 377-380, pl. xxxi.), and *Gnathanacanthus* (Proc. U.S. Nat. Mus. xiv. 1891, p. 701); those on the Cyclopterids and *Hemitripterus* include good figures of the cranial osteology.

In working out the classification I have had the advantage of examining the skeleton of at least one genus in each family, and when skeletons of other genera have not been at hand I have usually been able to test characters of importance on spirit-specimens.

The following scheme indicates the limits and contents of the

## Order SCLEROPAREI.

### Suborder I. SCORPÆNOIDEA.

#### Division I. SCORPÆNIFORMES.

##### Family 1. Scorpænidæ.

*Scorpana*, *Sebastes*, *Pterois*, *Tenianotus*, *Apistus*,  
*Glyptauchen*, *Centropogon*, *Tetraroge*, *Gymnapistus*,  
*Prosopodasys*, *Cocotropus*, *Erisphex*.

##### Family 2. Triglidæ.

Subfamily 1. Triglinæ: *Trigla*, *Lepidotrigla*, *Pri-notus*, *Pterygotrigla*.

Subfamily 2. Peristediontinæ: *Peristedion*.

Family 3. **Caracanthidæ.***Caracanthus.*Family 4. **Aploactidæ.***Aploactis, Trichopleura.*Family 5. **Synanciidæ.***Lysodermus, Minous, Chorismodactylus, Inimicus, Synancia, Erosa, Leptosynancia, Trachicephalus.*Family 6. **Patæcidæ.***Gnathanacanthus, Patæcus.*

## Division 2. HEXAGRAMMIFORMES.

Family 1. **Hexagrammidæ.***Hexagrammus, Agrammus, Ophiodon, Zaniolepis, Oxylebias.*Family 2. **Anoplopomatidæ.***Anoplopoma, Erilepis.*

## Division 3. PLATYCEPHALIFORMES.

Family **Platycephalidæ.***Platycephalus, Bembras.*

## Division 4. HOPLICHTHYIFORMES.

Family **Hoplichthyidæ.***Hoplichthys.*

## Division 5. CONGIOPODIFORMES.

Family **Congiopodidæ.***Congiopus, Zanclorhynchus.*

## Division 6. COTTIFORMES.

Family 1. **Cottidæ.***Rhamphocottus, Radulinus, Icelus, Icelinus, Astrolytes, Pseudoblennius, Jordania, Triglops, Scorpaenichthys, Hemilepidotus, Oligocottus, Artedius, Myxoccephalus, Oncocottus, Cottocomephorus, Cottus, Uranidea, Ascelichthys, Abyssocottus, Blepsias, Hemitripterus, Synchirus, Ereunias.*Family 2. **Cottunculidæ.***Cottunculus.*Family 3. **Psychrolutidæ.***Psychrolutes, Neophrynichthys.*Family 4. **Comephoridæ.***Comephorus.*

Family 5. **Agonidæ.**

*Percis, Hypsagonus, Brachyopsis, Occa, Pallasina, Podothecus, Agonus, Aspidophoroides.*

Family 6. **Cyclopteridæ.**

Subfamily 1. Cyclopterinæ: *Cyclopterus, Cyclopteroichthys, Liparops.*

Subfamily 2. Liparidinæ: *Liparis, Careproctus, Paraliparis, Rhinoliparis.*

## Suborder 2. GASTROSTEIOIDEA.

Family 1. **Gastrosteidæ.**

*Gastrosteus, Pygosteus, Eucalia, Spinachia.*

Family 2. **Aulorhynchidæ.**

*Aulorhynchus.*

## Suborder 3. DACTYLOPTEROIDEA.

Family **Dactylopteridæ.**

*Dactylopterus, Dactyloptena.*

## Suborder 1. SCORPÆNOIDEA.

Mesethmoid ossified; nasals paired; an opisthotic; second suborbital rigidly attached to first. Post-temporal of moderate size, attached to epiotic and sometimes pterotic above, to opisthotic below; supra-cleithrum overlapping anterior part of upper end of cleithrum; pelvic bones directly attached to cleithra. Anterior vertebræ free, normally formed. Pectoral base subvertical, often procurvent below.

*Synopsis of the Divisions and Families.*

I. Opisthotic large, extending forward to or narrowly separated from prootic.

A. Post-temporal forked.

1. Hyo-palatine bones all present and normally developed.

a. Vertebræ 24 to 40; anterior ribs, when present, sessile or on very short parapophyses, posterior ribs on strong parapophyses; two nostrils on each side. (*Scorpeniformes.*)

α. Epiotics not united by suture behind supraoccipital; suborbitals well ossified.

\* Three pairs of dentigerous upper pharyngeals.

† Gill-membranes free; pelvic fins well developed; ribs present at least on posterior præcaudal vertebræ.

Spinous dorsal longer than soft; anal with 2 or 3 pungent spines; pectoral radials anvil-shaped. . . *Scorpenidæ.*

Spinous dorsal shorter than soft; anal with 1 pungent spine or none; pectoral radials plate-like. . . *Triglidæ.*

†† Gill-membranes broadly attached to isthmus; pelvic fins very small; no ribs . . . . . *Caracanthidæ*.

\*\* A single pair of dentigerous upper pharyngeals; anal spines flexible; ribs absent; body scaleless.

Gill-membranes free; dorsal fin commencing on head; pelvics I 2, the inner ray not adnate . . . . . *Aploactidæ*.

Gill-membranes attached to isthmus; dorsal fin commencing behind head; pelvics I 4-5, the innermost ray adnate by membrane to skin of abdomen. *Synanciidæ*.

β. Epiotics united by suture behind supraoccipital; suborbitals very thin or even membranous; one pair of dentigerous upper pharyngeals; gill-membranes free.

*Patæcidæ*.

b. Vertebrae 42 to 64; all or most of the ribs and epipleurals inserted together on strong parapophyses. (*Hexagrammiformes*.)

Gill-membranes free; a single nostril on each side; a basisphenoid . . . . . *Hexagrammidæ*.

Gill-membranes attached to isthmus; two nostrils on each side; no basisphenoid . . . . . *Anoplopomatidæ*.

c. Vertebrae about 27; ribs attached to sessile epipleurals. (*Platycephaliformes*.) . . . . . *Platycephalidæ*.

2. Palatine and pterygoid forming a long slender rod; no mesopterygoid; metapterygoid reduced. (*Hoplichthyiformes*.)  
*Hoplichthyidæ*.

B. Post-temporal simple, forming an integral part of the skull. (*Congiopodiformes*.) . . . . . *Congiopodidæ*.

II. Opisthotic small; mesopterygoid reduced; no basisphenoid. (*Cottiformes*.)

A. Pelvic fins, when present, normally formed.

1. Sides of body naked, scaly, or with bony plates; abdomen always naked.

a. Second suborbital extending to præoperculum.

α. Lowest radial on hypocoracoid; skull moderately depressed.

Parasphenoid wings extending to alisphenoids; a separate spinous dorsal . . . . . *Cottidæ*.

Parasphenoid wings not reaching alisphenoids; a single dorsal fin . . . . . *Cottunculidæ*.

β. Lowest radial on cleithrum; skull strongly depressed. *Psychrolutidæ*.

b. Second suborbital not or scarcely produced across cheek. *Comephoridæ*.

2. Body enclosed in bony plates . . . . . *Agonidæ*.

B. Pelvic fins forming a suction disc . . . . . *Cyclopteridæ*.

## Division 1. SCORPÆNIFORMES.

In all the members of this group the cranial osteology is essentially similar; the opisthotic extends forward to the prootic, which intervenes between parasphenoid and alisphenoids; a basisphenoid is present and the roof of the myodome is ossified. The hyo-palatine and opercular bones are all present and normally developed. The post-temporal may have the upper fork expanded and very firmly united to the skull (some *Scorpana*, *Apistus*, Triglidae, Synanciidae). The radials are usually anvil-shaped, but by reduction of the interrarial foramina may become plate-like (Triglidae, *Chorismodactylus*, *Trachicephalus*, *Patæcus*); sometimes the hypercoracoid and hypocoracoid may be separated by cartilage (e. g. Triglidae, *Inimicus*, *Synancia*, *Trachicephalus*). The parapophyses may be divergent and only the last ones bridged across (many Scorpænidae, Triglidae) or may all be downwardly directed and completely united (*Scorpana*, Aploactidae, Synanciidae).

## Family 1. Scorpænidae.

The skeleton of *Sebastolobus alascanus* has been described and figured by Starks (Proc. Calif. Acad. Sci. (3) i. 1898, p. 361); other Scorpænidae differ from it chiefly in unimportant details of the skull, the size of the second sub-orbital, the form of the post-temporal, which may have the upper fork much expanded and be very firmly attached (*Apistus* and some species of *Scorpana*), the degree of union of the first radial and the hypercoracoid, which are usually ankylosed, the number of vertebræ, and the direction of the parapophyses. The vertebræ vary in number from 24 (*Scorpana*, *Pterois*) to 31 (*Sebastes*); *Apistus* has 26 (11+15), *Tetraroge* 26 (12+14), *Centropogon* 27 (11+16), and *Gymnapistus* 28 (11+17). In the three last-named ribs are present only on the præcaudal vertebræ with parapophyses.

The Scorpænidae are represented in the Lower Eocene (London Clay) by the extinct genus *Ampheristus*; other genera have been described from the Upper Eocene and Miocene.

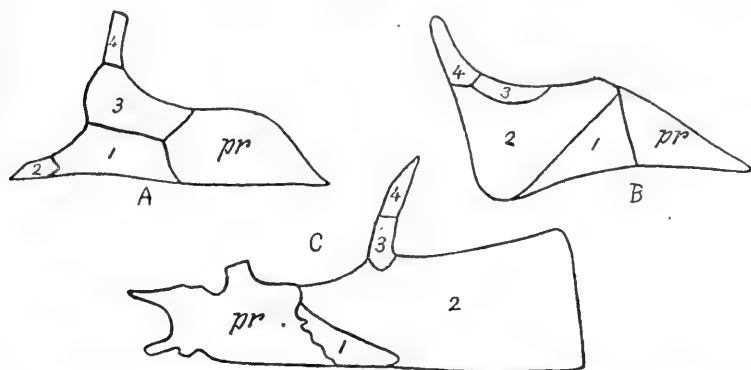
## Family 2. Triglidae.

The Triglidae are essentially similar to the Scorpænidae in osteology, except that the hypercoracoid and hypocoracoid are separated by cartilage, the pectoral radials are plate-like



(fig. 2, A), and, in correlation with the form of the snout, the præorbital is displaced forward and the first suborbital downward, so that the second is attached to the lateral ethmoid (fig. 1, B). Of the Scorpænids the genus *Apistus* especially

Fig. 1.



Præorbital (*pr*) and suborbitals (1, 2, 3, 4) of A. *Dactyloptena orientalis*, B. *Pterygotrigla polyommata*, C. *Platycephalus insidiator*.

approaches the Triglidae in the separation of the pelvic fins, the detachment of the lowest pectoral ray, the great depth of the second suborbital, the development of the upper limb of the post-temporal as a flat triangular plate, and the reduction of the foramina between the pectoral radials.

Vertebrae in *Prionotus* 25 or 26, *Pterygotrigla* 26, *Lepidotrigla* 29 or 30, *Trigla* 32 to 39, *Peristedion* 33.

### Family 3. Caracanthidae.

*Caracanthus* differs externally from the Scorpænidæ in the restricted gill-openings, shorter spinous dorsal and very small pelvic fins; the skeleton is typically Scorpænid, except for the absence of ribs; the vertebrae number 24.

### Family 4. Aploactidae.

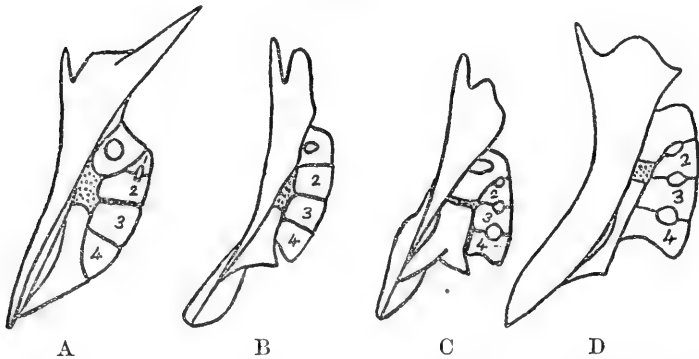
*Aploactis milesii* has the osteological characters of the Scorpænidæ, except that the skull is more depressed and ribs are absent; it has 31 vertebrae (13 + 18).

### Family 5. Synanciidae.

This family is closely related to the preceding. The

spinous dorsal is longer than the soft except in *Trachicephalus*. In *Lysodermus* and *Minous* 1, in *Chorismodactylus* 3 pectoral rays are detached; *Inimicus* has the two lowest rays almost detached; in the rest the pectoral is broad and procurvent, without detached rays. The differences in the

Fig. 2.



Pectoral fin skeleton of A. *Pterygotrigla polyommata*, B. *Trachicephalus elongatus*, C. *Minous monodactylus*, D. *Synancia horrida*. The radials are numbered.

pectoral fin skeleton are shown by the figures (fig. 2, B, C, D). The vertebræ number 11 + 15 in *Minous*, 12 + 16 in *Inimicus*, 11 + 13 or 14 in *Synancia*, 11 + 18 in *Trachicephalus*.

#### Family 6. *Patæcidæ*.

*Gnathanacanthus* differs from the *Scorpenidæ* only in the characters given in the key. *Patæcus* further differs in the absence of pelvic fins and the minute foramina between the pectoral radials. Vertebræ 10 + 19 in *Gnathanacanthus*, about 35 in *Patæcus*.

#### Division 2. HEXAGRAMMIFORMES.

Opisthotic large, but not always reaching prootic. Mesopterygoid well developed. 3 pairs of dentigerous upper pharyngeals. Vertebræ 42 to 64; præcaudals with parapophyses from the third, fourth, or fifth; ribs on parapophyses, epipleurals on ribs at or near their insertion. Post-temporal forked; pectoral radials 4, anvil-shaped, the two lowest on hypocoracoid.

Family 1. **Hexagrammidæ.**

The head-skeleton and pectoral arch are much as in the Scorpænidæ, except that the parasphenoid wings meet the alisphenoids. The skull is not depressed, a basisphenoid is present, the second suborbital reaches the præoperculum. Vertebræ in *Agrammus* 19+29, *Hexagrammus* 21+33, *Ophiodon* 23+34, and *Zaniolepis* 14+28. In *Hexagrammus octogrammus* I find that the hypercoracoid and hypocoracoid are well separated by cartilage, external to which a wing of the cleithrum reaches the middle radials; in the other genera the pectoral arch is as in normal Scorpænids.

The gill-membranes are free, and there is but a single nostril on each side.

Family 2. **Anoplopomatidæ.**

In *Anoplopoma* the parasphenoid does not meet the alisphenoids, there is no basisphenoid, the skull is depressed, the second suborbital does not reach the præoperculum, the gill-membranes are joined to the isthmus, and there are two nostrils on each side. Vertebræ 64 (32+32).

Division 3. **PLATYCEPHALIFORMES.**Family **Platycephalidæ.**

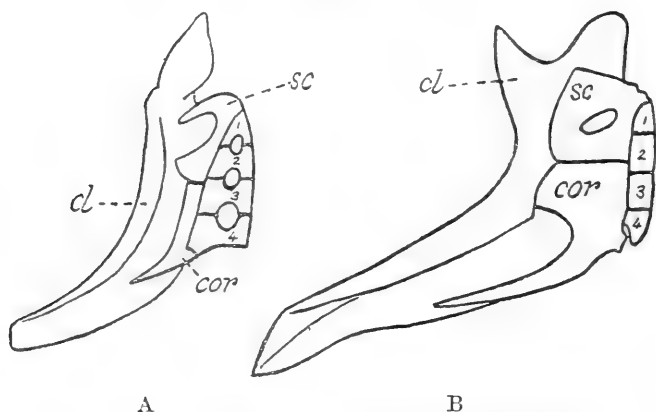
In the head-skeleton *Platycephalus* differs from the Scorpænidæ only in the depressed skull, with the parasphenoid meeting alisphenoids and frontals, and the basisphenoid apparently absent. The vertebral column has 11+16 vertebræ; the ribs are attached to the under surfaces of sessile epipleurals at some distance from the centra. The pectoral arch is Scorpænid, except that the radials are short squarish plates; the coracoids are broad (fig. 3, B). *Bembras* has the head less depressed and the pelvic fins further forward than *Platycephalus*, but is essentially similar in other characters; I have examined the pectoral arch of a stuffed specimen, which is exactly like that of *Platycephalus*.

Division 4. **HOPlichthyIFORMES.**Family **Hoplichthyidæ.**

Externally *Hoplichthys* and *Platycephalus* have little in

common except the depressed head, and the skeletons show that the two genera are not at all closely related. Whereas in *Platycephalus* the roof of the myodome is ossified and the basisphenoid is absent, in *Hoplichthys* the myodome has no osseous roof, but the basisphenoid appears as a vertical lamina between frontals and parasphenoid. In *Platycephalus* the suborbitals are on the upper surface of the head and are separated by a wide interspace from the lower limb of the præoperculum, but in *Hoplichthys* the suborbitals are angulated, belonging partly to the upper and partly to the lower

Fig. 3.



Pectoral fin skeleton of A. *Hoplichthys langsdorffi*,  
B. *Platycephalus insidiator*.

*cl*, cleithrum; *sc*, hypercoracoid; *cor*, hypocoracoid; 1, 2, 3, 4, radials.

surface of the head, with a serrated ridge along their middle at the edge of the head; they entirely fill the space between the orbit and the præoperculum. The palatine and pterygoid form a long slender rod; there is no mesopterygoid and the metapterygoid is reduced, so that the upper edge of the quadrate is free. The upper fork of the post-temporal is laminar, loosely attached to epiotic and pterotic; the supra-cleithrum is a slender rod; the hypocoracoid is very narrow, adherent to the cleithrum; the four radials are anvil-shaped, as in the Hexagrammidæ and Scorpenidæ, but the interrarial foramina are closed by an osseous membrane (fig. 3, A).

The vertebræ number 26 (8+18), the caudals gradually increasing in length posteriorly; the first three vertebræ have sessile epipleurals, the next four or five have epipleurals inserted on short parapophyses.

#### Division 5. CONGIOPODIFORMES.

##### Family Congiopodidæ.

*Congiopus* (*Agriopus*) and *Zanclorhynchus* are well distinguished externally by the produced snout, small protractile mouth, single nostril on each side, and gill-openings restricted to above the pectorals; further, the suborbitals are well ossified, the fin-rays are branched, the pelvics are narrow-based and placed well behind the pectorals, and there are no pungent anal spines. In all these characters they differ from the Patacidæ, which they resemble in the few-rayed pectoral and caudal fins. In *Zanclorhynchus* the dorsal fin has IX 12 rays and begins on the occiput, the head is spiny, the mouth toothless, and the pelvic fins far behind the pectorals. In *Congiopus* there are XVII-XXI 12-14 dorsal rays, the fin begins above the eye, there are villiform teeth in the jaws, and the pelvics are further forward.

In *Congiopus torvus* the skull is essentially similar to that of the Scorpenidæ, except that the epiotics unite behind the supraoccipital, as in *Gnathanacanthus*; this character by itself cannot be taken as evidence of relationship to the Patacidæ, for the epiotics are but narrowly separated in some Scorpenids in which the dorsal fin extends forward on the head. The post-temporal is not forked and is solidly united to the epiotic, pterotic, opisthotic, and exoccipital; the last emits a process which forms the inner wall of the groove in which the head of the supra-cleithrum articulates; otherwise the pectoral arch is Scorpenid.

The hyo-palatine and opercular bones are all present and there are three separate pairs of toothed upper pharyngeals. There are 39 vertebræ (18+21); parapophyses bearing the ribs are developed on the præcaudals from the sixth.

#### Division 6. COTTIFORMES.

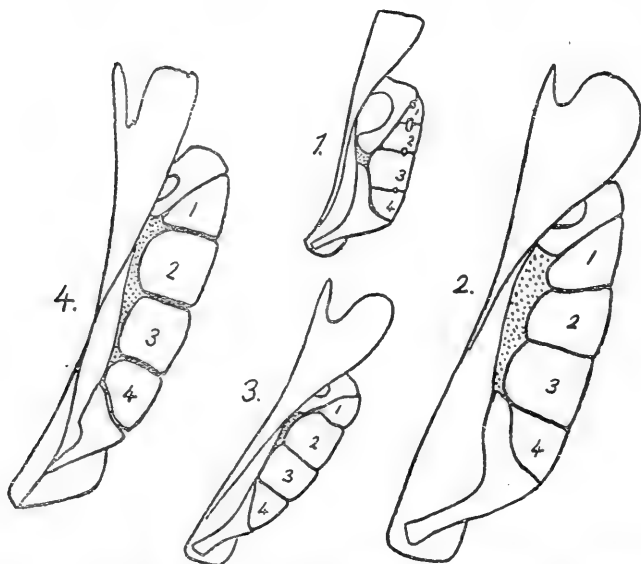
Opisthotic small; basisphenoid absent. One or two pairs of dentigerous upper pharyngeals, the third and fourth united with each other and sometimes with the second. Post-temporal forked; pectoral radials plate-like, the foramina

small or absent. Præcaudal vertebræ with epipleurals sessile or on short parapophyses; ribs absent or developed on a few posterior præcaudals only. Two nostrils on each side.

### Family 1. Cottidæ.

From this large and varied family I remove the Cottunculidæ and Psychrolutidæ, but other aberrant types are so closely connected by intermediate forms with the typical Cottids that it seems impossible to split the group further. I cannot recognize even *Rhamphocottus* as the type of a distinct family; the example I have examined has 27 vertebræ

Fig. 4.



Pectoral fin skeleton of 1. *Icelus bicornis*, 2. *Hemitripterus americanus*, 3. *Cottunculus microps*, 4. *Neophrynichthys latus*. The radials are numbered.

(not 24), and the whole skeleton is Cottid; there are other members of the family with paired ridges running backward from the orbits and ending in projections borne by the parietals.

A good account of the skeleton has been given by Berg;

he separates *Cottocomephorus* from the Cottidæ because the epipleurals are borne on short parapophyses; but this is the case in some other genera, particularly *Scorpenopsis*, and the character is unimportant.

In *Icelus bicornis* (fig. 4, 1) the hypercoracoid and hypocoracoid are only narrowly separated and but a small part of the third radial is inserted on the cartilage between them; the Agonidæ are essentially similar, and so is *Rhamphocottus* and a number of other Cottid genera, *Icelinus*, *Triglops*, &c.

In *Pseudoblennius*, *Radulinus*, *Podabrus*, &c. the greater part or even the whole of the third radial is inserted on cartilage, and in *Cottus*, *Ascelichthys*, *Enophrys*, *Oligocottus*, &c. it is inserted direct on the cleithrum; however, it is often difficult to distinguish between these two conditions, for the cleithrum may extend to the radials externally to the cartilage, as in *Hemilepidotus* and *Scorpenichthys*, where part of the second radial and the third are inserted on cartilage when seen from within, on the cleithrum in an external view. In *Oncocottus*, *Gymnocottus*, *Artediellus*, and *Ceratocottus* the third and half the second radial, in *Blepsias* and *Nautichthys* the third and all or the greater part of the second radial are on the cleithrum, these leading to *Hemitripterus* (fig. 4, 2).

The Eocene *Eocottus* may be, in my opinion, a Gobioid, and *Lepidocottus* also may belong to the same group.

### Family 2. Cottunculidæ.

*Cottunculus* differs from the Cottidæ in the characters given in the synopsis; the pectoral fin skeleton is figured (fig. 4, 3); the vertebræ number 28 (10 + 18).

### Family 3. Psychrolutidæ.

*Psychrolutes* and *Neophrynchthys* differ from the Cottidæ in the very depressed skull, with a median keel on the upper surface of the parasphenoid meeting the frontals and forming a complete interorbital septum. The pectoral fin skeleton is figured (fig. 4, 4); the vertebræ number 40 (14 + 26) in *Neophrynchthys latus*.

### Family 4. Comephoridæ.

Differ from the Cottidæ in that the second suborbital is not or scarcely produced across the cheek; the skeleton is

weakly ossified; there are 48 to 50 vertebrae. The pectoral fin skeleton is as in generalized Cottidae; the pelvic fins are absent. Two species of *Comephorus* are known from the depths of Lake Baikal; a very good account of the structure has been given by Berg ('Die Cataphracti des Baikal-See,' 1907).

#### Family 5. Agonidae.

The Agonidae are extremely closely related to the Cottidae, differing from them only in the complete investment of bony plates. The pectoral arch is of the most generalized Cottid type, with the coracoids very narrowly separated by cartilage. In most of the genera the suborbitals are arranged as in the Cottidae, but in *Agonus* and related genera they completely cover the cheek and approximate to those of the Triglidæ in form and position.

#### Family 6. Cyclopteridae.

Differ from the Cottidae externally in that the 6-rayed pelvic fins form a circular suctorial disc; the rays are depressed outwards and their bases are contiguous in the middle line. The skull is depressed, the alisphenoids are absent, and the parasphenoid does not extend upwards in front of the prootic. All four pectoral radials are inserted on the cleithrum between the widely separated hypercoracoid and hypocoracoid.

In the Cyclopterinae the form is deep, ovate, the spinous dorsal is separate or absent, the soft dorsal and anal are rather short and free from the caudal. The vertebrae number 29 (10 + 19) in *Cyclopterus lumpus*, the praecaudals without parapophyses. The second suborbital is broad and connected with the inner ridge of the praeperculum.

In the Liparidinae the tail is long and tapering and the vertical fins are confluent. The vertebrae number 40 (10 + 30) in *Liparis montagui*, probably more in the other genera; the praecaudals have haemal arches from the fourth. The process of the second suborbital is slender and connected with the outer margin of the praeperculum.

Gill has given a good account of the characters of this family, with figures of the skull and pectoral arch (Proc. U.S. Nat. Mus. xiii. 1891, pp. 361-376).

#### Suborder 2. GASTROSTEOIDEA.

The characters of most importance that distinguish this suborder from the preceding are the subabdominal position of



the pelvic fins, the pelvic bones not articulating with the cleithra, and the development of a pair of dermal plates, ectocoracoids, ankylosed with the hypocoracoids in the adult fish.

### Suborder 3. DACTYLOPTEROIDEA.

Mesethmoid unossified; nasals ankylosed to form a large median plate; no opisthotic; second suborbital a small bone movably articulated with first and with præoperculum (fig. 1, A)\*. Post-temporal a very large plate suturally united to epiotic, pterotic, and exoccipital; supra-cleithrum wedged in and rigidly united to upper end of cleithrum; pelvic bones directly attached to cleithra. First three vertebræ elongate, united by suture; first attached by suture to basioccipital. Pectoral base subhorizontal.

In addition to these diagnostic characters may be mentioned: the parasphenoid sends up a pair of wings which meet the frontals and alisphenoids in the interorbital region, the third suborbital emits a broad subocular lamina, the hyo-palatine and opercular bones are all present, there are three pairs of dentigerous upper pharyngeals, the pectoral radials number four, the lower elongate hourglass-shaped, and there are no ribs, but a series of epipleurals on the free præcaudal and anterior caudal vertebræ.

This suborder is a remarkably well-defined one, quite dissimilar to the other Scleroparei. Gill has placed the Dactylopteridæ with the Triglidæ to form the order Craniomi, on account of supposed resemblances in the structure of the post-temporal and supra-cleithrum †, but has recognized their divergence in other characters.

### Family Dactylopteridæ.

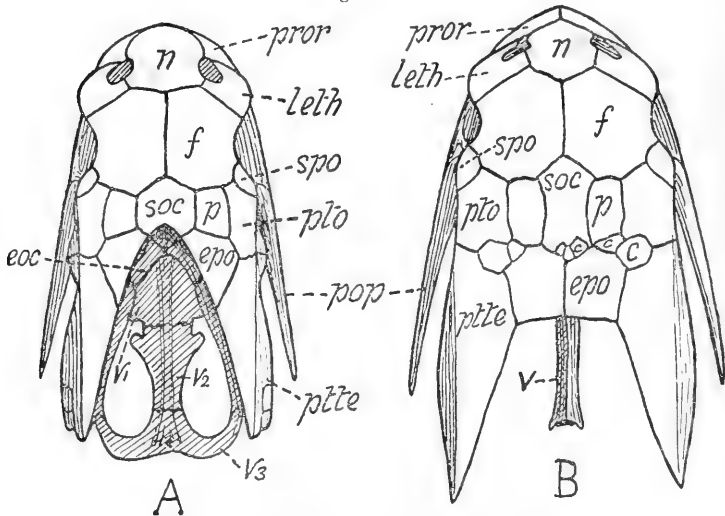
I have examined skeletons of *Dactylopterus volitans* and *Dactyloptena orientalis*. In both there are 22 vertebræ (3+6+13); these are compressed and from the sixth to the nineteenth bear paired processes directed obliquely upwards

\* This small bone, the "pontinal" of Gill, may be the segmented off distal end of the second suborbital, in which case the first may be fused with the præorbital; the interpretation given above is more probably correct. By this device the strong spine at the angle of the præoperculum acquires great freedom of movement without sacrificing the support of the suborbital stay.

† The supra-cleithrum of the Dactylopterids was evidently mistaken for part of the cleithrum, and one or more bony scales that adhere to the lower part of the posterior end of the post-temporal may have been taken for the supra-cleithrum.

and outwards from the neural arches; corresponding ventral processes are developed from the fourteenth to the nineteenth. In *D. volitans* none of the præcaudal vertebræ have transverse processes; the united anterior vertebræ bear a prominent neural crest and the first is sutured to the basioccipital and supraoccipital; in *D. orientalis* the united anterior vertebræ

Fig. 5.



Skulls and anterior vertebræ of A. *Dactyloptena orientalis* and B. *Dactylopterus volitans*, seen from above.

*pror*, præorbital; *n*, nasal; *leth*, lateral ethmoid; *f*, frontal; *p*, parietal; *c*, commissural bones; *spo*, sphenotic; *pto*, pterotic; *epo*, epiotic; *soc*, supraoccipital; *eoc*, exoccipital; *ptte*, post-temporal; *v*, *v*<sub>1</sub>, *v*<sub>2</sub>, *v*<sub>3</sub>, vertebræ.

have only a low neural crest, but they have transverse processes which form a continuous shelf on each side; those of the first vertebra are sutured to the exoccipitals and post-temporals, whilst those of the third are produced outwards and curve forwards to join the extremities of the post-temporal; the anterior free præcaudals have transverse processes which decrease backwards and are absent on the last two. The two genera also differ in cranial structure, for in *D. volitans* the epiotics meet behind the supraoccipital and in front of them the commissural bones appear as constituents of the cranial roof, whereas in *D. orientalis* the epiotics are separate and their inner edges diverge backwards. Also in *D. volitans* the præorbitals meet at the end of the snout, but in *D. orientalis* they are well separated.

XV.—*Descriptions and Records of Bees.*—XLIX.

By T. D. A. COCKERELL, University of Colorado.

*Colletes (lycii* subsp. ?) *peruvicus*, sp. n.

♀.—Length about 8 mm., anterior wing 6.

Black; hair of head and thorax rather long and abundant, below white, above faintly tinged with yellowish, the vertex, disc of mesothorax, and scutellum with an admixture, not very conspicuous, of fuscous hairs; mandibles rather dark chestnut-red; malar space long, not quite  $1\frac{1}{2}$  times breadth of base of mandibles; labrum with a strong median groove, and faint ones on each side; clypeus shining, impunctate laterally, in the middle with a very broad median depression which is sparsely punctured, its sides above forming a pair of blunt shining ridges; supraclypeal area smooth and shining; eyes very prominent; no distinct prothoracic spines; mesothorax brilliantly shining, with minute very sparse punctures; scutellum shining, the posterior half well punctured; area of metathorax a transverse band, with many closely set ridges; posterior face of metathorax with a large, shining, smooth, triangular area, but the other parts roughened; pleura shining, with sparse small punctures; tegulae reddish testaceous. Wings hyaline, very faintly brownish, the rather small stigma rufo-fuscous; nervures fuscous; second s.m. very broad, receiving first r.n. in middle. Legs black, with dark rufous tarsi, their hair pale, a little fuscous on outer side of hind tibiae. Abdomen rather narrow, brilliantly shining, with only the most minute, hardly visible, punctures, these scattered; hind margins of segments broadly pale rufous; basal half of first segment with long greyish-white hair; second (most clearly toward base) and the remaining segments with short greyish tomentum, more or less covering the surface; no hair-bands; apex with fuscous hair.

*Hab.* Piura, Peru (*C. H. T. Townsend*).

This is smaller than *C. lycii*, Jörgensen, from Mendoza, but evidently closely allied. The localities are, however, over 2000 miles apart, and the partly fuscous hair of the head and thorax above, the entirely red mandibles, &c. are distinctive of the Peruvian insect. In the clypeal structure there is a resemblance to *C. sulcatus*, Vachal, from Chili. The known Peruvian *Colletes* may be separated thus:—

Legs with hair mostly black .....	<i>striginasis</i> , Vachal.
Legs with pale hair .....	1.
1. Malar space very short .....	<i>inflatus</i> , Vachal.
Malar space long .....	<i>peruvicus</i> , Clill.

*Andrena mitsukurii*, sp. n.

♂.—Length about 11 mm., expanse about  $17\frac{1}{2}$ .

Black, with rather abundant dull white hair, faintly creamy-tinted on head and thorax, dark fuscous on face below antennæ (but pale about mouth), rather narrowly fuscous also at sides of front, and some fuscous hair on thoracic dorsum; fifth abdominal segment at apex, and sixth segment also, with dark fuscous hair, some black hair on middle of fourth segment, but the abdomen otherwise thinly covered with greyish-white erect hair, forming rather obscure fringes or bands at bases of second and third segments, but no apical hair-bands, the general appearance of the abdomen greyish hairy and unbanded. Legs with pale hair, light fawn on inner side of tarsi. Head not massive, but broad, the facial quadrangle much broader than long; mandibles and cheeks ordinary; process of labrum broadly truncate; antennæ long, ordinary, black, third joint a little longer than fourth; clypeus irregularly rugosely punctured, shining between the punctures; malar space about twice as broad as long; front and vertex coarsely rugoso-punctate, a small triangular depression in front of middle ocellus; mesothorax brilliantly shining, with strong and large but well separated punctures; scutellum more densely and very irregularly punctured; metathorax very coarsely sculptured, the poorly defined area very irregularly and coarsely reticulate; tegulæ piceous. Wings fuscous; stigma dark reddish, with fuscous margin, nervures dark fuscous; second s.m. rather small, higher than broad, receiving first r.n. a little beyond middle. Legs slender, normal, the small joints of tarsi dark reddish. Abdomen very coarsely and strongly punctured, but shining between the dense punctures, punctures on first segment larger than those on the others; apical margins of first four segments raised, shining, and each of these segments with a quite deep, finely rugulose (not distinctly punctured), transverse submarginal sulcus, the sulcus and raised margin occupying about one-third of the second segment. The b.n. falls some distance short of t.-m.

*Hab.* Japan (U.S. National Museum, 168).

This and the following species are dedicated to Japanese naturalists. In Schmiedeknecht's table of European species this runs to 98, and runs out because of the dark wings and prevailingly light hair of body. It is not like any species described from Japan or China. It resembles the subgenus *Trachandrena*, Rob., but the third antennal joint is not

shorter than the fifth. The strongly raised hind margins of the abdominal segments give it a very peculiar aspect. The type of *A. mitsukurii* also bears the numbers 35, 6, 22, and something in Japanese.

*Andrena watasei*, sp. n.

♂.—Length about  $10\frac{1}{2}$  mm., expanse about 18.

Black, with a broad head and unusually small thorax; hair of head and thorax rather long and abundant, greyish white, dorsally with only the faintest creamy tint, but some dark grey or blackish hair on scape, sides of front, and middle of thoracic dorsum; discs of abdominal segments beyond the second with more or less sooty hair, and that of apex pale sooty; the abdomen in general, especially the second and third segments, is thinly clothed with pale hair, which forms thin inconspicuous bands on the hind margins of the segments, but only at sides on first, broadly interrupted on second, and very weak in middle of third. Legs with white hair, pale purplish brown on inner side of tarsi. Head much broader than thorax; face covered with long light hair; facial quadrangle broader than long; mandibles rather robust, ordinary; face and front dull and granular; cheeks not enlarged; antennæ long, black, ordinary, third joint rather short, but longer than fourth; mesothorax and scutellum very shiny, with rather small but distinct and well separated punctures; mesothorax dull in front; metathorax with very long hair, the area finely rugulose, not defined; tegulæ piceous. Wings strongly reddish, paler basally; stigma and nervures ferruginous; b.n. meeting t.-c.; second s.m. a little broader below than high, receiving r. n. a little beyond middle. Legs black, slender, ordinary. Abdomen shining, with extremely minute punctures, best seen on first segment; hind margins of segments not peculiar, second segment depressed about one-fourth. Malar space very short.

*Hab.* Japan (U.S. National Museum, 132). Also labelled 35. 9.

In Schmiedeknecht's table runs to 154, and runs out because wings are dusky and area of metathorax is only rugulose. It can be run on with some difficulty to *A. propinqua*, from which it differs by the larger size, dark apical margins of abdominal segments, and generally pale hair of head and thorax. The general build and appearance of the insect is very like that of the American *A. sayi*, Rob., but the mesothorax is quite different. No closely similar Japanese species has been described.

*Andrena nawai*, sp. n.

♀.—Length about 13 mm.

Black, including the antennæ and legs, except the hind knees, tibiæ, and tarsi, which are ferruginous; head broad, facial quadrangle considerably broader than long; hair of front (especially at sides) and vertex black, but occiput and cheeks and middle and sides of face with abundant long fulvous hair; clypeus flat, its disc bare, with a broad impunctate band (not at all raised), but otherwise distinctly and rather closely punctured; malar space rather large, but broader than long; facial foveæ very broad, dark seal-brown, not separated from eye, going little below level of antennæ; third antennal joint a little longer than fourth and fifth combined; thorax densely clothed with long fulvous hair; mesothorax dull and granular, scutellum faintly shining; area of metathorax triangular, poorly defined, its sides smoother than the densely granular adjacent parts, and feebly shining, its middle with a delicate raised line and its base obscurely rugulose; tegulæ dark brown, small and covered with hair. Wings brownish-hyaline, stigma and nervures dull ferruginous; b. n. almost reaching t.-m.; second s. m. would be square were not the first t.-c. bent above; first r. n. joining second s. m. near end; third s. m. extremely long. Femora with long pale fulvous hair; anterior and middle tibiæ and tarsi with short fuscous hair; hind tibiæ and tarsi with clear red hair; curled floccus at base of hind legs large. Abdomen with the surface finely granular, sericeous, shining, without distinct punctures, hind margins of segments very narrowly reddish brown; second segment depressed at least two-fifths, but the depression feeble; abdomen with abundant long fulvous hair, which forms continuous bands on hind margins of segments, but the bands are only defined by the greater density of the hair; apex with rufo-fulvous hair.

*Hab.* Japan (U.S. National Museum, 126).

A well-marked species, running in Schmiedeknecht's table nearest to *A. opaca*, Morawitz, but differing greatly in the colour of the pubescence. It is very much like *A. trimmerana* (Kirby) from France, and must be considered a member of the same group. In addition to the colour-differences, however, the sides of the upper part of the metathorax in *trimmerana* are rather shining, with a distinct punctiform sculpture, not entirely opaque and evenly granular as in *nawai*.

*Andrena sasakii*, sp. n.

♂.—Length about 12 mm.

Black, including antennæ and legs, except that the small joints of tarsi are ferruginous; hind margins of abdominal segments broadly rufo-testaceous; hair of head and thorax long and abundant, light fulvous, nowhere mixed with black or fuscous; head broader than thorax, facial quadrangle much broader than long, cheeks broad but not peculiar, malar space very short, mandibles normal; clypeus and face rugulose, feebly shining, almost hidden by hair; third antennal joint equal to fourth, fifth shorter; vertex and front dull and granular; mesothorax and scutellum dull and finely granular; area of metathorax granular, hardly defined, rugulose at base; tegulæ dark rufous. Wings brownish hyaline, stigma and nervures ferruginous; b. n. meeting t.-m.; second s.m. broad, receiving first r. n. at middle; third s.m. not nearly so long as in *A. nawai*. Legs ordinary, with pale hair. Abdomen shining, without distinct punctures, thinly covered with pale ochraceous hair, not forming distinct bands; apical plate broadly truncate, shallowly subemarginate, with a thick brush of hair beneath; venter normal. Process of labrum very broad and low, truncate, not notched.

*Hab.* Japan (U.S. National Museum, 133).

Runs in Schiedeknecht's table to *A. fulvida*, Schenck, but is a considerably larger species, with paler nervures. It must be allied to the Japanese *A. hebes*, Pérez, but is larger and differently sculptured.

I give a key to the known *Andrenæ* of Japan:—

- |   |                               |                             |
|---|-------------------------------|-----------------------------|
| Tegument of clypeus variably pale, clypeus sometimes practically all pale; abdomen shining, with hind margins of segments testaceous. (Tokio and Wasaka.) . . . . . |                               | <i>knuthi</i> , Alfk. ♂     |
| Tegument of face wholly black . . . . .   |                               | 1.                          |
| 1. Clypeus prominent, very convex transversely, straight in profile; scutellum strongly bigibbous: length 13 mm. (Yokohama.) . . . . .                              | <i>prostomius</i> , Pérez. ♀. | 2.                          |
| Clypeus normal. . . . .   |                               | 2.                          |
| 2. A long spine or tooth near the base of each mandible . . . . .   |                               | 3.                          |
| Without such a spine or tooth . . . . .   |                               | 4.                          |
| 3. Third antennal joint much shorter than fourth; cheeks broad, angled behind above middle. (Yokohama.) . . . . .   | <i>dentata</i> , Smith. ♂.    |                             |
| Third antennal joint longer than fourth; species near to <i>A. ferox</i> , Kirb. (Yokohama.) . . . . .  |                               | <i>simulans</i> , Pérez. ♂. |

4. Abdomen with a delicate bluish tint; allied to *A. apicata*, Sm.: length 13 mm. At flowers of *Acer* in April. (Tokio.) . . . . . *consimilis*, Alfk. ♀.  
Abdomen not at all metallic . . . . . 5.
5. Hair of head and thorax above a lively red; malar space long; abdomen very shiny, hairy. (Yokohama.) . . . . . *biscutata*, Pérez. ♂.  
Hair of head and thorax fulvous or whitish, not brightly coloured. . . . . 6.
6. Hind margins of abdominal segments elevated; thorax and abdomen with large strong punctures . . . . . *mitsukurii*, Ckll. ♂.  
Hind margins of abdominal segments normal . . . . . 7.
7. Species of Sachalin: 11 mm. long; hair whitish; abdomen with hind margins of segments narrowly yellowish brown; tarsi yellowish brown. (Mauka.) . . . . . *maukensis*, Mats. ♀.  
Species of Japan . . . . . 8.
8. Mesothorax shining and punctured on disc. . . . . 9.  
Mesothorax dull and roughened or granular. . . . . 10.
9. Smaller, 8.5-9 mm. long; punctures of thorax very sparse; malar space linear. At flowers of *Taraxacum* in April. (Tokio.) . . . . . *knuthi*, Alfk. ♀.  
Larger, 10.5 mm. long; punctures of mesothorax very distinct. . . . . *watasei*, Ckll. ♂.
10. Males . . . . . 11.  
Females . . . . . 12.
11. Smaller, length 8-9 mm.; hair mostly white, black at sides of face . . . . . *præcociformis*, Ckll.  
Larger, length 12 mm.; hair of head and thorax light fulvous, with no black. . . . . *sasakii*, Ckll.
12. Hair of face partly black or fuscous . . . . . 13.  
Hair of face without black or fuscous . . . . . 14.
13. Thorax above with fuscous hair; scopa of hind tibiæ fuscous above and silvery white beneath. . . . . *halictoides*, Smith  
Thorax with long fulvous hair . . . . . *nawai*, Ckll.
14. Smaller, length 9-10 mm.; species allied to *A. angustior*, punctures of clypeus much stronger and sparser, the intervals brilliantly shining, and a broad impunctate median line. (Tokio.) . . . . . *hebes* Pérez.  
Larger, length 12-13 mm. . . . . 15
15. Hair uniform dull yellowish grey, the insect looking like *A. præcox*, but larger. At flowers of *Acer* and *Lactuca* in April. (Tokio.) . . . . . *japonica*, Alfken.  
Hair pale reddish above, dull white below; tibial scopa silvery white: species of the *trimmerana* group, with something of the aspect of *A. ferox*. . . . . *biscutata*, Pérez.



*Heteranthidium occidentale* (Cresson).

Rito de los Frijoles, New Mexico, Aug. 1912 (*Cockerell*).  
At the same locality I took *Anthidium maculosum*, Cresson.

*Anthidium porterae*, Cockerell.

Santa Fé, New Mexico, Aug. 1912 (*Cockerell*); also at the Rito de los Frijoles.

*Melitoma euglossoides*, Lep. & Serv. (*fulvifrons*, Smith).

Guatemala City, Guatemala, 1912 (*J. Rodriguez*); a small male. Quirigua, Guatemala City, nesting in a clay bank (*W. P. Cockerell*).

*Dianthidium ulkei perterritum*, subsp. n.

♀.—Like *D. ulkei*, but all the markings cream-coloured instead of rich yellow. The cream-coloured outer sides of the tibiae distinguish this from *D. pudens* (Cresson), which also has pale markings. There is an elongated light spot in front of the anterior ocellus, and a large light band behind the upper part of each eye.

*Hab.* Santa Fé, New Mexico, August 1912 (*Cockerell*).

*Cælioxyys otomita*, Cresson.

Quirigua, Guatemala, 1 ♀, at yellow-golden rod-like flowers (*W. P. Cockerell*).

*Cælioxyys azteca*, Cresson.

Quirigua, Guatemala, Feb. 11, 1 ♂.

Only a female of *azteca* has been described, but this is evidently its male. In my table of male *Cælioxyys* in *Canad. Entom.*, June 1912, it runs to *C. sayi*, Rob., but is very different by the narrow and much produced last abdominal segment. The greater part of the thorax above is red.

*Eulæma mussitans* (Fabr.).

Guatemala City and Quirigua, a female at the latter place "on a big pea" (*W. P. Cockerell*).

*Eulæma fasciata*, Lep.

Antigua and Quirigua, Guatemala (*W. P. Cockerell*).

*Euglossa cordata* (L.).

Quirigua, Guatemala, 4 ♀, one marked "flowers of smaller pea" (*W. P. Cockerell*). The variety *townsendi*, Ckll., is not separable.

*Ptiloglossa mexicana* (Cresson).

Quirigua, Guatemala, 1 ♀, at blue flowers of a species of Labiatae, Feb. 21 (*W. P. Cockerell*). *P. matutina* (Schrottky) is very closely allied.

*Ceratina virescens*, Friese.

San José, Costa Rica, Nov. 1911 (*W. M. Wheeler*).

*Ceratina nautlana*, Cockerell.

Amatitlan, Guatemala, Feb. 1912 (*W. P. Cockerell*).

*Ceratina abdominalis*, H. S. Smith.

Antigua, Guatemala, 1912 (*W. P. Cockerell*).

*Ceratina amabilis*, Cockerell.

Quirigua, Guatemala, Feb. 10-20, 6 ♀ (*W. P. Cockerell*). Five were from flowers of *Ipomœa sidæfolia*.

*Bombus unifasciatus*, Smith.

Amatitlan, Guatemala City, and Antigua, Guatemala (*W. P. Cockerell*).

*Apis mellifera*, L.

Guatemala City, Guatemala (*J. Rodriguez*).

*Centris clypeata*, Friese.

Antigua, Guatemala (*W. P. Cockerell*).

*Centris tarsata*, Smith.

Quirigua, Guatemala, 1 ♀, at "flowers of yellow vine" (*W. P. Cockerell*).

*Exomalopsis similis*, Cresson.

Quirigua, Guatemala, February (*W. P. Cockerell*).

*Agapostemon nasutus*, Smith.

Quirigua, Guatemala, 2 ♂, one Feb. 12, at flowers of *Ipomœa sidæifolia* (W. P. Cockerell).

*Panurginus pectiphilus*, sp. n.

♀.—Length about 5 mm., anterior wing 4.25.

Robust, black, with a broad abdomen; pubescence scanty, dull white, dense at apex of abdomen and quite thick on legs; facial quadrangle broader than long; eyes dark green; mandibles ferruginous, darkened at base and apex; process of labrum concave above, very broad, the margin gently rounded; clypeus and face shining, but strongly and closely punctured; flagellum very bright ferruginous beneath, except at base, the apical joint also clear red above; vertex brilliantly shining, but well punctured; mesothorax and scutellum shining, but distinctly and rather closely punctured; middle of metathorax shining, the apical pit deep and large, the basal enclosure represented by a very narrow rugose groove; tubercles densely covered with short greyish-white hair; tegulae ferruginous. Wings hyaline, nervures and stigma rufo-fuscous; b. n. falling a considerable distance short of t.-m.; second s.m. long, receiving first r. n. about or a little before the end of its first fourth; tibiae and tarsi with much white hair. Abdomen hairy at sides, apex, and on venter only; apical margins of segments broadly depressed, minutely transversely lineolate; the discs of segments minutely roughened or punctate, the second segment (except the depression) with uniform fine punctures all over, the surface shining.

*Hab.* Soledad Cañon, Organ Mts., New Mexico, at flowers of *Pectis papposa*; the hind legs loaded with pollen (C. H. T. Townsend).

This cannot be the female of *P. townsendi*, from the same mountains, owing to the difference in venation. It is a peculiar, compact little species, not very close to any other known to me. In the table of ♀ *Panurginus* in Entom. News, May 1907, p. 185, it runs nearest to *P. innuptus* (at least the small joints of hind tarsi being clear red), but that is a much larger insect, and has a large sculptured basal area of metathorax.

*Panurginus nubis*, sp. n.

♀.—Length nearly 7 mm., anterior wing 5.

Black, rather slender, but with a broad head, the facial

quadrangle broader than long; pubescence white, scanty, tinged with yellow on apex of abdomen and inner side of tarsi; head, thorax, and abdomen brilliantly shining, but the front, except at sides, dull and densely granular-punctate, the bases of the second and third abdominal segments also with broad dull microscopically sculptured bands; apical part of mandibles dark reddish; process of labrum very large, shining and concave above, broadly truncate at apex, but the truncation gently rounded; clypeus with rather sparse irregular strong punctures, and a deep median linear groove on the upper two-thirds; sides of face shining, with the punctures running more or less in lines; flagellum dark castaneous beneath except at base; sides of vertex shining, irregularly rugoso-punctate; mesothorax shining and sparsely punctured, with deep median and parapodial grooves; area of metathorax small, finely striate; tubercles shining, thickly fringed with pale greyish hair; tegulae rufo-testaceous, darker basally. Wings dilute brownish, the large stigma and nervures fusco-ferruginous; b. n. falling a trifle short of t.-m.; marginal cell broadly truncate; first r. n. joining second s.m. about one-fourth of the distance from base. Legs black, hind tarsi dark brown. Abdomen elongate, the hind margins of the segments very broadly depressed, the shining depression of second segment about as broad as the part before, the latter consisting of an opaque anterior half, and a shining posterior one, the two parts abruptly separated, but the extreme base narrowly shiny; fifth ventral segment deeply grooved in middle, the groove ending at the apex of a large triangular light ferruginous area.

*Hab.* Cloudcroft, New Mexico, Sept. 5 (*Cockerell*).

A commonplace looking species, but with good characters. Compared with *P. porterae* it is smaller but very similar, yet easily distinguished by the second abdominal segment, which has the abruptly defined opaque basal part so closely sculptured that the punctures cannot be separately made out with a lens; whereas in *porterae* the basal part has distinct punctures, is not opaque, and is not abruptly defined. Compared with *P. ornatipes*, *P. nubis* has a much narrower thorax and much broader process of labrum. It is not the female of *P. barberi*, from the same region, as the mesothorax is much more sparsely sculptured, and the paler stigma is narrower and more pointed at end. On the whole, *P. nubis* is closest to *P. didirupa*, which differs from it by the broader smooth band between the opaque band and apical depression on second abdominal segment, the lack of

a distinct linear sulcus on the clypeus, and the fifth ventral segment with only a feebly depressed median line and poorly developed apical area.

*Panurginus ximenesiæ*, sp. n.

♀.—Length about 6 mm.

Head and thorax shining black, with scanty white hair, metathorax dark brown, tubercles light yellow, but face wholly black; eyes blue-green; facial quadrangle broader than long; mandibles reddened apically; process of labrum rather long and narrow, abruptly truncate; clypeus sparsely but distinctly punctured, not sulcate; middle of front closely and finely punctured; flagellum rather bright ferruginous beneath except at base; mesothorax shining, with sparse feeble punctures; metathorax subopaque, shiny just above the truncation, the extreme base rough, but hardly any defined area; tegulæ pellucid testaceous. Wings hyaline, faintly dusky, stigma and nervures pale reddish brown; b. n. falling short of t.-m.; first s.m. very long; first r. n. joining second s.m. just beyond end of first fourth. Legs reddish brown, with white hair, anterior and middle knees light yellow. Abdomen rather dark red-brown, shining, the basal halves of second and following segments dullish, minutely and densely rugoso-punctate, this sculptured part not abruptly defined; fifth ventral segment depressed in middle.

*Hab.* Mesilla Park, New Mexico, at flowers of *Verbesina (Ximenesia) exauriculata*, close to the Agricultural College, Sept. 12 (*Cockerell*, 5057).

A very distinct little species, looking at first like a small edition of *P. perlævis*, but readily known by the light tubercles and details of sculpture, as well as the size.

Another addition to the list of New Mexico *Panurginus* as given in *Trans. Amer. Entom. Soc.* xxxii. p. 299, is *P. piercei*, *Crawf.*, which I collected at Raton.

P.S.—My friend Mr. H. Ichinose has kindly interpreted the Japanese characters on the labels of some of the species of *Andrena* described above, as follows:—

*Andrena nawai.* Shimura field, April 15, 1900.

*Andrena watasei.* Nikko.

*Andrena mitsukurii.* Nishigaha (a town near Tokio).

XVI.—*Descriptions of New Zealand Species of Pselaphidæ from Dr. Sharp's Collection in the British Museum.* By Major T. BROUN, F.E.S.

A PAPER containing descriptions of new species of Faronini was forwarded to London for publication about two months ago. The present one deals principally with the Euplectini; but seven or eight species of the genus *Euplectopsis* must remain without names at present, as M. Ach. Raffray has in his possession, from Greymouth, several closely allied, perhaps identical, species which he may have described at Rome.

Mount Albert,  
Auckland, N.Z.,  
4th November, 1912.

*List of new Species described, with numbers according with those in the 'Manual of New Zealand Coleoptera.'*

EUPLECTINI.

3494. *Euplectopsis sanguineus*.  
3495.       "       *duplicatus*.  
3496.       "       *clavatulus*.  
3497. *Plectomorphus longiceps*.  
3498.       "       *brevicornis*.  
3499.       "       *egenus*.  
3500. *Vidamus modestus*.  
3501.       "       *sternalis*.  
3502. *Zealandius fovealis*.

BRACHYGLUTINI.

3503. *Eupines simplex*.

Group EUPLECTINI.

EUPLECTOPSIS, Raffray.

Wytzman's Gen. Ins., Pselaphidæ, 1908, p. 82.

3494. *Euplectopsis sanguineus*, sp. n.

Shining, sanguineous; legs and antennæ light fusco-rufous, palpi and tarsi flavescent; pubescence yellowish grey, somewhat curled, with a few long erect setæ behind, the second and third dorsal segments with some very short, depressed, brassy, squamiform setæ.

*Head* longer than broad, evidently smaller than the thorax, slightly narrowed behind, with obtuse hind angles; depressed and smooth in front, antennal tubercles somewhat elevated but small, the foveæ rather ill-defined, placed

further back than the eyes and prolonged forwards, the occiput and sides distinctly punctate. *Eyes* small, composed apparently of three or four coarse facets. *Thorax* about as long as broad, widest and rounded at, or just before, the middle, rather more narrowed in front than behind; central channel deep and broad, extending from near the apex to the rather broader basal depression, which is connected with the deep lateral foveæ by a groove. The sides in front of these foveæ seem swollen and the base is bipunctate. *Elytra* quite a third longer and broader than the thorax, a little narrowed before the middle; sutural striae well-marked, deep, broad and foveiform at the base; intra-humeral impressions also broad and deep at the base, the interval between each of these and the sutural stria appearing subcarinate; they become obsolete towards the middle and, in certain lights, seem duplicated; the suture is minutely seriate-punctate, the rest of the surface has a few indistinct scattered punctures. *Hind body* much shorter than the elytra, curvedly narrowed and deflexed behind, with a few very fine punctures, basal segment horizontal and quite as long as the next one.

*Antennæ* shorter than the head and thorax, rather slender; basal two joints almost equal, stout and oblong; joints 3-8 small and subglobular, slightly broader than long, ninth similar to the preceding one and only a little larger, tenth transverse, yet scarcely twice the breadth of the eighth, the terminal elongate-conical, distinctly acuminate and fully the length of the preceding four combined.

Most nearly allied to the northern *E. tumidus* (3379), but with even more acuminate terminal joints to the antennæ, the other joints also different. The head is rather smaller, more deeply depressed in front, so that its hinder portion is more convex in the middle, and it is less punctate; the elytra are broader behind.

♀. Length  $1\frac{2}{3}$ ; breadth  $\frac{1}{2}$  mm.

Greymouth. One, found by Mr. R. Helms, in Dr. Sharp's collection, British Museum.

3495. *Euplectopsis duplicatus*, sp. n.

Nitid, slightly convex, moderately elongate, not slender; somewhat castaneo-rufous, elytra brighter, legs and antennæ of a paler hue, tarsi and palpi flavescent; sparingly clothed with suberect, unequally elongate, yellowish hairs, the head with numerous shorter decumbent ones.

*Head* not much smaller than the thorax, moderately closely and distinctly punctate: genæ narrowed behind,

with obtuse angles : the foveæ rather shallow, not distinctly extending forwards to the rather flat forehead; antennal tubercles distant and small. *Eyes* moderately large, not very convex, situated at the middle. *Thorax* of about equal length and breadth, rounded and widest just before the middle, rather more narrowed in front than behind; it is quite distinctly but irregularly punctured, most closely near the base : lateral foveæ subrotundate and deep, without any definite anterior prolongation, and not distinctly united to the semicircular basal fossa, discal furrow moderately broad and deep and almost reaching the apex. *Elytra* subquadrate, with somewhat rounded shoulders, a little depressed at the base and apex, without definite punctation; sutural striæ broad, deep, and foveiform at the base, but duplicated for most part of their length, the outer border of each carinate at the base, more feebly so behind; intra-humeral impressions also deep and broad at the base, but becoming obsolete towards the middle. *Hind body* rather shorter than the elytra, much narrowed and deflexed near the extremity, the basal three segments subequal.

*Legs* rather long, simple.

*Antennæ* fully the length of the head and thorax; basal joint cylindrical and nearly twice as long as broad, second oviform, evidently longer than broad, the next small and subovate, joints 4-8 small and moniliform, the eighth shortest, fifth and seventh slightly larger than adjacent ones, ninth moderate, distinctly larger than the preceding one, but not as broad as the transverse tenth, the terminal one nearly the length of the preceding three combined, conical and acuminate.

*Underside* finely pubescent, pale chestnut-red. Prosternum carinate along the middle. Metasternum convex and moderately elongate. Basal ventral segment covered by the femora, second obtusely elevated across the middle for nearly half of its whole breadth and minutely ciliate behind, third curvedly depressed across the middle of the base and about as long as the following two singly, sixth large, obtusely triangular, the operculum distinct, oviform, and extending from the apex nearly to the base.

After studying the descriptions of the five species (3198-3202) referred to *Trichomyx* by Herr Reitter, I feel pretty sure that the peculiar duplication of the sutural striæ and the rather plane head are sufficiently good distinguishing characters. None described by me are exactly similar.

♂. Length  $1\frac{1}{2}$ ; breadth  $\frac{1}{2}$  mm.

Greymouth (*Helms*). British Museum. A single male from Dr. Sharp's collection.



3496. *Euplectopsis clavatulus*, sp. n.

Elongate, not slender, slightly convex, nitid, finely, irregularly, but not closely punctate; castaneo-rufous, legs and antennæ paler, palpi and tarsi flavescens; rather thinly clothed with decumbent, distinct, greyish pubescence.

*Head* smaller than the thorax, genæ nearly straight, with obtuse angles; the foveæ distinct, more or less confluent in front, antennal tubercles distant, rather small. *Thorax* narrow, oviform, rather longer than broad, moderately rounded near the middle, less narrowed behind than in front, where it is almost as broad as the occiput; discal furrow well marked, extending from the base nearly to the apex, lateral foveæ subrotundate, rather large and deep, and united to the rather narrow basal depression. *Elytra* sub-oblong, about a third longer than the thorax, evidently broader than it is, a little rounded near the shoulders; sutural striæ well marked throughout but not broad, punctiform at the base, with a basal puncture alongside each; the intra-humeral impressions short and broad, indistinctly duplicated, bipunctate at the base. *Hind body* as broad as the wing-cases, deflexed behind and therefore appearing shorter, the basal three segments slightly increasing. *Legs* stout, the anterior tibiæ somewhat arched and longer than the others.

*Antennæ* rather shorter than the head and thorax, moderately stout, gradually incrassate from the seventh joint onwards; second joint oblong-oval, nearly as long as the basal, third slightly longer than broad, fourth and fifth about equal, neither quite as long as broad, sixth smallest, seventh rather broader than the sixth, joints 8-10 successively dilated, eleventh conical, subacuminate, hardly the length of the preceding three.

*Metasternum* moderately elongate and convex. Basal ventral segment partly covered by the femora, segments 2-4 slightly increasing, fifth widely incurved behind, barely half the length of its predecessor in the middle, sixth semi-circularly emarginate, the seventh with a distinct oblong operculum.

Rather broader than Reitter's *E. longicollis* (3198), and at once differentiated by the gradual enlargement of the last five antennal joints, forming a sort of elongated club; and as each elytron is quadripunctate at the base, this species exhibits two well-marked characters which, in conjunction, and independently of details of sculpture, separate it from any other species known to me.

♂. Length  $1\frac{2}{3}$ ; breadth quite  $\frac{1}{2}$  mm.

Greymouth. Found by Mr. Helms. One example in Dr. Sharp's collection, British Museum.

PLECTOMORPHUS, Raffray.

Wytzman's Gen. Ins., Pselaphidæ, 1903, p. 105.

3497. *Plectomorphus longiceps*, sp. n.

Subdepressed, shining, sanguineous, antennæ and legs paler, palpi and tarsi fulvescent; pubescence greyish, mingled with long erect hairs.

*Head* large, as long as the thorax and, in line with the moderately prominent eyes, as broad as it is, genæ slightly narrowed towards the rounded hind angles; its surface shining but minutely asperate, the central portion obtusely elevated as far as the eyes, broadly depressed between, and just behind, the elevated antennal tubercles, which are vertical in front; the well-marked foveæ, situated just behind the eyes, are prolonged to the frontal depression. *Thorax* quite as long as broad, widest and rounded before the middle, more narrowed in front than behind; its sculpture similar to, but more distant than, that of the head; mesial channel deep, extending from the apex to the angulate basal depression, this is united to the lateral foveæ, which are prolonged as grooves almost to the apex. *Elytra* subquadrate, distinctly narrowed before the middle, of equal length and breadth, with fine indefinite sculpture; sutural striæ broad and deep, not distinctly foveate at the base, intra-humeral impressions also broad and deep, indistinctly prolonged to the middle. *Hind body* nearly as broad as but evidently shorter than the elytra, basal segment slightly longer than the next, with a short median depression in front, these two are horizontal, the others deflexed.

*Antennæ* elongate, as long as the head and thorax, rather slender, finely pubescent; basal joint cylindrical, quite twice as long as broad, second fully half the length of the first, oblong, joints 3-6 decreasing in length, more or less longer than broad, eighth very slightly broader than the oviform seventh, ninth rather broader than the eighth, bead-like, but hardly as broad as the subquadrate tenth, the terminal conical, subacuminate, nearly as long as the preceding two combined.

When compared with the type of the genus, *P. spinifer* (2476), this is seen to be larger, its head is manifestly longer, more oviform, and with obsolete hind angles, the thorax is longer, the elytra are more narrowed near the base, with

larger intra-humeral impressions, the abdomen is shorter, but the antennæ are longer, with a decidedly more elongate basal joint.

♀. Length  $2\frac{1}{3}$ ; breadth  $\frac{2}{3}$  mm.

Greymouth (*Helms*). One from Dr. Sharp's collection in the British Museum.

3498. *Plectomorphus brevicornis*, sp. n.

Elongate, rather narrow, glossy, with greyish-yellow, depressed and suberect but not very elongate, pubescence; head and thorax sanguineous, abdomen more infuscate, elytra fulvo-rufous, legs and antennæ of a lighter hue, tarsi and palpi flavescent.

*Head* as broad, in line with the rather large moderately convex eyes, as the middle of the thorax but a good deal shorter than it is, the genæ distinctly narrowed behind, with obtuse hind angles; its narrow central portion is convex and projects as far as the front of the eyes; the depression between the antennal tubercles is divaricate and extends backwards near each side, becoming gradually broader and deeper near the base, so that the usual foveæ are obliterated. At the middle of the base there is a minute angular impression. *Thorax* scarcely longer than broad, slightly rounded and widest before the middle, only very slightly and gradually narrowed behind, more, and quite obliquely, in front; central channel deep, extending from near the apex to the base, but hardly any broader behind than at the middle, so that the common basal depression is only marked off by the strip uniting it to the large lateral foveæ, which are prolonged as grooves to the front. *Elytra* suboblong, a third longer than the thorax, slightly narrowed near the shoulders, indistinctly punctate; sutural striæ deep, foveiform at the base, alongside each there is a basal fovea which is nearly equal in size to the short, foveiform intra-humeral impressions. *Hind body* nearly as long and broad as the elytra, with the basal three segments nearly horizontal and equal. *Legs* slender, simple.

*Antennæ* shorter than the head and thorax, with elongate slender pubescence; the suboblong (rotundate in one antenna) second joint nearly as long as the basal; joints 3-8 transverse, fifth and seventh only a little larger, the sixth and eighth rather smaller than the other ones, ninth nearly double the size of the eighth and almost as broad as the transverse tenth, the terminal one conical but not acuminate, hardly the length of the preceding two combined.

The relatively large eyes, occupying a third of the length of each side of the rather short head, the unusual basal sculpture of the elytra, and the short antennæ, all the joints of which except the basal two and the eleventh are transverse, indicate a new form intermediate between this genus and *Euplectopsis*. Though more like the latter genus in form, its broad head and trisulcate thorax do not accord with typical species, and as there is only a solitary individual, it is not advisable to institute a new genus for its reception.

Length  $1\frac{2}{3}$ ; breadth  $\frac{1}{2}$  mm.

Auckland. British Museum, from Dr. Sharp's collection.

3499. *Plectomorphus egenus*, sp. n.

Nitid, very slightly convex, fulvo-testaceous; legs and antennæ paler, bearing depressed, slender, greyish pubescence.

*Head* as large as the thorax, rounded behind the rather large eyes, with obsolete hind angles, the foveæ prolonged and confluent in front, antennal tubercles slightly elevated and distinctly separated. *Thorax* rather broader than long, a little rounded and widest near the front, obliquely narrowed there, very gradually behind; central channel broad and deep, extending almost from the apex to the base, with a transverse stria uniting it to the lateral foveæ, which extend as grooves to the front. *Elytra* slightly narrowed before the middle, suboblong, with broad sutural striæ; these are punctiform at the base, with a distinct basal puncture alongside each, intra-humeral impressions foveiform, rather short and only obsoletely prolonged backwards. *Hind body* almost as broad as the elytra, but much shorter, its basal segment nearly as long as either of the next two. *Legs* simple, slender.

*Antennæ* rather stout, of nearly the same length as the head and thorax, with slender pubescence; second joint subrotundate and about as large as the exposed portion of the first, third small, slightly narrowed at the base, joints 4-8 transversely moniliform, the sixth and eighth just perceptibly smaller than the seventh, ninth and tenth transverse, the former not quite as broad as the other, eleventh conical, not acuminate, nearly equalling the preceding two.

Less elongate and convex than *P. brevicornis*, with almost similarly formed antennæ, the head rather broader and more curvate behind, the thorax and elytra slightly shorter, the intra-humeral impressions not so deep, and the abdomen

evidently shorter. Fully matured individuals are doubtless more rufescent.

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

Tairua. This seems to be another of my unique specimens sent to Dr. Sharp and now preserved in the British Museum.

#### VIDAMUS, Raffray.

Wytzman's Gen. Ins., Pselaphidæ, 1908, p. 89.

#### 3500. *Vidamus modestus*, sp. n.

Elongate, rather narrow, subparallel, nitid, very slightly convex, castaneo-rufous, with the antennæ and legs paler, tarsi and palpi flavescent; clothed with depressed, short, yellowish-grey pubescence.

*Head* rather short, gradually yet distinctly narrowed behind the moderately large eyes, its hind angles obtuse and but little broader than the thoracic apex in the female; in the male subquadrate, with the obtuse hind angles evidently broader than the front of the thorax; the forehead obtusely angulate in the middle and oblique towards the sides, the foveæ situated just behind the eyes and prolonged into the slight impression across the forehead. *Thorax* small, subcordate, rounded and widest just before the middle, with a large rotundate fovea at each side and an angulate depression in the middle in front of the base, united by a transverse stria; the basal margin is tripunctate. *Elytra* suboblong, slightly narrowed near the shoulders, without perceptible punctation, sutural striæ well marked, deepest at the base, where there is a small puncture near each; intra-humeral impressions foveiform. *Hind body* rather narrower than the elytra but nearly as long, basal segment almost as long as the second or third, the others deflexed. *Legs* rather slender, simple.

*Antennæ* shorter than the head and thorax, distinctly pubescent towards the extremity; second joint oblong-oval, about as long as the basal, third smaller than second, yet distinctly longer than broad, fourth to eighth small and moniliform, fifth and seventh slightly larger, ninth distinctly larger than eighth, but not as broad as the transverse tenth, the terminal conical and acuminate, longer than the preceding two united.

*Male*.—*Underside* chestnut-red, finely pubescent; abdomen finely punctate, segments 2-4 slightly decreasing, fifth rather

shorter than fourth, slightly but widely emarginate behind, sixth large, deeply medially concave behind, the supplementary one subquadrate.

Much more slender than Sharp's *Euplectus convexus* (254) and differing from all the older species described by myself by the shorter, posteriorly narrowed, head of the female and other details.

Length  $1\frac{2}{3}$ ; breadth  $\frac{1}{2}$  mm.

Tairua, Auckland. Three found by myself and sent to Dr. Sharp about forty years ago. In the British Museum.

### 3501. *Vidamus sternalis*, sp. n.

Elongate, subdepressed, shining, finely punctate, with fine, suberect, yellowish-grey pubescence; head, thorax, and abdomen castaneo-rufous; elytra, legs, and antennæ fulvescent.

*Head* not perceptibly narrower than the middle of the thorax, with rounded hind angles; the foveæ are placed near the base and extend forwards as broad channels to the slightly raised frontal margin; when examined sideways the transverse frontal impression seems obsolete. *Thorax* slightly longer than broad, rounded and widest just before the middle, the postmedian depression angular and ending as a puncture at the basal margin; there is another basal puncture at each side of the middle; lateral foveæ deep, united to the central depression by a groove. *Elytra* suboblong, a little narrowed near the shoulders, fully a third longer and broader than the thorax; sutural striæ well marked, punctiform at the base, and with a small basal puncture alongside each; intra-humeral impressions short, each minutely bipunctate at the base. *Hind body* as long as the elytra, the intermediate segments about equal. *Legs* simple.

*Antennæ* as long as the head and thorax; second joint subquadrate and shorter than the basal one, third and fifth slightly larger than the fourth, joints 6-8 slightly increasing in breadth, ninth not as broad as the transverse tenth. terminal one twice the length of its predecessor.

*Underside* chestnut-red. Metasternum with a punctiform fovea behind each of the middle coxæ and another near each side. Abdomen elongate; second and third segments equal, each longer than the basal one, fifth densely and minutely setose in front, with a linear impression across the middle, so that this segment seems duplicated (no distinct suture, however, can be seen), sixth large, slightly rounded behind, but damaged and detached.

The head and thorax are longer than those of *V. modestus*, the sutural striæ are deeper and broader, the antennæ are more incrassate towards the extremity, and the metasternal foveæ have not been noticed in any other species.

Length 2; breadth nearly  $\frac{1}{2}$  mm.

Greymouth (*Helms*). One from Dr. Sharp's collection, British Museum.

#### ZEALANDIUS, Raffray.

Wytzman's Gen. Ins., Pselaphidæ, 1908, p. 111.

#### 3502. *Zealandius fovealis*, sp. n.

Elongate, rather narrow, nitid, head subopaque; clothed with decumbent greyish pubescence and long upright setæ; dark rufous, legs and antennæ pale chestnut-red, tarsi and palpi flavescens.

*Head* smaller than the thorax, narrowed in front of the minute eyes; genæ slightly narrowed behind, with obtuse angles, moderately closely and distinctly punctate; antennal tubercles distant and slightly elevated, the foveæ small, situated just behind the eyes and only indistinctly prolonged to the flattened forehead. *Thorax* subcordate, widest before the middle, more gradually narrowed behind than in front, of about equal length and breadth, more distinctly punctured near the base than elsewhere; discal furrow moderately deep and extending from near the apex to the angular basal depression; lateral foveæ subrotundate, without any perceptible anterior prolongation, and not definitely connected with the basal fossa. *Elytra* scarcely longer than broad, curvedly narrowed towards the base and but little wider than the thorax there; they are only slightly transversely convex and somewhat indefinitely punctured; sutural striæ broad, foveiform and deep at the base, and apparently duplicated, the dorsal nearly similar but more shallow behind, the interstices carinate. *Abdomen* as long as the wing-cases, as broad at the base, but narrowed and deflexed posteriorly; basal three segments nearly horizontal and slightly increasing.

*Antennæ* as long as the head and thorax, rather thickly pubescent towards the extremity; basal joint red, cylindrical, its length nearly double the breadth, second shorter, oblong-oval, the next distinctly narrowed at the base, joints 4-7 moniliform and almost equal, eighth smaller than seventh, contracted apically, ninth and tenth subquadrate, the latter

the larger, both evidently larger than the preceding ones, the terminal one largest, conical and acuminate.

Only a single species has been recorded from the same locality—*Z. fulgens* (3384); but it is a much broader insect, with a large *Vidamus*-like head, and, moreover, the lateral thoracic foveæ are prolonged as grooves to the front. It differs also from the other members of Section 2 by the more elongate hind body, narrower head, and the almost entire absence of the usual transverse connecting stria between the lateral foveæ and basal fossa.

Length  $1\frac{2}{3}$ ; breadth  $\frac{1}{2}$  mm.

Greymouth (*Mr. R. Helms*). One (a female, I believe) from Dr. Sharp's collection, British Museum.

### Group BRACHYGLUTINI.

#### EUPINES, King.

Wytzman's Gen. Ins., Pselaphidæ, 1908, p. 206.

#### 3503. *Eupines simplex*, sp. n.

Glabrous, shining, smooth, moderately convex; piceo-rufous, with the legs and antennæ rufescent, tarsi and palpi obscurely testaceous.

*Head* subquadrate, somewhat narrowed behind the moderately large eyes, with two small interocular foveæ, and (in the male only) biimpressed in front. *Thorax* about as long as broad, rounded and widest before the middle, without definite sculpture. *Elytra* nearly double the length and breadth of the thorax and, in conjunction with the abdomen, of uninterruptedly oval contour, with fine sutural striæ. *Legs* elongate, simple.

*Antennæ* as long as the head and thorax, their terminal three joints more thickly pubescent than the others and distinctly larger; basal joint stouter but hardly any longer than the oblong second, third and fourth rather smaller than the following one, seventh and eighth bead-like and slightly broader than the preceding ones, ninth transverse, distinctly broader than the eighth but smaller than the tenth, the terminal one large, subconical, twice the length of the tenth.

*Underside* dark red, finely and distantly punctate, with numerous slender, decumbent, yellowish hairs. *Metasternum* unimpressed. Basal ventral segment invisible in the middle, second nearly as large as the remaining ones combined, the next two very short in the middle, the terminal large.



*Female*.—Thorax with a slight transverse impression near each side of the base. Antennal joints 9 and 10 evidently narrower than the large terminal one.

*E. piciceps* (233) is the nearest ally, but in it joints 2-7 of the antennæ are evidently longer than broad.

Length  $1\frac{1}{2}$ ; breadth quite  $\frac{1}{2}$  mm.

Tairua, Auckland. Sent by myself to Dr. Sharp about forty years ago, both sexes; now in the British Museum.

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XVII.—On the Systematic Position of the Coleopterous Genus *Lemodes* (*Heteromera*), with Notes on some Allied Genera.  
By K. G. BLAIR, B.Sc., F.E.S.

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THE genus *Lemodes* was created in 1858 by Boheman ('Voy. de la Frégate Eugénie,' Ins. p. 103) for the reception of the brilliant little Australian *L. coccinea*, Bohem., and was placed by its author in the family Pyrochroidæ. Here it was left by Lacordaire (Gen. Col. v. p. 604) with an expression of doubt as to its being correctly included in the family, from the other members of which it presents many points of difference.

Since this date (1859) many other species of the genus have been described without any alteration being made in its systematic position: in 1873 Macleay described *L. mastersi* from Gayndah, Queensland (Trans. Ent. Soc. N.S.W. ii. p. 308); in 1883 Oberthür (Col. Novit. i. p. 63) described *L. albertisi* from New Guinea and *L. atricollis* from Victoria (a further note on the latter by M. Pic appeared in 'L'Échange,' xxii. 1906, p. 56); in 1895 Lea (Proc. Linn. Soc. N.S.W. (2) x. p. 282) described *L. elongata* and *L. corticalis*, followed in 1906 (*op. cit.* vol. xxxi. p. 226) by *L. splendens*, all from New South Wales; while, to conclude the list, in Ann. & Mag. Nat. Hist. (8) ix. 1912, p. 533, I added *L. ceruleiventris* and *L. tumidipennis*.

The last species was described upon a single specimen bearing no nearer indication of its habitat than "Australia," but since then, by the courtesy of Commander Walker, I have been enabled to examine a series of the same species taken by him in conjunction with Mr. H. J. Carter at Otford in the Illawarra district, Sydney. Mr. Carter informs me further that it occurs in the North Coast district also. It is found on or under rotten bark and in the rotten wood of old

timber in the "scrub," and apparently feeds on the fungoid growths infesting such situations. It is not gregarious like *L. coccinea*, Boh.

*L. tumidipennis* differs very considerably from the other species of the genus *Lemodes*, not only in the peculiar form of the elytra, which may indeed be considered merely an exaggeration of that which is found in *L. coccinea*, but also in the lack of the long silky red pubescence, with which the others are for the most part clothed, and more particularly in the shape of the head, which instead of being strongly transverse and subtriangular in outline, and almost truncate behind the eyes, is almost circular in outline and strongly rounded behind the eyes. The prothorax is about half as long again as it is broad and more strongly compressed laterally before the base, so that it appears to bulge out dorso-ventrally. These characters certainly warrant generic separation, and I propose for it the name *Lemodinus*.

The small size and general facies of this insect give it a distinctly Anthicid appearance, indeed a search amongst the unnamed Anthicid material in the Museum Collection revealed the presence of some of the specimens taken by Commander Walker and presented by him. An examination of the characters, together with those of *Lemodes*, proves that both these genera should be transferred to the Anthicidæ. The deep form of the body, not at all depressed, the more or less moniliform antennæ, the small, entire, and prominent eyes, the constricted prothorax, and, finally, the broad triangular intercoxal process of the abdomen all point to their true affinities with the Anthicidæ and are characters all quite foreign to the Pyrochroidæ. Herr von Kreckich-Strassoldo informs me further that the genitalia agree in general with those of the Anthicidæ, and that the lower wings, while belonging, as do those of all the Heteromera, to Ganglbauer's Type III. (Münchener Koleopt. Zeitschr. 1903, p. 292, or Gahan in Entom. vol. xlv. 1911, p. 125), yet in *Lemodes* show a more developed form than appears in the Pyrochroidæ; in the Anthicidæ these organs show very considerable variety in their degree of development.

To the same group of genera as indicated by Mr. Blackburn (Trans. Roy. Soc. S. Austr. 1899, vol. xxiii. p. 83) belongs his genus *Trichananca*. Mr. Blackburn has sufficiently demonstrated the relationship of *T. victoriensis*, Blackbn., with *Lemodes*, indeed he considered that *L. corticalis*, Lea = *T. victoriensis*, Blackbn. (the latter name taking precedence); while an examination of the type of *T. victoriensis* now in the collection of the British Museum makes it clear

that its relationship with the Anthicid genus *Tomoderus* is at least equally close. From *Tomoderus*, *Trichananca* differs in the peculiar formation of its anterior tarsi and in its more slender antennæ, the individual joints of which are all considerably elongate. I cannot accept Blackburn's statement that "the relation between the head and the prothorax is quite as in *Techmessa*" (*Edemeridæ*). In that genus the head is not constricted behind, but fits directly into the prothorax, whereas in *Trichananca* the head is sharply constricted behind, forming a very distinct neck, which, however, is to a great extent sunk in the prothorax. The relation between the head and prothorax in *Trichananca* is remarkably similar to that in *Tomoderus compressicollis*, Motsch. This character was correctly recognized by Lea in his description of *Lemodes corticalis*.

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XVIII.—Notes on *S. American Leporidae*.

By OLDFIELD THOMAS.

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## (1) THE SMALL "TAPETI" OF RIO JANEIRO.

IN common with other authors, I have hitherto taken the small Rio Janeiro hare as being Linné's *Lepus brasiliensis*, pending the identification of an exact locality for the latter.

Now, however, that, in the course of my studies on the 'Systema Naturæ,' Pernambuco has been fixed as the type locality of *L. brasiliensis*\*, a renewed examination of the Eastern Brazilian hares is needed.

Among the several series of hares obtained by A. Robert in Brazil is a set of nine specimens from Lamarão, Bahia, a locality on the railway that runs north-westwards from the town of Bahia, and therefore not so very far from Pernambuco. For the moment, therefore, these may be treated as true *L. brasiliensis*.

This animal, while slightly smaller than my "*L. minensis*" from the Rio Jordão, is undoubtedly of the same group (skull about 70 mm. in total length), and I am now of opinion that the forms which have been termed *minensis*,

\* P. Z. S. 1911, p. 146. Pallas's *Lepus tapeti*, being equally based on Maregrave's Tapeti, is an absolute synonym of *S. brasiliensis*.

*chapadensis*, and *paraguensis* should all be considered as subspecies of *brasiliensis*, while an additional subspecies from Peru is described below.

But the little hare of Rio Janeiro, hitherto taken for *brasiliensis*, is certainly an entirely different species, and may be called

*Sylvilagus tapetillus*, sp. n.

Size exceedingly small, skull little larger than that of the smallest N. American hares. General coloration dark, strongly contrasted. Light rings on dorsal hairs buffy, little lighter on sides. Light nostril patch large, white, conspicuous; cheeks blackish. Superciliary streak broad, strongly marked. Ears rather long for this group, their proectote grizzled tawny basally, black terminally. Nuchal patch dark rufous. Fore feet pale tawny; hind feet mixed tawny and whitish.

Skull small, slender, with narrow muzzle. Postorbital processes slender, ankylosed terminally to the skull in the type, and merely leaving a narrow foramen about 2 mm. in length. Palatal foramina narrow. Bullæ rather small.

Teeth with the approximated enamel walls of the anterior and posterior laminae less strongly crenulated than usual; anterior premolar with only three convex loops of enamel anteriorly.

Dimensions of the type (measured on the badly prepared skin):—

Head and body 295 mm.; hind foot 70; ear 46 (dry).

Skull: greatest length 61; condylo-incisive length 55; zygomatic breadth 32.5; nasals, length 24, breadth anteriorly 8.3, posteriorly 11.7; interorbital breadth (on ridges, not at notch) 14.6; breadth of brain-case 24.3; palatal foramina 14.5 × 5; breadth of palatal bridge 7; upper tooth-series (alveoli) 13.

*Hab.* Rio Janeiro. Type from Porto Real, near Rezende.

*Type.* Old specimen, sex indeterminable. B.M. no. 92.11.24.3. Collected by L. Hardy de Dréneuf.

This little hare is readily distinguishable from all the members of the *Sylvilagus brasiliensis* group by its much smaller size. Its distribution would seem to be limited to the near neighbourhood of Rio de Janeiro.

(2) THE HARE OF EASTERN PERU.

*Sylvilagus brasiliensis inca*, subsp. n.

A dark strongly coloured race of *brasiliensis*.

Size and general characters as in *S. brasiliensis*; colour

much darker than in any of the other races, and especially darker than in the nearest one geographically, the pale *S. b. chapadae*. Back heavily overlaid with black, the light rings strong buffy, paler on sides. Under surface greyish white. Chin and nostril patches pure white. Crown mixed tawny and black. Superciliary streak cream-buff, strongly contrasted. Cheeks heavily blackened. Ears with the basal halves of their proectote strongly tawny, the terminal halves blackish. Nuchal patch large, rich tawny. Hands and feet pale tawny above. Tail dull buffy basally, the end smoky brown above, dull buffy below.

Skull about as in *brasiliensis*, the tip of the muzzle narrow and pointed, the postorbital processes rather slender, the palatal foramina narrow, and the bullæ inconspicuously smaller than in the eastern races.

Dimensions of the type (measured on the skin) :—

Head and body 365 mm. ; hind foot 75 ; ear 40.

Skull : greatest length 70 ; condylo-incisive length 61·7 ; zygomatic breadth 35 ; nasals, length 27, breadth anteriorly 8, posteriorly 13·7 ; interorbital breadth on ridges 17 ; intertemporal breadth 14·3 ; breadth of brain-case 26 ; palatal foramina  $19 \times 6\cdot3$  ; upper tooth-series (alveoli) 14.

*Hab.* Marcapata, E. Peru. Type from Cadena.

*Type.* Adult female. B.M. no. 4.12.4.15. Collected in 1902 by J. Kalinowski. Received in exchange from the Branicki Museum, Warsaw. Three specimens.

This Peruvian race of the Brazilian hare is readily distinguishable by its dark strongly contrasted colours.

Forms referable to what I should consider *S. brasiliensis* in the broad sense range over the southern half of Brazil, and westwards to Peru. Northwards they range into Colombia, and will probably be found to intergrade with *S. gabbi*. Then on the north coast and islands of Colombia and Venezuela there occurs *S. cumanicus*, from which, with topotypes of both before me, I scarcely think *S. margaritæ* and *superciliaris* can be distinguished. *S. orinoci*, however, is a more isolated form, tending again towards *S. brasiliensis*. The Andean hares, *S. meridensis*, *andinus*, and their allies, form another group, very different looking externally, but really essentially related to the rest. Finally, the black-naped hares of Maracaibo and Oruba Island, N. Venezuela (*S. nigronuchalis* and its rather dubious subspecies *continentis*), are the most obviously different from the rest of all the S. American Leporidae.

(3) THE MOUNTAIN HARES OF THE *SYLVILAGUS ANDINUS* GROUP.

A number of hares, or, as Americans call them, rabbits, from different parts of Ecuador and N. Peru have long been in the British Museum under the name of *Sylvilagus andinus* (*Lepus andinus*, Thos., 1887), but a renewed examination of them shows that they consist of at least four definable forms, while a fifth, very different from any, is now being described by Sr. Cabrera. With the exception of the two original specimens of *andinus* (obtained by W. Rosenberg) all the British Museum specimens are from the collection of the late P. O. Simons.

Examples referable to true *andinus*, recognizable by its large rufous nape-patch, which always extends beyond the laid-back ears, and may reach the withers, are in the collection from Cayambe, N.E. of Quito; Guaillabamba, near Riobamba; the Paramos E. of Riobamba; and Telagua in Province Bolivar.

Then from the neighbourhood of Mt. Chimborazo we get

*Sylvilagus andinus chimbanus*, subsp. n.

All essential characters as in true *andinus*, but the rufous nape-patch much reduced in size, so that no part of it shows beyond the ends of the ears when laid back. Ears averaging rather longer than in *andinus*; the region between their anterior bases and the eyes more prominently greyish (grey no. 6) than in the allied form. Upper surface of feet generally quite white.

Dimensions of the type (measured in the flesh):—

Head and body 335 mm.; tail 20; hind foot 65; ear 55.

Skull: greatest length 67; condylo-incisive length 61; zygomatic breadth 32·8; palatal foramina 16·3; breadth of palatal bridge 6·6.

*Hab.* Sinche, Upper Rio Chimbo, just north of Guabanda, Ecuador. Alt. 4000 m.

*Type.* Adult female. B.M. no. 99.9.9.114. Original number 146. Collected 20th December, 1893, by P. O. Simons. Presented by Oldfield Thomas. Five specimens.

This is probably the form inhabiting Mount Chimborazo, near the western slopes of which Sinche (3200 m.) is situated.

*Sylvilagus andinus canarius*, subsp. n.

Size rather larger than in true *andinus* and *chimbanus*. General colour darker and warmer throughout, the light ring on the body hairs—approximately cream-buff in *andinus*—more approaching clay-colour. As a consequence there is less difference between the body colour and that of the rump and hind legs, which, as usual, are dark rufous. Under surface with a slight buffy suffusion. Nape-patch large, extending nearly to the withers; deep tawny. Light line over eyes rather more marked than in *andinus*. Light nostril patches greyish white, not specially conspicuous. Cheeks and region between eye and ear suffused with dull buffy, not so clear a grey as in *chimbanus*. Hands and feet more or less washed with buffy.

Skull rather longer than in *andinus*—the nasals longer and inclined to be trumpet-shaped anteriorly. Bullæ rather smaller though distinctly more inflated than in the species next following.

Dimensions of the type (measured in the flesh) :—

Head and body 348 mm.; tail 22; hind foot 70; ear 55.

Skull: greatest length 70.5; condylo-incisive length 63; zygomatic breadth 33; nasals, length 28, breadth anteriorly 11.2, posteriorly 15; palatal foramina 17.8; breadth of palatal bridge 7.5.

*Hab.* Cañar, Andes of Ecuador. Alt. 2600 m.

*Type.* Adult male. B.M. no. 99.9.9.123. Original number 272. Collected 18th April, 1899, by P. O. Simons.

This more southern form of the Andean rabbit is distinguishable by its darker general colour, slightly larger size, and smaller bullæ.

Mr. Simons marks the type specimen as "from hole in ground"; so that these rabbits are evidently burrowers, like the true rabbits of Europe.

*Sylvilagus capsalis*, sp. n.

Size rather larger than in *S. andinus*. Fur straighter and less woolly. General colour paler, the pale rings on the hairs cream-buff on back, nearly white on sides. Under-side dull whitish, the chin nearly white, the throat-collar greyish with whitish tips. Forehead about as in *andinus*, but supraorbital streak much more strongly marked, whitish. Light nostril patches snowy white, strongly contrasted. Region between eye and ear not conspicuously grey. Ears with the basal half of their proectote slightly tawny, not

greyish as in *andinus*; terminal half blackish; hairs of metentote whitish, those along the edge tinged with pale tawny. Nuchal patch large, as in true *andinus*, dull tawny. Upper surface of hands and feet tawny whitish.

Skull very flat in frontal region; postorbital processes slender, the notch behind them equally narrow throughout. Palatal foramina widely open, their edges rounded. Bullæ much smaller than those of *andinus*, scarcely inflated, little exceeding those of *S. surdaster*. Upper incisors more bent downwards and inwards, so as to be practically invisible from above.

Dimensions of the type (measured in flesh):—

Head and body 350 mm.; tail 20; hind foot 75; ear 55.

Skull: greatest length 68·3; condylo-incisive length 62; zygomatic breadth 33·5; nasals 26 × 13·8; palatal foramina 17 × 7; breadth of palatal bridge 7; upper tooth-row (alveoli) 13.

*Hab.* San Pablo, Cajamarca, Pacific slope of N. Peru. Alt. 2000 m.

*Type.* Adult female. B.M. no. O. 3. 15. 29. Original number 718. Collected 8th November, 1899, by P. O. Simons.

In its paler colour, as compared with the saturate *S. andinus*, this rabbit shows the influence of the dry climate of the coast of N.W. Peru. It shows some relationship to the members of the *S. brasiliensis* group by its sides being paler than the back, by its light superciliary streak, and by the inclination to tawny on the bases of the ears. Its skull is recognizable by its small bullæ and the unusually slight projection forward of the incisors.

### XIX.—*Four new Shrews.* By OLDFIELD THOMAS.

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#### *Sorex batis*, sp. n.

A large dark-coloured shrew, without tricolor pattern.

Size about as in the larger races of *S. araneus*. General colour dark, without any trace of the "tricolor pattern" so characteristic of *S. araneus*; upper surface either blackish slate or sepia-brown, some specimens of the series all of the one colour, some of the other, and some half one and half the



other; sides quite similar to back; under surface almost equally dark. Hands and feet pale brown. Tail rather longer than is usual in *S. araneus*, dark brown above, rather paler below.

Skull of about the size of that of *S. araneus*, but distinguishable by the much broadened lateral wings of the brain-case, which project out on each side conspicuously more than in *araneus*, and considerably alter the relative proportions of the breadth to the height and length.

*Teeth*.—First incisor shorter than in *araneus*, its horizontal length going nearly twice in the distance from its hinder edge to the front of  $p^4$ , that of *araneus* only going about once and a half; the posterior cusp more pointed, narrower antero-posteriorly, less of a broadened blade, its antero-posterior and transverse diameters approximately equal. As a consequence of the smaller size of  $i^1$ , the distance from the front of  $i^1$  to the front of  $p^4$  is markedly less than in *S. araneus*, while the size of the molariform teeth is exactly the same.

[*S. araneus tetragonurus*, the large Central and S.E. European form, has been used in this comparison; many of the other races are smaller, while that described below is larger, but the relative proportions are much the same in all.]

Dimensions of the type (measured in the flesh):—

Head and body 75 mm.; tail 52; hind foot 13; ear 6.

Skull: condylo-basal length 19.5; greatest breadth 10.2; height of brain-case from basion 5.4; upper tooth-series 8.5; front of  $p^4$  to back of  $m^2$  4.2.

In no. 6. 3. 6. 211, an old male, the brain-case breadth is 10.5 mm., with a condylo-basal length of 19.5.

*Hab.* Trebizond region, north-eastern Asia Minor; type from Sumela, 30 miles S. of Trebizond. Alt. 1000–1300 m. Fifteen specimens.

*Type*. Adult male. B.M. no. 6. 3. 6. 18. Original number 2024. Collected 12th October, 1905, by A. Robert. Presented by Oldfield Thomas.

The absence of the tricolor pattern, the expanded brain-case, and the peculiar first incisor will readily distinguish this well-marked species.

*Sorex batis* is the "larger longer-tailed form from Asia Minor" mentioned under *S. araneus santonus* by Miller (Cat. Mamm. W. Eur. p. 40, 1912). It had not been definitely determined at the time Mr. Miller was doing his work on the group.

*Sorex araneus peucinius*, subsp. n.

Nearest to *S. a. tetragonurus*, but still larger. Colour dark.

Size very large, the largest of the shrews referable to *S. araneus*. Upper surface slaty blackish, sides indistinctly brownish, the tricolor pattern present though not conspicuous. Under surface brownish, much darker than is usual in *tetragonurus*, though nearly equalled by some Italian specimens of that race. Hands and feet pale brown. Tail of average length, decidedly shorter than in *S. hatis*.

Skull and teeth essentially as in *S. araneus*, but exceeding in size those of any other of the European races; the molar teeth are especially larger than is usual in *araneus*, for while the distance from the front of  $p^4$  to back of  $m^2$  (a very exact and definite measurement which can be taken with great accuracy) is 4.3 in all of the largest specimens of *araneus*, which measure 20 mm. in condylo-basal length, it is 4.6 in the present animal.

Dimensions of the type (measured in the flesh) :—

Head and body 80 mm.; tail 43; hind foot 15; ear 7.

Skull: condylo-basal length 20.5; greatest breadth 10; height of brain-case from basion 5.6; upper tooth-series 9; front of  $p^4$  to back of  $m^2$  4.6.

*Hab.* Swamp region of the Delta of the Danube, Dobrukscha; type from Ciatal.

*Type.* Old female. B.M. no. 12. 12. 17. 9. Original number 78. Collected 14th October, 1912, by A. Rettig. Presented by the Hon. N. Charles Rothschild.

This shrew, from the swamps of the Danube Delta, is distinguishable from *S. a. tetragonurus*, the form found in the mountain regions of Central and Southern Europe, by its dusky belly and large size. Its hind foot (15 mm.) surpasses that of any *Sorex* mentioned in Miller's Catalogue, where nearly 1000 specimens are recorded as examined.

*Soriculus fumidus*, sp. n.

A dark species with a short tail.

Size about as in *S. sacratu*s. General colour dark smoky blackish, darker than in typical adult *S. sacratu*s, but similar to some which are probably in a darker or juvenile stage; probably the insular species is always normally dark. Under surface scarcely lighter than upper. Hands and feet brown; the digits lighter. Tail decidedly shorter than head and body, well haired, dark brown, little lighter below.

Skull on the whole similar to that of *S. sacratus*, but rather broader and the brain-case more angularly expanded. Basisphenoid region of the comparatively simple structure found in the large *S. nigrescens*, with but little trace of the lateral fossæ with overhanging boundaries which occur in all the available specimens of *S. sacratus*. Such well-developed fossæ do not occur in *S. nigrescens*, *minor*, *macrurus*, or *irène*, and if really constant in *sacratus* they form a very distinctive mark of that species. Second upper incisor larger than third.

Dimensions of the type (measured on the skin):—

Head and body probably about 60 mm.; tail 48; hind foot 12·5.

Skull: condylo-basal length 18; basal length 16·4; greatest breadth 9·6 \*; upper tooth-series 8; front of  $p^4$  to back of  $m^2$  4·3.

*Hab.* Mt. Arizan, Central Formosa. Alt. 8000'.

*Type.* Old male. B.M. no. 12. 11. 32. 1. Original number 32. Collected March 1912, and presented by Walter Goodfellow, Esq. Another specimen obtained by Mr. A. Owston's native collector in 1906.

This shrew is probably most nearly allied to the Himalayan *S. caudatus*, but has a much shorter tail. From the Chinese *S. sacratus* it is distinguished by its simpler basisphenoid region and rather shorter tail.

#### *Chodsigoa sodalis*, sp. n.

Smallest species of the genus.

Size considerably less than in *Ch. larvarum*, the smallest previously described species of *Chodsigoa*. Skull not so strikingly flattened as usual, its general shape more like that of other shrews. Upper profile nearly straight, slightly concave over the orbits, slightly convex on the brain-case, Sagittal and lambdoid crests not developed in the type.

Teeth lighter throughout than those of *Ch. larvarum*, not only actually, but proportionally, the anterior incisors especially slender and delicate, not one-fourth the bulk of those of the larger species. Pigmentation at a minimum, the tip of the first incisor and the *extreme* tip of the unicuspid and large premolar being but quite lightly marked with rufous.

Dimensions of the type:—

External measurements unknown.

Skull: condylo-basal length 17·5 mm.; basal length 16;

\* The greatest breadth in *S. sacratus* is recorded as 9·5, but this appears to have been a misprint, as I now make the measurement 9·2 mm.

greatest breadth 8.5; interorbital breadth 4.5; height from basion 4.7; upper tooth-series 7.8; horizontal length of  $i^1$  1.3; front of  $p^1$  to back of  $m^2$  4.1.

*Hab.* Mt. Arizan, Central Formosa. Alt. 8000'.

*Type.* Adult skull, teeth still unworn. B.M. no. 12.11.23.2. Collected and presented by Walter Goodfellow, Esq.

This shrew is readily distinguishable from the other members of *Chodsigoa* by its much smaller size and its unusually delicate  $i^1$ . Its occurrence in Formosa extends considerably the known range of the genus, which has hitherto only been found in Northern and Western China.

Its external appearance is probably not very dissimilar from that of the other Arizan shrew, *Soriculus fumidus*, as Mr. Goodfellow brought home the typical skull as being just an extra skull of that species.

XX.—*Descriptions of Fifteen new Species and Varieties of Marine Shells from the Falkland Islands.* By H. B. PRESTON, F.Z.S.

[Plate IV.]

*Pareutheria fuscata* (Brug.) \*, var. *curta*, var. n.

Shell differing from the type in its shorter and more ovate shape, the whorls being much shorter and broader and the aperture more auriform than in the typical form.

Alt. 25, diam. maj. 14 mm.

Aperture; alt. 9, diam. 8 mm.

*Hab.* Port Stanley Harbour, Falkland Islands (A. G. Bennett).

*Natica falklandica*, sp. n. (Fig. 1.)

Shell perforate, ovate, solid, yellowish white; whorls  $4\frac{1}{2}$ , regularly increasing, shouldered above, the last whorl large and somewhat lengthened, marked only with transverse growth-lines, suture well impressed; umbilicus moderately wide, very deep; columella obliquely descending, somewhat outwardly thickened above, and extending into a thick, well-defined, parietal callus, which joins the upper margin of the labrum; aperture ovate.

\* *Buccinum fuscatum*, Brug., Kiener, Icon. Coq. viv. pp. 20-21, pl. viii. fig. 24.

Alt. 27·5, diam. maj. 24 mm.

Aperture: alt. 18, diam. 11·75 mm.

Hab. Port Stanley, Falkland Islands (*A. G. Bennett*).

The species would seem to be allied to *Natica soluta*, Gould\*, but differs from that species chiefly in its more exerted spire and longer whorls, more open umbilicus, and less curved columella.

*Natica subantarctica*, sp. n. (Fig. 2.)

Shell rather roundly ovate, moderately solid, white, covered with a pale yellowish-brown periostracum; whorls 5, the last two large in proportion to the remainder, the last ascending in front, marked with transverse growth-lines crossed by somewhat indistinct scratch-like striæ; suture incised; umbilicus narrow, deep, partly filled by the thickened columella; columella white, porcellanous, rather sharply curved below where it is puckered into a series of short folds, very obliquely descending above, outwardly thickened and reflexed, so as to partly fill up the umbilical cavity, and above this extending into a minutely granular, moderately thick, shining, well-defined, parietal callus, which joins the upper margin of the labrum and just behind which it forms a whitish calous thickening; labrum acute; aperture rather elongately subovate; interior of shell white.

Alt. 15, diam. maj. 13·25 mm.

Aperture: alt. 9·25, diam. 6·5 mm.

Hab. Falkland Islands (*A. G. Bennett*).

Allied to *N. patagonica*, Phil.†, but considerably smaller, much less openly umbilicate, and with proportionately broader penultimate whorl; moreover the columella in the present species is much more oblique above and arched below than is the case with *N. patagonica*, while the curious puckering of the lower portion of the columella into short folds is a character which should readily separate it from that species.

*Photinula solidula*, Cooper and Preston ‡,  
var. *depressa*, var. n. (Fig. 3.)

Shell differing from the typical form in its much greater depression of spire, while retaining all the other characters of the species.

\* Gould, Wilkes, U.S. Expl. Exp. 1856, pl. xv. fig. 257.

† Philippi, Abbild. ii. p. 41, pl. ii. fig. 2.

‡ Ann. & Mag. Nat. Hist. 1910, v. pp. 111-112, pl. iv. fig. 3.

Alt. 9, diam. maj. 11.75 mm.

Aperture: alt. 5, diam. 6 mm.

*Hab.* Port Stanley, Falkland Islands (*A. G. Bennett*).

*Acmæa inquilinus*, sp. n. (Fig. 4.)

Shell ovate, with slightly straightened sides, anteriorly gently sloping, posteriorly rather sharply sloping and somewhat rounded, porcellanous, white, painted at the apex and occasionally on the remainder of the shell with reddish chestnut and sculptured with numerous closely set radiating ribs; apex subcentral; margin of shell rather finely crenelate, flesh-coloured, irregularly dotted with reddish brown; interior of shell pinkish white, smooth, porcellanous; spatula large, elongately ovate.

Alt. 4.25, diam. maj. 11 mm.

*Hab.* Port Stanley, Falkland Islands, on *Fissurella picta*, Gmel. (*A. G. Bennett*).

*Acmæa perconica*, sp. n. (Fig. 5.)

Shell subcircular, high, conical, sculptured, with twelve or thirteen broad whitish radiating ribs, between which occur one or more whitish radiating bands, the interstices being of a blackish-brown colour; apex very posteriorly situate, slightly overhanging; margin of shell painted with brownish black alternating with whitish, slightly produced both anteriorly and posteriorly, so that the shell does not lie quite flat when placed upon a plane; spatula whitish, not well defined posteriorly, anteriorly broadly margined with rich blackish brown, concentrically painted, especially towards the base, with elongate blotches of pure white; below the spatula the shell shades from yellowish to bluish white, the surface being marked with multitudinous, interlacing, scratch-like striae.

Alt. 12, diam. maj. 15 mm.

*Hab.* Falkland Islands (*A. G. Bennett*).

*Scurria scurra*, Gray, var. *charon*, var. n.

Differing from the typical form in its much darker colour, which is of a dark brown shade.

Alt. 22, diam. maj. 35, diam. min. 30 mm.

*Hab.* Falkland Islands (*A. G. Bennett*).

This would appear to be a constant local variety peculiar to the Falkland Islands, which has been revealed after the examination of a long series of specimens both from the

Chilian coast and from the present locality; in every case the specimens from the continental area were of a whitish or pale yellowish tint, while those from the Falkland Islands were invariably of a dark brown colour; the radiating colour-lines which occur in both forms are considerably more conspicuous in the present variety, but in all other respects, apart from colour, both the continental and island shells do not appear to differ.

*Nacella falklandica*, sp. n. (Fig. 6.)

Shell large, elongately ovate, slightly laterally compressed, moderately thin, dorsally arched, with very posterior and somewhat curvedly overhanging apex, pale greenish olive, painted, especially posteriorly, with streaks and blotches of chestnut, sculptured with broad radiate costulae, crossed by fine, closely set, and very wavy concentric striae; margin coarsely crenellate by the terminations of the radiate costulae; interior of shell polished, shining, yellowish white, closely rayed and mottled with chestnut-brown.

Alt. 16, diam. maj. 42.5, diam. min. 21.75 mm.

*Hab.* Falkland Islands (*A. G. Bennett*).

*Helcioniscus bennetti*, sp. n. (Fig. 7.)

Shell small, thin, brown, ovate, with subcentral nucleus, anteriorly somewhat gently sloping, very slightly convex, posteriorly steeply sloping, slightly concave, sculptured with multitudinous, rounded, radiating riblets crossed by rather fine, concentric, scabrous ridges; margin of shell reddish chestnut, slightly crenellated by the terminations of the radiating riblets; interior of shell bronze, shading to yellowish brown; spatula large, well defined, ovately rectangular.

Alt. 8.5, diam. maj. 25 mm.

*Hab.* Port Stanley, Falkland Islands (*A. G. Bennett*).

*Modiolarca bennetti*, sp. n. (Fig. 8.)

Shell rather convex, somewhat rectangular, covered with a dark chocolate periostracum; dorsal margin almost straight; ventral margin very slightly rounded; anterior side also very slightly rounded; posterior side produced and obtusely rounded; umbones very anteriorly situate, small, not prominent; right valve bearing an elongate and upwardly curved cardinal tooth, left valve an elongate, somewhat erect, nodulous, cardinal tooth; interior of shell dark livid purple.

Long. 4.75, lat. 6.5 mm.

*Hab.* Mullet Creek, Port Stanley, Falkland Islands  
(A. G. Bennett).

*Cyamium copiosum*, sp. n. (Fig. 9.)

Shell moderately large, ovately cuneate, whitish, bearing traces of having been covered with a thin, membranaceous, dark cream-coloured periostracum; both valves concentrically striate; umbones rather large, prominent; dorsal margin gently sloping; ventral margin scarcely rounded; anterior side sloping above, rounded below; posterior side somewhat produced, acuminately rounded; right valve bearing two erect cardinal teeth, of which the anterior is somewhat triangular in shape and grooved down the centre, while the posterior is narrow and very slightly curved; left valve also bearing two cardinal teeth, of which the anterior is moderately fine and obliquely placed, while the posterior is broad, narrowly triangular, and abruptly terminating.

Long. 6, lat. 8.5 mm.

*Hab.* Mullet Creek, Port Stanley, Falkland Islands  
(A. G. Bennett).

*Cyamium cuneatum*, sp. n. (Fig. 10.)

Shell ovately cuneate, whitish yellow, both valves indistinctly concentrically striate; umbones moderately small, slightly prominent; dorsal margin sloping; ventral margin very gently rounded; anterior side abruptly sloping above, nearly straightly descending below; posterior side produced, rounded; anterior cardinal tooth in right valve moderately coarse, obliquely triangular; posterior tooth in right valve oblique, slightly curved, narrow above, sloping to a broad base; anterior cardinal tooth in left valve broad, triangular, fitting between the anterior and posterior in right valve; posterior tooth somewhat weak and elongate, curved.

Long. 4.75, lat. 6.5 mm.

*Hab.* Falkland Islands (A. G. Bennett).

*Cyamium stanleyense*, sp. n. (Fig. 11.)

Shell differing from *C. copiosum* in its much more ovate form; the dorsal margin slopes considerably less and the posterior side is obtusely rounded; the valves are more coarsely concentrically striate; the anterior cardinal tooth in the left valve is much smaller and the posterior is much broader and coarser.

Long. 5.75, lat. 9.25 mm.

*Hab.* Port Stanley, Falkland Islands (A. G. Bennett).



*Saxicava subantarctica*, sp. n. (Fig. 12.)

Shell inequivalve and inequilateral, elongately subrectangular, whitish except where covered with a membranaceous reddish periostracum, marked with coarse irregular concentric ridges; dorsal margin arched anteriorly, scarcely sloping posteriorly; ventral margin a little contracted in the median region, otherwise rather straight; anterior side angled above, sloping below; posterior side angularly rounded above, bluntly rostrate below; ligament rather long, fleshy; umbones not prominent, much eroded; hinge-plate edentulate; interior of shell whitish.

Long. 8.5, lat. 17 mm.

*Hab.* Falkland Islands (*A. G. Bennett*).

*Mytilimeria falklandica*, sp. n. (Fig. 13.)

Shell ovately rectangular, posteriorly gaping, thin, covered with a thin, brownish-yellow, membranaceous periostracum, which slightly overlaps the margin of the shell; both valves concentrically creased and radiately sculptured with moderately fine and distant ridges; dorsal margin nearly straight; ventral margin gently rounded; anterior side rather angularly rounded; posterior side produced, obtusely rounded; umbones small, very anteriorly situate, not prominent; interior of shell nacreous and marked with fine scratch-like grooves, especially towards the umbonal region, which correspond to the radiating ridges on the outer surface of the shell.

Long. 10.5, lat. 17.25 mm.

*Hab.* Falkland Islands (*A. G. Bennett*).

## EXPLANATION OF PLATE IV.

- Fig.* 1. *Natica falklandica*, sp. n., nat. size.  
*Fig.* 2. — *subantarctica*, sp. n., nat. size.  
*Fig.* 3. *Photinula solidula*, C. & P., var. *depressa*, var. n., nat. size.  
*Fig.* 4. *Acmæa inquietus*, sp. n.,  $\times 2$ .  
*Fig.* 5. — *perconica*, sp. n., nat. size.  
*Fig.* 6. *Nacella falklandica*, sp. n., nat. size.  
*Fig.* 7. *Helicioniscus bennetti*, sp. n., nat. size.  
*Fig.* 8. *Modiolarca bennetti*, sp. n.,  $\times 2$ .  
*Fig.* 9. *Cyamium copiosum*, sp. n.,  $\times 2$ .  
*Fig.* 10. — *cuneatum*, sp. n.,  $\times 2$ .  
*Fig.* 11. — *stanleyense*, sp. n.,  $\times 2$ .  
*Fig.* 12. *Saxicava subantarctica*, sp. n., nat. size.  
*Fig.* 13. *Mytilimeria falklandica*, sp. n., nat. size.

XXI.—On new Species of Indian Curculionidæ.—Part I.  
By GUY A. K. MARSHALL.

*HYPERINÆ.*

*Hypera medicaginis*, sp. n.

*H. plantaginis* statura et colore simillima, sed thorace minus transverso et minus rotundato, elytris in dorso deplanatis, humeris magis prominentibus et subrectangulariter rotundatis, squamis latioribus et magis profunde excisis.

Colour black, clothed with dense greyish-white or brownish-grey scales, the thorax with two broad dorsal brownish stripes (often indistinct in the middle) enclosing a narrow pale median line; these stripes are continued on to the elytra, forming a conspicuous dark brown patch at the base of intervals 2 and 3; the lateral and apical areas of the elytra are darker than the disk, being lighter or darker brown, with rows of ill-defined brown or blackish spots on the intervals, the inner margin of the dark area running as follows:—from below the shoulder obliquely to interval 5 at about one-third from the base, then straight along interval 5 for nearly another third of its length, and thence again obliquely to the suture, reaching it at the top of the declivity; the first, or sutural, interval usually with a row of dark spots from before the middle to the apex.

*Head* with the front nearly as broad as the base of the rostrum. *Rostrum* a little shorter than the prothorax, gradually dilated from base to apex, thinner than the front femora, closely punctured and without any trace of a carina; mandibles red-brown. *Antennæ* red-brown, the scape just reaching the front margin of the eye, joint 1 of the funicle longer than 2. *Prothorax* rather broader than long, the sides moderately rounded, broadest a little before the middle, only slightly narrowed behind. *Elytra* with the shoulders roundly prominent, the sides subparallel to beyond the middle; the finely punctured striæ entirely hidden by the dense scaling, each scale very broadly emarginate for about one-third of its length, the two projecting points being almost hair-like; each interval with a row of stout suberect bristles.

Long. 4-4 $\frac{1}{4}$ , lat. 2 mm.

BENGAL: Pusa (*H. Maxwell Lefroy*).

*Types*, ♂ ♀, in the British Museum.

In size and colouring very similar to *H. plantaginis*, de G.,

from which it differs in its much narrower and less rounded prothorax and more oblong elytra, the shoulders forming almost a rounded right angle. In *H. plantaginis* the scales are also distinctly narrower and more deeply divided, and the elytra are more convex, both longitudinally and transversely. In general shape *H. medicaginis* more closely resembles *H. variabilis*, Hbst., but apart from its smaller size and very different coloration, the former species differs *inter alia* in its much broader front, more transverse prothorax, more prominent shoulders, and distinctly broader scales.

All the three species mentioned belong to that section of the genus to which Capiomont, in his 'Révision des Hypérides' (Ann. Soc. Ent. France, 1867 & 1868), restricted the name *Phytonomus*, Schönh., a course which has unfortunately been followed by Dr. Karl Petri in his admirable monograph of the group (Siebenbürg. Ver. Naturwiss. Hermanstadt, 1901). Schönherr held the opinion that all the generic names of Curculionidæ should be masculine (Disp. meth. Curcul. 1826, p. v), and this appears to be the only reason why he substituted the name *Phytonomus* for that of *Hypera*, Germ. As, however, his genus is absolutely synonymous with *Hypera*, the name cannot properly be used for any subdivision of Germar's genus. Moreover, as Dr. Petri admits, the two sections merge into one another in such a way that certain species might with equal justice be placed in either of them, so that there is obviously no need for a new generic name, for Germar's genus forms a very homogeneous and natural assemblage.

Mr. Lefroy records this species as doing considerable damage to lucerne (*Medicago sativa*) at Pusa. *H. variabilis*, Hbst., has also been sent by Mr. Lefroy from the same locality. The only other species hitherto recorded from India is *H. imbecilla*, Fst. (Stett. ent. Zeit. 1886, p. 150), which has been omitted from Dr. Petri's monograph.

#### CLEONINÆ.

##### *Epilectus baluchicus*, sp. n.

Ater, alutaceus, supra squamis pallide ochraceis maculatim irregulariter obsitus, subtus dense squamosus, abdomine fasciis latis nudis nitidis ornato; femoribus præcipue nudis, tibiis tarsisque densissime ochraceo-pilosis; thorace atro opaco, confertim punctato, ochraceo-bivittato, fovea magna utrinque pertuso et in medio basi impresso; elytris leviter et regulariter punctato-striatis, interstitiis fere planis æqualibus.

Dull black, with the following markings formed of pale ochreous scales:—two stripes in the rostral furrows, a transverse band on the vertex of the head, a curved lateral stripe on each side of the thorax, and numerous irregular blotches on the elytra, many of them often coalescing to form an uneven humeral and a postmedian lateral patch.

*Head* closely and finely punctate, the rostral carinæ continued on to the front. *Rostrum* with three carinæ, enclosing two very broad and deep furrows, which extend from the insertion of the antennæ to the front of the head; the central carina equally narrow throughout; the apical portion of the rostrum not impressed or carinate. *Antennæ* slender, with only joint 7 of the funicle attached to the club, joint 6 distinctly narrowed towards the base, joint 2 half as long again as joint 1. *Prothorax* slightly longer than its basal width, parallel-sided from the base to two-thirds of its length, then abruptly constricted, the basal and apical margins rounded, the ocular lobes well developed; the upper surface dull, shagreened, with moderately close shallow punctation, a large deep fovea on each side behind the middle and a shallow impression in the centre of the base; the irregular lateral band of scaling passes through the deep fovea and includes anteriorly a small bare shining spot; prosternum clothed with dense scaling. *Elytra* broadly ovate, with regular narrow punctured striæ, the intervals finely shagreened, slightly convex and of about equal width on the disk, with a few small scattered granules near the base; scales feathery, each scale bearing a fringe of long bristles. *Legs* black, the femora for the most part bare and shining, but with some thin scaling about the base; the tibiæ and tarsi clothed with long dense tawny hairs; the tarsi comparatively short, joint 3 being evidently shorter than 2. *Venter* with dense scaling similar to that of the elytra; segments 2-4 each with a broad bare shining band occupying the apical half of the segment, but not reaching the sides; segment 1 with a deeper band, which is produced in the centre towards the base; segment 5 with only a small central bare patch.

Long. 23-27, lat.  $6\frac{1}{2}$ -9 mm.

BALUCHISTAN: Quetta and Nusikki district.

*Types*, ♂ ♀, in the British Museum; cotypes in the Calcutta Museum.

The only two other known species of *Epilectus*, Fst. (D. e. Z. 1904, p. 208) are *E. lehmanni*, Mén. (Turkestan), and *E. gigas*, Marseul (Algeria), and they may both be distinguished from *E. baluchicus* (apart from their very different upperside colouring) by the absence of the thoracic

foveæ and of the long fulvous hairs on the tibiæ, and by the dark bands clothed with brown hairs on the *bases* of the ventral segments. In addition, *E. lehmanni* differs in having two shiny discal patches on the prothorax, as well as numerous shiny granules, and each elytron is distinctly bicostate at the base; while *E. gigas* has a fine central carina on the prothorax, and the intervals 1 and 3 of the elytra are raised behind.

#### ATELABINÆ.

##### *Apoderus sissu*, sp. n.

Saturate testaceus, capite, prothorace, sterno, elytris nigro-limbatis, scutello et maculis novem in elytris nigris; ♀ pedibus omnino testaceis—♂ tarsis et tibiæ dimidio apicali nigris. Capite glabro, in fronte striolato, postice in medio tenuiter striato; prothorace subconico, nec longiore quam in basi latiore, oblique punctato-plicato, antrorsum in medio sulcato; elytris nitidis, oblongis, prope basin conjunctim transverse impressis, evidenter usque ad apicem punctato-sulcatis, interstitiis coriaceis.

Dark testaceous, with the sides of the head and prothorax (broadly), the scutellum and the sides (or sometimes the whole) of the sternum, black, and with the following black markings on the elytra:—a small spot on the humeral angle, a sutural patch just behind the scutellum and a small dot on each side of it, a large round spot at the middle on intervals 3 to 5, a smaller one at the apex of intervals 4 and 5, and a marginal stripe extending from about one-third from the base to the apex; legs entirely testaceous in ♀, but with the tarsi and the apical half of the tibiæ black in ♂.

*Head* of ♂ about as long as the prothorax, subtriangular, the sides being straight from behind the eyes to the basal constriction, the forehead coarsely striolate, the posterior parts with faint transverse wrinkles and with a shallow longitudinal stria; head of ♀ slightly shorter, more convex, the sides rounded behind the eyes, and the transverse wrinkling almost obsolete. *Rostrum* glabrous, with a shallow central furrow between the antennæ and a rounded dorsal impression on the anterior part. *Antennæ* testaceous brown, with the club fuscous. *Prothorax* subconical, about as long as the basal width, the sides moderately rounded, the anterior and posterior constrictions distinct, the front margin deeply sinuate, the base subtruncate, the dorsum coarsely punctate and with deep oblique wrinkles, except on the central anterior portion, which is smooth, with a few punctures and a short central furrow. *Scutellum* semicircular, with coarse

confluent punctation. *Elytra* longer than broad and slightly dilated behind, the humeral callus small and rounded, the sulci broad and deep, closely punctate, and continued right to the apices, which are separately rounded, the intervals even and coriaceous, with a few very short recumbent setæ, a shallow common transverse impression a little behind the scutellum. *Legs* with the tibiæ distinctly furrowed in ♂, and the front pair slightly bent towards the apex; ♀ with the front tibiæ normal and the furrows indistinct. *Sternum* with the punctation coarse and confluent at the sides, but sparse in the centre, the meso- and metasternal epimera densely pubescent.

Long.  $3\frac{1}{2}$ -4, lat.  $1\frac{3}{4}$ -2 mm.

UNITED PROVINCES: Dehra Dun (*E. P. Stebbing*). BENGAL: Pusa (*H. M. Lefroy*).

*Types*, ♂ ♀, in the British Museum.

Belongs to Jekel's section *Strigapoderus*, but has the short head of typical *Apoderus*. The markings of the elytra vary somewhat, the anterior spots being rarely absent, while occasionally all the spots are enlarged and more or less confluent.

Both Mr. Lefroy and Mr. Stebbing record this species as doing considerable damage to sissu-trees (*Dahlbergia sissoo*), which it defoliates.

*Apoderus lefroyi*, sp. n.

Flavo-testaceus; capite (rostro et collo exceptis), elytrorum area basali, fascia apicali, maculis duabus duplicatis singulatim in declivitate, piceo-brunneis; scutello et prothorace, punctis duobus rufo-flavis exceptis, nigro-piceis; sterno late ad latera, anguste in medio metasterni, plaga media in segmento 1° abdominis, maculis lateralibus subrotundatis in segmentis 1-3 nigro- aut brunneo-piceis; pedibus flavo-testaceis, femoribus annulo lato juxta-apicali nigro-piceo. Prothorace transverso, rude plicato, in medio sulcato; elytris subquadratis, ad apicem late truncatis, humeris acute rectangulatis, lateribus prope basin parallelis dein ad apicem leviter ampliatis, supra rude punctato-sulcatis, tuberculis tribus concavis singulatim in serie obliqua ab humero ad medium obsitis, tuberculo postico aliis multo majore.

Head pitch-brown, the rostrum and neck testaceous yellow; prothorax brownish black, with two small dorsal reddish-yellow spots; scutellum black; elytra with the anterior two-thirds pitchy brown, except the basal margin, which is yellowish, the posterior third testaceous yellow, with a common transverse row of four pairs of brown spots on the

declivity, and a broad apical brown band; legs testaceous yellow, with a brown ring near the apex of the femora; underparts yellow, the sternum with a broad lateral and a narrow central stripe black, the venter with a triangular central black patch on segment 1 and rounded brown lateral spots on segments 1-3.

*Head* divided by a transverse furrow behind the eyes; the front portion with coarse scattered punctation, a very deep central furrow which is abbreviated anteriorly, and an oblique stria on each side in front which is continued on to the base of the rostrum; posterior part of head glabrous and impunctate, very convex, with the sides strongly rounded and with a distinct central furrow. *Rostrum* fairly closely punctate above, with a broad furrow between the antennæ and a shallow rounded impression on the anterior part. *Antennæ* entirely testaceous yellow. *Prothorax* evidently broader than long, the anterior and posterior constrictions distinct, the apical and basal margins truncate, broadest at the base, the sides strongly rounded, the dorsum very coarsely and irregularly wrinkled, with a deep central furrow which reaches neither base nor apex. *Scutellum* transverse, subtrapeziform, the sides moderately rounded, the apex sinuate, so that two projecting angles are formed; disk shiny, almost impunctate, and with a shallow impression on each side at the base. *Elytra* as broad as long, broadly truncate at the apex, the shoulders sharply rectangular, the sides parallel from there for about one-third of their length, then roundly dilated, the greatest breadth being quite close to the apex; upperside with broad shallow sulci containing large punctures, the intervals bare, shiny, and very narrow, being no broader and scarcely higher than the transverse ridges between the punctures, intervals 3 and 5 slightly more raised; an oblique row of three sharply conical tubercles from the shoulder to the middle: the first very small and immediately above the humeral angle; the second about twice as large, situated a little further back, with its base extending from the fourth to the fifth interval; the third much larger still, placed about the middle, its base extending from interval 2 to 5. *Legs* with the internal edge of the tibiæ not denticulate and the outer apical spine bent inwards almost at right angles.

Long. 6, lat.  $3\frac{3}{4}$ -4 mm.

ASSAM: Nongpoh, Khasi Hills (Pusa coll.).

*Types*, ♂ ♀, in the British Museum.

This striking species belongs to Jekel's subgenus *Hoplapoderus*, its nearest ally being *A. vitticeps*, Jek., from China, which is similar in general facies. But apart from various

differences in colour (the elytra being obscure red with large black patches), the latter differs in having all the tibiæ denticulate internally; on the elytra the supra-humeral tubercle is hardly perceptible, and the other two are blunter, the third being placed well behind the middle, while in front of it is a broad oblique impression in which the sulci are obliterated; the sulci elsewhere are distinctly deeper and posteriorly almost catenulate rather than punctate, while the intervals are evidently carinate; further, the apices of the elytra are much narrower, being separately rounded and not truncate.

I have much pleasure in dedicating this species to my friend Prof. H. Maxwell Lefroy, who has done such excellent work in the position of Imperial Entomologist to the Government of India, from which he has just retired.

COSSONINÆ.

*Cossonus binodosus*, sp. n.

Elongatus, modice convexus, omnino ater, nitidus, antennis tarsisque piceis. Rostrum antice non dilatatum, subparallellum, ad basin leviter angustatum, supra obsoletissime punctatum. Prothorax in medio triangulariter levissime impressus, impressione (fere ad apicem extensa) et lateribus rude punctatis, area longitudinali angusta in dorso utrinque impunctata. Elytra oblonga, modice convexa, striis profundis punctis magnis obsitis; interstitiis 2, 3, 7, 9 postice conjunctis et costam latam obliquam elevatam formantibus; interstitiis dorsalibus angustis subplanis impunctatis.

Shiny black, with the antennæ and tarsi piceous. *Head* impunctate on the vertex, the forehead with a large deep central fovea and a few scattered punctures. *Rostrum* subparallel-sided anteriorly and slightly narrowed towards the base, the lower edge of the scrobe projecting slightly when viewed from above; the upper surface almost impunctate, except for a few coarse punctures at the extreme base, the sides also punctured towards the base. *Prothorax* broadest near the base, roundly narrowed in front, and with a distinct apical constriction, the base strongly bisinuate; the dorsum with a very shallow median triangular impression (almost reaching the apex), which is very coarsely punctured and has an irregular central carina; on each side of this is a rather narrow, obliquely longitudinal, impunctate area, the entire lateral area beyond this being very coarsely and closely punctured. *Elytra* oblong, moderately convex, the sides parallel from the shoulders to well beyond the middle, thence slightly narrowed and very broadly rounded at the apex;



the striæ broad and deep, containing large punctures which hardly diminish posteriorly, the intervals rather narrow, almost plane and impunctate; intervals 2, 3, 7, and 9 are united posteriorly, where they form a broad, obtusely elevated, oblique costa, which gives the elytra their characteristic oblong shape; when viewed obliquely from behind this costa has the appearance of an obtuse prominence. *Legs* comparatively finely punctured.

Long. 5, lat. 2 mm.

N.E. BURMA: Sansi Gorge, Chinese frontier, 6000-8000 feet, Dec. 1910 (*Dr. C. W. Beebe*).

*Type*, ♂, in the Calcutta Museum.

Described from a single example. The species may be readily distinguished from any previously described Eastern *Cossonus* by the curious posterior elevations on the elytra. In other respects it is closely allied to *C. foveicollis*, Fst.

The whole of the sternum (except the middle of the metasternum) and the sides of the first two ventral segments are closely covered with very coarse punctures, the rest of the venter being glabrous except for some scattered punctures in the middle of the first and last segments and a single transverse row on the third and fourth.

XXII.—*Descriptions of Two new Fishes from Paranagua, Brazil, presented to the British Museum by Herr A. Rachow.* By C. TATE REGAN, M.A.

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*Characidium (Jobertina) rachovii.*

Depth of body nearly equal to length of head,  $3\frac{1}{2}$ - $3\frac{3}{4}$  in the length of the fish. Snout shorter than diameter of eye, which is 3 in the length of head and greater than the interorbital width. Nostrils well separated. Maxillary barely reaching the vertical from anterior margin of eye; teeth tricuspid. 32 scales in a longitudinal series, 12 in a transverse series from dorsal to pelvic fins, 6 or 7 in the lateral line, which does not extend to below the dorsal fin. Dorsal 13-15; origin equidistant from end of snout and base of caudal, or a little nearer the former; longest rays  $\frac{2}{3}$ - $\frac{1}{2}$  the length of head. Anal 8-9. Pectorals reaching pelvics, which are inserted below the fourth or fifth ray of dorsal and reach the anal. Caudal forked. A dark stripe from snout

through eye to base of caudal; 10 to 12 dark cross-bars; dorsal, anal, and pelvic fins with series of dark spots; caudal dusky.

Three specimens, 30 to 40 mm. in total length.

This species is very closely related to *C. interruptum*, Pellegrin (Bull. Mus. Paris, 1909, p. 151), from Serra d'Estrello, Rio Grande do Sul, in which the lateral line runs on 9 scales to below the origin of the dorsal fin, which has only 11 rays.

*Corydoras macropterus*.

Depth of body  $3\frac{1}{5}$  to  $3\frac{1}{2}$  in the length, length of head  $3\frac{1}{2}$  to  $3\frac{2}{3}$ . Diameter of eye 5, interorbital width  $2\frac{1}{4}$  to  $2\frac{1}{2}$ , length of snout 2 to  $2\frac{1}{4}$  in the length of head. Suborbital narrow; cheek covered with short bristles, strongest in males; barbels nearly reaching gill-opening. Dorsal I 8; spine about  $\frac{1}{2}$  the length of head; fin very elevated, second and third rays longest, when laid back reaching tip of adipose fin (♀) or base of caudal (♂); base of dorsal rather less than its distance from adipose fin, which is preceded by 3 to 5 median scutes. Anal I 6-7. Pectoral very long, extending to origin of anal. Scutes 24-25/21-22; humeral shields wide apart, each separated by 2 scutes from base of pelvic fin. 3 or 4 dark blotches on the back, more or less alternating with others on the lower part of the side, both series connected with an irregular lateral band; dorsal and caudal barred with series of spots; lower fins dusky.

Four specimens, 55 to 65 mm. in total length.

In coloration and in the bristles on the cheeks this species shows relationship to *C. kronei*, Ribeiro, but it differs in the shorter snout and broader interorbital region and especially in the produced dorsal and pectoral fins.

XXIII.—*The Pœciliid Fishes of the Genus Jenynsia.*

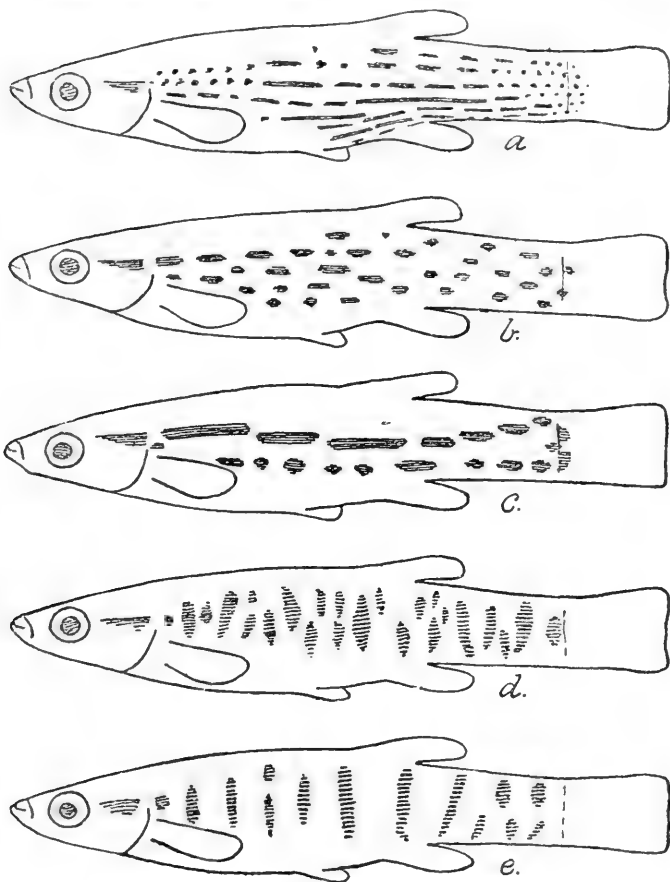
By C. TATE REGAN, M.A.

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FOR many years the only known species of the genus *Jenynsia* was *J. lineata*, Jenyns\*, originally described from Maldonado and Montevideo. In 1902 a second species,

\* For the synonymy v. Garman, Mem. Mus. Comp. Zool. xix. 1897, p. 69.

*J. pygogramma*, was described by Boulenger\* ; the types come from the Rio Cruz del Eje, Cordova, Argentina, and the species is well distinguished from *J. lineata* by its irregular scaling, the abdomen being naked and the scales on the back much smaller than on the sides of the body.



In 1906 I described *J. maculata* † from Cachi, Salta, Argentina, and quite recently Haseman has added *J. eigenmanni* ‡, a supposed new species from the Rio Iguassu.

\* Ann. & Mag. Nat. Hist. (7) ix. 1902, p. 336.

† *Ibid.* (7) xviii. 1906, p. 154.

‡ Ann. Carnegie Mus. vii. 1911, p. 385, pl. lxxxii.

As a result of the study of a large number of specimens, especially a series from the La Plata received from the Berlin Museum, I have reached the conclusion that *J. maculata* and *J. eigenmanni* are merely varieties of *J. lineata*, and that the species is extremely variable in the pattern of its markings.

In typical *lineata* there are narrow longitudinal stripes along the series of scales; in some specimens these may be to a greater or less extent broken up into spots (fig. *a*). Numerous examples approximating to the typical form in the collection of the Natural History Museum are from the Rio Grande do Sul, the La Plata, Naposta Grande, and Tala, Salta, Argentina. In the variety *maculata* (fig. *b*) the spots are larger and fewer, but there is no sharp line of demarcation from *lineata*.

A series of examples from the La Plata, received from the Berlin Museum, includes some typical *maculata* and others with the spots still larger and fewer; some of these have the spots mostly rounded or ovate, in some they are expanded longitudinally and in others vertically. Two of the extreme forms are figured: one (fig. *c*) bears a close resemblance to Haseman's *J. eigenmanni*; the other (fig. *d*) leads towards the barred variety figured below it (fig. *e*), one of three nearly similar specimens from Caiza, Bolivian Chaco (*Coll. Borelli*).

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XXIV.—*New Species of Heterocera from Costa Rica.*—XX.  
By W. SCHAUS, F.Z.S.

Thyrididæ.

*Macrogonia major*, sp. n.

♀. Palpi purple-brown, the second joint shaded below with grey and fuscous. Head, collar, and thorax yellow-roseate. Fore wings yellowish, thickly reticulated with roseate; costa with numerous dark spots to near middle, then with widely separated black streaks along extreme edge; a fine black line from middle of inner margin to near apex; a faint brownish basal line; a similar sinuous antemedial line; an indistinct annular line at end of cell; some marginal black reticulations. Hind wings deep roseate; a black medial line; a fainter postmedial line; some terminal fine dark reticulations; cilia on both wings dark red, tipped

with black and whitish. Wings below brownish buff, the lines very indistinct; a large black spot with white point at end of cell on fore wings; cilia lilacine rose mottled with black.

Expanse 32 mm.

*Hab.* Sixola, Esperanza.

*Betousa stellata*, sp. n.

♀. Body above greyish brown; abdomen irrorated with grey, dorsally shaded with black; abdomen below with a ventral black shade, divided by a brownish-grey line. Wings brown tinged with grey, streaked and spotted with greyish white. Fore wings: basal third with streaks broken into spots by veins, mottled and edged with darker brown; medial, postmedial, and subterminal spots edged with darker brown, and containing dark points, with diverging lines cutting each spot into five or six divisions; these spots all become smaller and less distinct towards costa; the postmedial spots are incurved below cell and almost suffuse with medial spots; the subterminal spots are partly followed by some very small spots; small marginal spots less distinctly subdivided. Hind wings: the spots are smaller, whiter on inner margin, and only the postmedial and subterminal show dark centres. Wings below greyer, with the spots similar but less distinct.

Expanse 41 mm.

*Hab.* Sixola.

The wings are broad, the outer margins rounded.

*Rhodoneura changuinola*, sp. n.

♂. Palpi and frons brown. Vertex and thorax dark grey. Abdomen pale brown. Fore wings pale brown, the hind wings greyish brown, the lines and striæ fuscous brown. Fore wings: large medial, postmedial, and a smaller subterminal white shade on costa; inner margin faintly shaded with grey; basal line slightly outcurved; antemedial more outcurved, sinuous on inner margin; medial oblique, outcurved above submedian; postmedial from white costal shade obliquely outcurved to inner margin near tornus; a subterminal heavier line from costa to termen at vein 4; some irregular striæ except on basal third. Hind wings: a straight basal line; antemedial somewhat angled; a faint medial line and small dark spot on discocellular; postmedial and subterminal lines distinct, and a fainter line between them; some marginal striæ. Wings below paler, the lines as above.

Fore wings: cell fulvous to antemedial line; a similar shade along subcostal and vein 8 to apex, interrupted medially; velvety black streaks irrorated with metallic scales antemedially below subcostal and on median, below subcostal between medial and postmedial lines, and also beyond the latter; the antemedial line expands in cell and below it, and is blacker, irrorated with yellow hairs.

Expanse 16 mm.

*Hab.* Sixola.

*Rhodoneura semierma*, sp. n.

♀. Palpi buff. Frons brown. Vertex, collar, and thorax dark olive, the patagia paler. Abdomen above pale olive; a black dorsal spot at base; second segment crossed by a velvety olive-brown shade, expanding laterally; abdomen below roseate brown. Wings buff, tinged with brown. Fore wings: costa and cell anteriorly mottled with grey and dark olive, also some black shading along costal edge; an antemedial inangled fuscous line in cell, irrorated with opalescent scales; irregular, transverse, fine brownish lines on basal third; a large black shade at end of cell, narrowest between veins 6 and 9, and suffusing below 6 with a dark brown postmedial streak from costa; a brownish shade below vein 3 narrows to a point on inner margin; the postmedial streak on costa is shaded on either side with grey and indistinctly with silvery white, beyond which is a longitudinal black and reddish-brown streak above vein 8; a subterminal line from veins 8 to 5 is replaced below it by geminate striæ; termen shaded with grey, brown from costa to vein 3, indentate on veins; from vein 4 to inner margin a brown shade follows close to termen. Hind wings: some faint brownish shadings and spots, also scattered black irrorations, more thickly antemedially, forming broken lines; a larger medial and postmedial black spot near inner margin. Underneath brighter, the shadings suffused with fuscous.

Expanse 44 mm.

*Hab.* Sixola.

Wings narrow; outer margin of fore wings oblique, of hind wings incurved below apex.

*Rhodoneura umbrata*, sp. n.

♀. Palpi reddish brown. Head, collar, and thorax dark brown, the patagia shaded with grey anteriorly. Abdomen fuscous, the last segments with dark brown lines. Legs buff, the tibiæ shaded with reddish brown. Fore wings fuscous,

the costa faintly mottled with brown; a whitish-buff shade below cell to submedian and termen, thickly mottled with fuscous to beyond middle, then less so; a similar broad shade on outer margin from vein 4 to above vein 6, crossed by indistinct fuscous lines. Hind wings: costal margin broadly fuscous, edged behind by a lunular white line; posterior portion lilacine, with faint brownish spots. Fore wings below fuscous, the costa and apex buff-brown, and some similar irregular subterminal markings. Hind wings below: costa brownish, with black striæ; cell and beyond to apex fuscous grey, shading behind to black; the lunular white line suffusing with white ground-colour of posterior portion of wing; the spots distinct, bright brown. Wings narrow; outer margin of fore wing oblique, of hind wing crenulate, incurved below apex and excised below vein 3.

Expanse 33 mm.

*Hab.* Sixola.

### Pyralidæ.

Subfam. *CRAMBINÆ*.

*Chilo marcella*, sp. n.

♀. Palpi, head, collar, thorax, and fore wings ochreous brown, the wings finely irrorated with fuscous grey; abdomen above and hind wings fuscous grey. Fore wings: a dark point at end of cell; a postmedial outcurved series of smoky spots on interspaces; a faint subterminal, lunular, dentate line, broken by veins; minute fuscous-grey terminal spots on interspaces; cilia of both wings tipped with whitish. Wings below fuscous grey, the margins pale buff, widest on termen and apex of fore wing.

Expanse 61 mm.

*Hab.* Sixola, Esperanza, La Florida.

Some specimens are browner, others paler than type.

*Daratoperas vinasella*, sp. n.

♂. Palpi fuscous, fringed above with whitish buff. Head, collar, and thorax whitish buff. Abdomen above fuscous brown, terminal segment whitish buff. Fore wings pale buff; some scattered black scales; a small black spot at end of cell; a smoky shade along median and veins 3 to 5 to termen; a fine smoky postmedial line, deeply outcurved beyond cell and inbent to middle of inner margin, slightly inangled below vein 2; a similar subterminal line, straighter and dentate from costa to vein 5; terminal black spots on

interspaces; cilia whitish. Hind wings fuscous brown; costal margin and cilia whitish; an interrupted terminal dark line. Wings below whitish; fuscous spots on discocellular; terminal black points; a fine and indistinct subterminal line.

♀. Fore wings paler, browner, discal point and post-medial line barely visible; terminal black spots smaller. Hind wings paler. Underneath buff-white, with no markings except a few terminal black points.

Expanse, ♂ 45, ♀ 65 mm.

*Hab.* Juan Vinas, San José.

*Erupa evanidella*, sp. n.

♂. Body and fore wings whitish buff; abdomen with faint yellowish transverse shades. Fore wings: a fine, lunular, greyish-brown postmedial line, outcurved beyond cell, the lunules incurved, and all very faint, except the lunule above submedian, which is coarse and heavily marked; a subterminal similar line, but the lunules outcurved; minute terminal grey spots. Hind wings whiter; a faint sub-terminal greyish spot below vein 2 and one above vein 5. Wings below without markings.

Expanse 35 mm.

*Hab.* Sixola.

*Erupa discordella*, sp. n.

♂. Palpi, head, and body dull reddish brown; lateral orange tufts at base of abdomen. Fore wings bright brown; incurved dark brown lunule in cell; postmedial line fine, whitish, heavily shaded outwardly with dark brown, from vein 8 across end of cell to middle of inner margin; a straight, postmedial, fine whitish line from costa, inwardly edged with small triangular dark brown spots on veins and outwardly narrowly shaded with dark brown; a terminal reddish-brown line. Hind wings dull dark brown, the veins terminally yellowish. Wings below greenish yellow; a post-medial macular black line; an oblique streak on discocellular of fore wing; a dark brown spot on discocellular of hind wing.

Expanse 37 mm.

*Hab.* Carillo.

Near *E. congruella*, Wlk., but the postmedial line not so oblique as in Walker's species.



*Erupa invidella*, sp. n.

♂. Palpi, head, collar, and thorax brown. Abdomen pale buff, with a few darker irrorations. Fore wings whitish, thickly irrorated with brown; a faint subbasal darker shade; an inangled white line in cell medially; an oblique white line on discocellular, interrupted and continuing to inner margin before middle, outwardly shaded with darker brown; a thick subterminal white line, edged with darker brown and not quite straight; a terminal darker line. Hind wings thinly scaled, brownish yellow. Wings below thinly scaled brownish yellow; some terminal dark spots. Fore wings: the subterminal line faintly indicated by darker shadings. Hind wings: a faint discal point; a postmedial finely lunular dark line; a faint subterminal shade.

Expanse 25 mm.

*Hab.* Sixola, Carillo, Juan Vinas.

*Erupa pravella*, sp. n.

♀. Palpi, head, and collar dark reddish brown. Thorax dark purple-brown, the patagia tipped with white. Abdomen above brown, partly shaded dorsally with purplish brown. Fore wings purplish brown, opalescent; a medial wavy black line, somewhat curved on costa and preceded by some lilacine scales; a brown-black outer coarse line, surmounted by a white spot on costa and with its outer edge somewhat dentate; an interrupted terminal white line, thickest at apex. Hind wings brown, darker beyond a vague postmedial fuscous shade. The outer margins of wings are slightly incurved below apices, then well rounded. Wings below brown, shaded with fuscous to near termen; an outer darker shade.

Expanse 35 mm.

*Hab.* Sitio.

Near *Erupa ruptilineella*, Hmpsn.

*Platytes thy nella*, sp. n.

♀. Palpi outwardly light brown, inwardly pale buff. Head white, with a medial light brown line. Collar light brown, dorsally whitish. Thorax and abdomen light brown. Fore wings whitish buff; light brown streaks on costa, in and below cell, and on interspaces; a whitish line above submedian from base to just beyond middle, marked by a brown point medially; a black point at end of cell; faintly darker shades on intervenal streaks forming a postmedial

shade angled beyond cell, obsolete below vein 3, and with similar shading from its angle to termen below apex; black terminal points. Hind wings white.

Expanse 25 mm.

*Hab.* Juan Vinas.

*Platytes rutubella*, sp. n.

♀. Palpi outwardly buff-brown. Head and collar dorsally whitish; collar outwardly and patagia buff-brown. Abdomen brownish grey. Fore wings dull yellow, streaked with buff-brown on costa, in cell, below it, and on interspaces; a black point at end of cell; a whitish streak on subcostal, in cell, and below cell, the latter not reaching termen and irrorated beyond middle with fuscous purple; a purplish shade from vein 3 at cell to termen below apex; traces of a faint brownish postmedial shade outangled beyond cell and inbent to inner margin before middle; terminal black points. Hind wings white.

Expanse 31 mm.

*Hab.* Juan Vinas.

DIATRÆRUPA, gen. nov.

Fore wings differ from *Diatræa* in having veins 8, 9, 10 stalked and veins 4 and 5 very shortly stalked; vein 11 anastomoses with 12 as in *Diatræa*. Hind wings: veins 4 and 5 stalked; 8 anastomosing with 7 to near end.

Type of genus, *Diatrærupa guapilella*, Schs.

*Diatrærupa guapilella*, sp. n.

♀. Palpi, collar, and thorax light greyish brown. Head and abdomen whitish buff, the latter with orange-brown on second and third segments dorsally. Fore wings: the base broadly shaded with dull brownish grey; cell and a postmedial shade brown; terminal third with brown streaks on interspaces, suffusing at apex, terminally between veins 3 and 4, and at tornus; terminal black points; a few black scales scattered in cell and along inner margin. Hind wings white, very faintly tinged with yellow.

Expanse 23 mm.

*Hab.* Guapiles.

*Crambus albifrons*, sp. n.

♂. Palpi outwardly dull grey. Frons whitish. Collar whitish, outwardly shaded with grey. Thorax and abdomen

brownish grey. Fore wings: costal margin brown, with a silvery-white streak from base to middle of wing; a silvery-white streak from base of cell to termen; space below cell and vein 5 pale brown, becoming whitish on inner margin and termen; a fine fuscous-brown streak below cell from base to postmedial space and similar short streaks between veins 2 to 4; terminal black spots, obsolescent towards apex; cilia silvery white. Hind wings silvery white.

Expanse 23 mm.

*Hab.* Poas.

*Crambus pavidellus*, sp. n.

♀. Palpi dark brown, mottled above with dull lilacine. Head dull lilacine brown. Body dark greyish brown. Fore wings: basal half of costa and cell anteriorly brown; below it a white streak from base expanding at end of cell; a fine black line along median to vein 2; inner margin broadly greyish white, suffused with brown basally below cell; a deeply outcurved dark antemedial line below submedian; a postmedial dark brown line, outangled beyond cell, preceded from costa to vein 5 by a fine whitish shade, black from angle to black line on median, inangled below middle of cell, outangled on inner margin, parallel with antemedial line; space beyond this line greyish white on interspaces, the veins dark grey or brown to fuscous shading preceding subterminal line, this shading narrow on inner margin; subterminal fine, whitish, outcurved on costa, inbent on inner margin, followed by a brown line and some whitish spots on interspaces; termen brown, with black spots not reaching apex; a sub-apical greyish-white line; cilia dark silvery grey. Hind wings fuscous grey, darkest on termen; the base, a streak through cell, and broad shade near inner margin whitish.

Expanse 16 mm.

*Hab.* Poas.

*Crambus retusellus*, sp. n.

♂. Palpi, head, and thorax grey-white, the collar faintly tinged with brown. Abdomen pale grey, with darker segmental shades. Fore wings white; costal margin broadly brown to beyond middle; inner margin faintly tinged with brown, and with scattered dark irrorations; a postmedial brown line outangled at vein 5, then obsolescent and only marked on middle of inner margin; subterminal line geminate, thick on costa and oblique, then vertical, the inner line irregular, expanding at vein 5 and preceded by a fine black

streak on submedian fold, the outer line fine; terminal black points, connected by a fine brownish line. Hind wings white tinged with grey.

Expanse 12 mm.

*Hab.* Juan Vinas.

Near *Crambus atristrigellus*, Hmps.

*Crambus meretricella*, sp. n.

♀. Palpi bone-colour, ringed with black at base of joints. Head and thorax mottled grey and black. Abdomen brownish grey. Fore wings bone-colour, obscured, except on postmedial space, by grey shadings along costa and in cell, and below cell by grey and black mottlings; there is a clear line medially from cell to inner margin, the postmedial space expands inwardly on inner margin and almost reaches it; the terminal space is greyish, crossed by a subterminal bone-colour shade from vein 6 to inner margin; the terminal fuscous spots are triangular; cilia dark silvery grey, with a paler line at base. Hind wings grey; cilia grey, broadly tipped with silvery white, and with a pale basal line.

Expanse 12 mm.

*Hab.* Juan Vinas.

*Culladia psythiella*, sp. n.

♂. Palpi dark greyish brown fringed above with white. Head, collar, and thorax white, the patagia shaded with brown. Fore wings velvety white; costa shaded with grey-brown; a fine postmedial brown line angled at end of cell, marked by a dark point below vein 2 and on inner margin; a subterminal geminate brown line, outcurved to vein 5, the inner of the two lines more heavily marked; an orange-brown coarse line before apex, and similar marginal spots above and below vein 5; a terminal line, black at apex, and with black points below veins 2, 3, and 4. Hind wings grey, the cilia whitish.

Expanse 14 mm.

*Hab.* Juan Vinas.

Subfam. *SCENOBIINÆ*.

*Cacographis undulalis*, sp. n.

♂. Palpi orange-brown, fringed below at base with white. Head reddish brown. Collar yellow, shaded with orange-brown in front. Thorax and abdomen yellow above, underneath silvery white. Wings yellow shaded with orange-

brown, the lines brown-black. Fore wings incurved below apex, then outcurved; base of costa finely black; a basal and an antemedial line, the latter slightly inbent below cell; a hyaline spot at end of cell, edged, except along median, with fuscous brown, more broadly outwardly and with two white spots; postmedial line fine, sinuous, outcurved beyond cell; a fine terminal brown line. Hind wings: a large hyaline spot at end of cell, also dark edged and followed by fuscous irrorations, and a small white spot at lower angle of cell; postmedial line sinuous; outer margin more darkly irrorated; apex produced, termen incurved below it; a fine terminal line. Wings below bone-white; the postmedial line punctiform, with a large spot above submedian on fore wing, and more distinct spots on costa and between veins 5 and 6.

Expanse 38 mm.

*Hab.* Juan Vinas.

LOXMAIONIA, gen. nov.

Palpi porrect, short, thickly scaled; antennæ with short ciliated pectinations, diminishing and not reaching tips; legs hairy; abdomen robust. Fore wings long, rather narrow; vein 2 before end of cell; 3, 4, 5 approximated at their base; 6 from upper angle of cell; 7 from cell approximated to 8 for a fourth of its length; 8 and 9 on long stalk; 10 and 11 from cell. Hind wings: vein 2 from before lower angle of cell; 3, 4, 5 from lower angle; 6 and 7 on short stalk; 8 approximating 7 for a short distance beyond its stalk with 6.

Type of genus, *Loxmaionia megale*, Schs.

*Loxmaionia megale*, sp. n.

♂. Palpi white, shaded with brownish grey at base. Frons white with two greyish spots; vertex and collar yellowish white, the latter with a transverse greyish shade; thorax mottled dark grey and whitish, yellowish white behind; abdomen dark greyish brown, with dorsal and subdorsal interrupted whitish lines, and segmental yellowish-white lines on two basal segments. Fore wings dark greyish brown; interrupted basal and antemedial whitish lines; a small white spot in cell medially, and a similar short streak below cell; an oblique whitish line on discocellular, and interrupted line below it to inner margin; interspaces from veins 2-5 and 6-7 thinly scaled postmedially showing a whitish ground-colour, also the terminal spaces between

veins 2 and 4 ; traces of a subterminal irregular whitish line ; the spots and lines faintly edged with fuscous brown ; cilia white spotted with grey-brown. Hind wings semihyaline white ; a fuscous-grey shade on inner margin ; costal margin and terminal shadings from vein 5 to apex fuscous grey, also a faint postmedial line near costa, and an interrupted terminal line ; cilia as on fore wing.

Expanse 49 mm.

*Hab.* Juan Vinas, Sixola.

*Hositea bicincta*, sp. n.

♀. Labial and maxillary palpi white, shaded with black-brown at base. Head and thorax white ; collar medially black-brown, outwardly white. Abdomen whitish, the third and fifth segments with broad black-brown bands, the other segments with very pale brownish shadings and a few dark irrorations. Fore wings white ; a black point at base below cell, followed by a large black spot and one on costa ; a fine outcurved yellow-brown line marked by a few darker scales below cell ; a thick oblique black streak on discocellular, and smaller inbent spots below it from vein 3 to inner margin ; a postmedial, broad, very pale brown shade, follows a fine macular black line from veins 7 to 3 obliquely outcurved, the last spot outset ; an oblique, dentate, light reddish-brown shade from vein 6 to termen at vein 4 ; a terminal black line thick at apex, diminishing to vein 4, below vein 4 terminal black points. Hind wings white, somewhat hyaline to postmedial line ; a black spot near base ; a small medial spot at vein 7 ; a large round spot at end of cell, brown, crossed by a whitish shade and partly edged with black ; postmedial line black, inbent to discal spot at vein 3, and sinuous to inner margin, followed at veins 3 to 2 by a brown shade, and from vein 2 to inner margin by a black shade ; outer margin broadly shaded with pale brown from costa to vein 3 ; a fine interrupted brown terminal line, and a triangular spot between veins 2 and 3.

Expanse 28 mm.

*Hab.* Sixola.

*Patissa parvipunctella*, sp. n.

♀. Palpi brown. Head, body, and wings white. Fore wings : costa from base to near middle fuscous brown ; spots fuscous brown ; a large spot at end of cell ; a small spot on subcostal before middle, and a large spot above inner margin ; a small spot on costa near apex and one at tornus.

Hind wings : a spot below cell and one at anal angle. Wings below without markings.

Expanse 13 mm.

*Hab.* Sixola.

Subfam. *PHYCITINÆ*.

*Acrobasis jocarella*, sp. n.

♀. Palpi, head, collar, and thorax pale olive-buff, the patagia purplish. Abdomen dorsally whitish buff, subdorsally dark purplish brown. Fore wings : margins dull pale olive with a few dark irrorations ; cell mottled dull olive and reddish brown ; a broad reddish-brown shade below cell ; a medial black line on costa, two points on median, and traces of a dark geminate line from below cell ; two black points on discocellular ; a postmedial fuscous line, sinuous, outangled between veins 4 and 5 ; a subterminal brownish shade not reaching costa, crossed by white streaks and black points on veins from 6 to submedian ; a subterminal fuscous shade on costa ; terminal black spots. Hind wings purplish brown ; cilia grey-white, crossed by a darker shade at base.

Expanse 26 mm.

*Hab.* Avangarez.

*Myelois fearnella*, sp. n.

♂. Palpi brown mottled with grey. Head and thorax dark grey. Abdomen brownish, with pale segmental lines. Fore wings : costa dark grey, somewhat paler at base ; inner margin grey irrorated with pale reddish brown ; termen narrowly paler grey ; cell, below it, and intervenal spaces pale reddish brown, somewhat mottled with grey ; a fine black streak below subcostal ; median finely black ; submedian irrorated with black ; veins 2-6 black, interrupted by a grey subterminal shade slightly outcurved ; two black spots on discocellular, some postmedial greyish clusters of scales on veins also interrupting black streaks ; terminal black spots on interspaces. Hind wings semihyaline, dirty white, faintly iridescent ; veins and narrow terminal shade dark.

Expanse 23 mm.

*Hab.* Avangarez.

*Myelois dorsimacula*, sp. n.

♀. Palpi, head, and collar brown ; thorax similar irrorated with dark brown. Abdomen pale brownish at

base, otherwise duller brown, with transverse fuscous shadings; a large dorsal, dark red-brown, velvety spot on second segment and a smaller paler spot on first. Fore wings brown, darker shaded on inner and outer margins; a faint outbent fuscous basal line; traces of a geminate line on inner margin and a small spot below cell; a cluster of dark velvety scales on discocellular, and a few similar scales below vein 2; a very faint paler outer line, vertical to vein 5, slightly outcurved to vein 2, then inset and again outcurved; terminal fuscous spots. Hind wings semihyaline lilacine, darker shaded on terminal space.

Expanse 40 mm.

*Hab.* Sixola.

*Hypsipyla fluviatella*, sp. n.

♂. Palpi whitish at base, otherwise brown, the second and third joints terminally whitish buff. Head whitish buff. Tegulae mottled reddish and grey-brown, dorsally edged with whitish buff. Patagia reddish brown. Abdomen buff-brown. Fore wings reddish brown, the base broadly darker shaded; the medial line reddish brown, outbent on costa, then vertical, forming three lunules, defined by pale narrow buff shadings inwardly, also preceded on inner margin by some greyish-white scaling, and followed by paler buff shading beyond cell to apex, interrupted on costa terminally by a broad dark streak, and on vein 6 by a fine dark streak; the inner margin whitish at tornus; terminal whitish spots on veins 2-4, extending on cilia. Hind wings semihyaline white, slightly iridescent; a dark brown line on costa.

Expanse 45 mm.

*Hab.* Sixola.

*Piesmopoda angulineella*, sp. n.

♀. Palpi outwardly brown. Head, collar, and thorax pale olive-ochre. Abdomen dark purple-brown, with broad pale segmental line, and dorsal line on basal half. Fore wings: costal margin and cell medially whitish, otherwise pale olive-ochre; base of costa reddish, and similar irrorations on extreme edge, in cell along subcostal, and vein 8 to apex; some dull brown irrorations below cell and postmedially; antemedial line fine, dark greyish brown, outbent, angled below cell, inangled on submedian, outbent on inner margin; a whitish spot on discocellular; subterminal line straight, whitish buff, edged with dark greyish brown; some terminal



black scales, barely traceable. Hind wings semihyaline smoky grey; cilia whitish with a dark shade near base.

Expanse 21 mm.

*Hab.* Juan Vinas.

*Piesmopoda burdettella*, sp. n.

♂. Palpi brown, shaded with white below on basal half. Head, collar, and thorax ochreous brown. Abdomen dark brown, with paler segmental lines; white dorsal points edged with black on two basal segments. Fore wings: costal space above median white, thinly irrorated with reddish brown, and with a similar small antemedial spot and long medial streak on extreme edge; below cell to inner margin lilacine brown shaded with ochreous and red; some black scales on submedian antemedially, followed by a whitish streak interrupted by a black medial point; a black medial point on median; two distinct black points on discocellular; a sinuous subterminal white line broadly edged inwardly with fuscous brown, outwardly with reddish brown; whitish irrorations on outer margin, chiefly towards apex; a terminal black line not reaching apex; cilia lilacine brown, divided by a dark grey shade. Hind wings semihyaline brownish white, darker on termen; cilia grey, with a paler line at base.

Expanse 20 mm.

*Hab.* Poas, Juan Vinas.

*Piesmopoda montella*, sp. n.

♀. Palpi brown, the third joint irrorated below with black. Frons brown. Vertex, collar, and thorax ochreous brown. Abdomen fuscous brown with triangular ochreous shades, reduced to lines on three terminal segments. Fore wings ochreous brown; costal margin to subterminal line broadly white irrorated with reddish brown, its extreme edge brown with commencement of an antemedial line; two small reddish spots on discocellular; subterminal inbent on costa, then slightly outcurved pale reddish brown, edged on either side with black from costa to vein 2; some terminal black points; cilia ochreous brown divided by whitish irrorations. Hind wings semihyaline brownish white, darkest terminally; cilia pale with a dark shade near base.

Expanse 24 mm.

*Hab.* Poas.

*Piesmopoda nerthella*, sp. n.

♀. Palpi white, finely irrorated and tipped with light

brown. Head brown. Collar and thorax grey-black. Abdomen fuscous grey with pale segmental lines. Fore wings: base dark grey shading to light grey towards ante-medial line which is outbent, white, outwardly edged with brown; space beyond dark grey tinged with purple, somewhat paler terminally; a subterminal dentate brownish shade, darker at apex; a faint dark point on discocellular; costa shaded with brown on outer half; very minute dark terminal spots; cilia brown faintly irrorated with whitish grey. Hind wings semihyaline, brownish white, the veins and termen darker.

Expanse 19 mm.

*Hab.* Juan Vinas.

*Hyalospila celiella*, sp. n.

♂. Palpi brown. Frons whitish, medially ochraceous. Vertex, collar, and thorax ochraceous. Abdomen grey-brown; a paler dorsal streak on first three segments, and subdorsal black points on basal segment; anal tufts orange. Fore wings brownish; the subcostal and median shaded with white, both edged below with dark brown; veins terminally dark brown irrorated with grey towards costa; an ochreous shade below cell and along inner margin; ante-medial and medial brown suffusions in cell and on submedian, those medially interrupting the white shade on median and on submedian preceded and followed by white streaks; short dark brown streaks on veins postmedially; two indistinct dark spots on discocellular; cilia brownish grey, with faint paler irrorations, and a light brown shade at base. Hind wings semihyaline, dirty white, shading to fuscous terminally; cilia whitish, crossed at base by a pale brown and fuscous line.

Expanse 19 mm.

*Hab.* Juan Vinas.

*Ulophora subsutella*, sp. n.

♂. Body light brown; anal hairs black. Fore wings light brown; medial line outcurved, fine, black, crossing a fuscous-grey shade in and just below cell; a clearer pale brown spot on discocellular, and shade beyond it; subterminal line fine, fuscous brown, vertical on costa, slightly inbent from vein 5 to inner margin, followed by a light brown line and a diffuse fuscous-brown shade; termen finely dark brown. Hind wings semihyaline, whitish, tinged with pale brown. Vein 2 fringed below with downturned ochreous-brown hairs.

Expanse 17 mm.

*Hab.* Juan Vinas.

*Discopalpia semproniella*, sp. n.

♂. Palpi, head, collar, and thorax olive-buff. Abdomen similar at base, shading to fuscous on terminal segments; a small black-and-white dorsal spot on second segment. Fore wings buff-brown; costal margin brownish white irrorated with reddish brown; cell antemedially brown irrorated with black and reddish scales; a pale line along median vein to end of cell; first line represented by small black spots on subcostal, median, and submedian, the last geminate; two black points on discocellular; veins terminally dark streaked; a diffuse subterminal dark brown shade with traces of a pale sinuous line; some terminal black scaling; cilia grey-brown. Hind wings semihyaline white, iridescent, tinged with brown; termen narrowly dark shaded.

Expanse 20 mm.

*Hab.* Juan Vinas.

*Pectinigeria musælla*, sp. n.

♂. Palpi, head, and thorax pale roseate brown. Abdomen olive-brown, shaded dorsally with greyish white. Fore wings: base of costa and cell dark grey; costa otherwise roseate white, shaded behind with olive-grey and then roseate brown, which fills the greater portion of wing; a faint roseate-white shade from middle of submedian to termen between veins 4 and 5, the inner margin and tornal space below it very pale roseate brown; a few black scales are scattered over the wing. Hind wings creamy white, somewhat iridescent.

Expanse 24 mm.

*Hab.* Banana River.

*Zophodia dryopella*, sp. n.

♂. Palpi brown above, whitish grey below. Head dark brownish grey. Collar brown irrorated with white. Thorax white irrorated with brown. Abdomen brownish grey. Fore wings white, the inner margin broadly brown; some dark irrorations at base; costa finely black at base; ante-medial broad, white, defined by two black lines wavyly outbent from costa, angled below cell, and slightly incurved to near inner margin; a short black streak below discocellular; subterminal defined inwardly by a fine black interrupted dentate line, outwardly by a black spot on costa, and brown spots, expanding and suffusing towards inner margin; terminal dark brown spots except at apex; cilia whitish grey. Hind wings semihyaline brownish white, the

veins darker. Fore wings below with a white costal spot before apex.

Expanse 23 mm.

*Hab.* Juan Vinas.

*Eucampyla putidella*, sp. n.

♀. Body and fore wings greyish brown thinly irrorated with darker scales. Fore wings: a faint dark basal line; a darker medial line, outcurved and inangled on submedian, a dark shade on discocellular; subterminal line defined by two dark lines, inangled at vein 6, outangled below it, and faintly incurved; a pale line at base of cilia. Hind wings semihyaline smoky white, darkest on termen; base of cilia pale, followed by a faint dark line.

Expanse 21 mm.

*Hab.* Poas.

AZERA, gen. nov.

Palpi obliquely ascending, reaching a little above head, third joint nearly as long as second. Antennæ annulate. Fore wings narrow; vein 2 from end of cell; 3, 4, 5 stalked; 6 from upper angle; 7 and 8 on very long stalk; 9 absent; 10 and 11 free. Hind wings: vein 2 from lower angle of cell; 3 absent; 4 and 5 stalked; 6 from upper angle; 7 and 8 coincident.

Type of genus, *Azera mucIELla*, Schs.

*Azera mucIELla*, sp. n.

♂. Palpi mottled brown and grey. Head and thorax dark grey. Abdomen fuscous with grey segmental lines. Fore wings grey; the base broadly brownish grey; a similar medial line slightly outbent from costa; two small fuscous spots on discocellular; an outer and subterminal brownish-grey shade parallel with termen; a terminal fuscous line; cilia dark grey crossed by a whitish line. Hind wings semihyaline, smoky grey, the veins and termen darker shaded.

Expanse 13 mm.

*Hab.* Juan Vinas.

*Salebria polydectella*, sp. n.

♀. Palpi and head buff-brown. Collar and thorax dull dark brownish. Abdomen fuscous brown. Fore wings mostly fuscous irrorated with dull grey; the termen and inner margin between lines shaded with dull grey; the inner

margin on basal half tinged with brown; lines fine, velvety black, the medial slightly sinuous, preceded by a narrow pale shade, the postmedial faintly indented from below vein 5 to inner margin, followed by a dark brown shade, outbent on costa to apex; a pale spot on discocellular; a terminal black line; cilia outwardly pale reddish brown. Hind wings thinly scaled, brownish grey, darkest along termen.

Expanse 20 mm.

*Hab.* Juan Vinas.

*Ceracanthia tecmessella*, sp. n.

♀. Palpi, head, and collar light reddish brown. Thorax grey shaded with brown. Fore wings: basal two-thirds whitish grey, irrorated with black and brown; an oblique fuscous-brown shade at base; an antemedial oblique brown shade on costa and cell, and a small fuscous shade on inner margin; two black spots at end of cell, placed obliquely; terminal third purplish brown, the veins partly streaked with black, interrupted by a fine whitish subterminal line; terminal black spots. Hind wings thinly scaled, grey-brown, the veins and termen darker.

Expanse 14 mm.

*Hab.* Avangarez.

*Nephopteryx obstitella*, sp. n.

♀. Palpi whitish grey irrorated with brown. Head, collar, and thorax grey mottled with dull brown. Abdomen dark grey-brown, with pale segmental lines; a blue-black shade dorsally on second segment. Fore wings white irrorated with dark greyish brown; antemedial line broad, clear white, slightly oblique, edged with fuscous, its outer edge incurved on inner margin and outbent; discocellular line brown irrorated with black; a postmedial fuscous-brown shade indented to below cell, outbent on inner margin; subterminal line white, slightly indented on costa, preceded by short black streaks and outwardly edged by a dentate black line, broadest on costa; terminal semilunar fuscous spots, cilia whitish grey. Hind wings semihyaline whitish; a narrow dark terminal shade.

Expanse 22 mm.

*Hab.* Poas.

*Nephopteryx senesciella*, sp. n.

♂. Palpi outwardly fuscous grey. Head, collar, and

thorax brownish grey. Abdomen brown; triangular pale dorsal shades on segments 2-4; anal hairs brownish buff. Fore wings: base pale brownish to antemedial line, which is very broad on costa, outcurved to below cell, then outbent, narrow, broadly edged outwardly with black on costa and cell, otherwise narrowly edged with black; a black shade at base of costa; space beyond whitish grey finely irrorated with black, more heavily on costa; a thick black streak on discocellular; an inbent postmedial dark brown shade, mottled with black on costa and inner margin; subterminal line sinuous, indicated by small fuscous spots inwardly and a dentate line outwardly; terminal fuscous spots, cilia greyish white. Hind wings semihyaline white tinged with brown; the interspaces near discocellular iridescent; a dark terminal shade.

Expanse 16 mm.

*Hab.* Juan Vinas.

*Moodna formulella*, sp. n.

♀. Palpi greyish brown. Head and collar medially light reddish brown; collar laterally and thorax fuscous grey. Abdomen brownish grey with fuscous dorsal shadings. Fore wings: basal half fuscous grey on costa, towards middle of inner margin, and median vein; a brown shade below cell and at base of inner margin; the cell greyish, the whole limited by a fine whitish curved line, thickest on inner margin, and a thick dark brown curved line; postmedial space light brown on costa, whitish below it, irrorated with reddish brown, and greyish on inner margin; the subterminal line inbent, straight, parallel with termen, buff-white defined by reddish-brown shading, somewhat diffuse on outer edge; some dark streaks on veins on either side of pale subterminal line; termen greyish, with reddish-brown spots on interspaces; cilia dark silky grey. Hind wings semihyaline brownish grey, the veins darker; the termen narrowly darker.

Expanse 28 mm.

*Hab.* Juan Vinas.

Subfam. *GALLERIANÆ*.

*ATHALIPTIS*, gen. nov.

*Female*.—Palpi long, slender, porrect, slightly downcurved. Antennæ simple. Legs smooth. Fore wings long, narrow; apex acute, outer margin oblique; vein 3 before lower angle;

4 and 5 from lower angle; 6 close to upper angle; 7-10 stalked from upper angle, 10 before 7; 11 free. Hind wings: discocellular inangled to near base; veins 3 and 5 stalked; 4 absent; 6 from upper angle; 7 and 8 stalked.

Near *Tirathaba*.

Type of genus, *Athaliptis cymonia*, Schs.

*Athaliptis cymonia*, sp. n.

♀. Palpi pale rust-brown. Head and collar white. Thorax, abdomen, and fore wings pale straw-colour. Fore wings irrorated with dull yellow; cell and just below it irrorated with pale rust-brown, extending to postmedial line, which is fine, outangled at vein 5; terminal dark spots on interspaces. Hind wings white. Wings below silky shaded with greyish brown, darker on fore wings, which have the costa shaded with roseate brown; terminal fuscous grey spots on both wings.

Expanse 22 mm.

*Hab.* Juan Vinas.

Subfam. *EPIPASCHINÆ*.

*Pococera narthusa*, sp. n.

♀. Palpi and frons fuscous grey. Vertex, collar, and thorax buff-brown. Abdomen fuscous grey with pale segmental lines. Fore wings above median and vein 4 grey, below it whitish irrorated with brown and grey; an antemedial fuscous point in cell, and one below cell, followed by a brownish line from costa slightly outbent; a fuscous point on discocellular; postmedial very faint, from costa, incurved around cell, from vein 3 very distinct fuscous, incurved and outbent from submedian fold, followed throughout by a brownish shade to outer line, which is darker brown, slightly incurved from vein 5; subterminal brown spots on interspaces, followed by the darker terminal spots; cilia brownish. Hind wings brown; cilia with paler line at base and whitish tips. Wings below without lines.

Expanse 18 mm.

*Hab.* Tuis.

Subfam. *CHRYSAUGINÆ*.

*Gephyra siderealis*, sp. n.

♂. Palpi, head, and collar dark reddish brown, somewhat opalescent. Thorax fuscous brown, opalescent. Abdomen and

hind wings fuscous brown, the former with fine pale segmental lines. Fore wings deep purple, iridescent; an antemedial dark reddish-brown shade, widest on costa, not reaching inner margin; a yellow spot irrorated with red medially on costa, preceded by a broken white line, and followed by a thick white line; a yellow spot in cell below it, and a white spot in cell above median, the latter followed by a small yellow and red spot; postmedial line slightly curved, brownish, indistinct; a small white spot on costa beyond postmedial; a broad subterminal dark red shade, irrorated with yellow towards costa, interrupted at vein 3 and not reaching inner margin, followed partly by some dark brown shading; a slight yellow shade at apex; cilia yellow from apex to vein 4, then dark. Wings below fuscous, shaded with dark red especially at apices; fore wing with pale yellowish costal patch medially; hind wings with postmedial yellowish line.

Expanse, ♂ 19, ♀ 23 mm.

*Hab.* Juan Vinas, Sitio, Cachi.

*Casuarina neglecta*, sp. n.

♂. Palpi fuscous. Head, collar, and patagia olive-brown. Thorax and abdomen ochreous brown. Fore wings dark olive-brown; base of costa light brown; a small black spot at end of cell; a small white costal spot before apex; a fine pale and indistinct line from apex to inner margin before tornus; some lilacine scales terminally. Hind wings bright yellow, the outer margin broadly black, its inner edge angled at vein 3; the costa narrowly black. Wings below bright yellow; the costal margins narrowly, the outer margins broadly black; base of costa on fore wing shaded with brown.

♀. Fore wings more distinctly olive; traces of a fine antemedial line; two small whitish spots medially below cell, shaded with a few brown scales, these spots superposed obliquely, the upper spot minute. Underneath the costa of fore wing broadly reddish brown to apex.

Expanse, ♂ 25, ♀ 26 mm.

*Hab.* Sixola.

*Casuarina purpurea*, sp. n.

♀. Palpi dark purplish red. Head, collar, and thorax lilacine brown. Abdomen dark olive-grey with faint paler segmental lines. Fore wings dark lilacine brown thinly irrorated with black, especially on medial space; lines fine, paler, the antemedial slightly outbent, the postmedial out-



curved below costa, then slightly inbent; a small white spot on costa beyond postmedial; some lilacine irrorations terminally towards apex. Hind wings brownish orange, darkest terminally, and more broadly at vein 3; cilia purplish. Wings below brownish orange, the apices broadly shaded with dark purple.

Expanse 19-24 mm.

*Hab.* Esperanza, Sixola.

*Casuarina angulinea*, sp. n.

♀. Palpi fuscous grey irrorated with whitish grey. Head dark olive-grey. Collar and thorax lilacine brown. Abdomen orange-brown. Fore wings greyish brown, shading to reddish brown terminally; antemedial line dark brown, slightly outcurved below cell; postmedial line fuscous brown, deeply outangled opposite cell, followed on costa by a pale olive-grey shade to apex; a few grey scales terminally; cilia dark grey-brown tipped with white. Hind wings orange-brown. Fore wings below lilacine brown, the darker lines visible on costa. Hind wings below paler; a postmedial fuscous shade most distinct and broader from costa to vein 4, outwardly edged with grey, interrupted below vein 4 and on inner margin.

Expanse 20 mm.

*Hab.* Tuis, Guapiles.

*Xantippe caphysoides*, sp. n.

♀. Head, thorax, and fore wings lilacine buff irrorated with red. Abdomen buff-brown shaded with fuscous. Fore wings: an antemedial and a postmedial fine yellow line, vertical and parallel; some black irrorations on costa on medial side of lines; cilia dark red at base, terminally yellowish white. Hind wings buff-yellow; the costa and termen irrorated with red, and a similar postmedial line not reaching inner margin; a terminal interrupted reddish-brown line. Fore wing below purplish red; a pale antemedial streak on costa; a pale postmedial line slightly outbent; terminal yellow points on veins; costa and apex irrorated with yellow. Hind wings below buff-yellow; costal margin to postmedial line broadly dark purple-red; outer margin irrorated with red; the postmedial lines better defined; the terminal line as above.

Expanse 25 mm.

*Hab.* Turrialba, 5800 feet.

*Xantippe suavis*, sp. n.

♂. Head, collar, thorax, and fore wings olive-buff. Abdomen slightly darker. Fore wings: two faintly paler lines; the medial line inbent, defined by darker scaling along its outer edge, the postmedial vertical, defined by darker scaling on either side. Hind wings fuscous grey.

Expanse 12 mm.

Hab. Juan Vinas.

## SPEOSIA, gen. nov.

*Male*.—Palpi short, filiform, upturned not reaching vertex. Antennæ pubescent. Legs smooth. Fore wings: costa highly arched antemedially with cavity below; apex to vein 4 produced, incurved below vein 4; the termen between 4 and apex very slightly incurved; vein 2 from just beyond middle of cell; 3 before end of cell; 4 and 5 from lower angle; 6 from near upper angle; 7, 8, 9 on long stalk from upper angle; 10 free; 11 free, upcurved near cavity; costal margin with short fringe at base. Hind wings: cell long, terminally broad, the discocellular straight, vein 2 from lower angle; 3 above angle, 4 absent, 5 from middle of discocellular; 6 and 7 stalked to close to termen; the scales downturned from vein 8 to middle of cell, upturned from median; glandular patches beyond cell and also below vein 2.

Type of genus, *Speosia bullata*, Schs.

*Speosia bullata*, sp. n.

♂. Head greyish brown. Collar, thorax, and fore wings light brown. Abdomen and hind wings fuscous brown. Fore wings: costa near base highly arched with fovea below, the space thus formed shaded with fuscous; a small fuscous spot at end of cell; terminal space darker shaded. Wings below buff-brown; fore wings outwardly shaded with dark grey above vein 2; fovea fuscous. Hind wings shaded with dark grey at apex; a large patch of raised brown scales beyond and below cell.

Expanse 15 mm.

Hab. Juan Vinas.

*Pelagis? socialis*, sp. n.

♀. Palpi, head, collar, and patagia roseate brown; thorax and abdomen dark brown. Fore wings roseate brown; a

broad antemedial dark brown fascia, narrowest on inner margin, its inner edge slightly outbent, its outer edge limited by a pale line outwardly finely shaded with fuscous, somewhat inbent below cell; postmedial line slightly outcurved beyond cell, incurved from vein 4 to inner margin, pale-coloured, almost white on costa, defined by narrow fuscous shading, and punctiform on veins 2-4; a subterminal dark shade crossed by dark streaks on veins and suffusing with the darker terminal space. Hind wings dark greyish brown; a subterminal pale line on a darker shade below vein 2. Wings below reddish brown; an irregular postmedial whitish line partly edged with fuscous shadings.

Expanse 24 mm.

*Hab.* Tuis, Juan Vinas.

*Lepidomys viridans*, sp. n.

♀. Palpi olive-grey. Head and body pale yellowish green. Fore wings: base and termen pale yellowish green; intermediate space dark green, edged by white lines, the inner line medial on costa, inbent to inner margin towards base, outer line angled below costa near apex, inbent to middle of inner margin; apex dark yellow-green. Hind wings whitish grey, darker terminally. Wings below showing indistinctly the markings of upper side.

Expanse 20 mm.

*Hab.* Sixola.

*Arta incurvalis*, sp. n.

♀. Head, collar, and thorax pale greyish brown shaded with red. Abdomen greyish brown. Fore wings roseate brown irrorated with red; lines dull yellowish, the medial slightly incurved, the postmedial vertical; termen shaded with grey; a terminal interrupted fuscous line; cilia yellowish white. Hind wings greyish.

Expanse 21 mm.

*Hab.* Juan Vinas.

*Sarcistis rufescens*, sp. n.

♀. Palpi, head, collar, and thorax brownish grey. Abdomen thickly irrorated with dull dark brown; pale segmental lines. Fore wings brownish red, the termen greyish, irrorated with dark red; the two lines fine, dark red, almost vertical and parallel; the costa finely yellowish; cilia dark red at base, luteous terminally. Hind wings fuscous grey;

cilia luteous, crossed by a dark red line. Fore wings below red; costal margin irrorated with yellow; inner margin whitish; a fuscous-grey shade in and below cell. Hind wings below whitish, the costal margin and termen, broadly near apex, red, irrorated with yellow; a postmedial pale line on costal half.

Expanse 18 mm.

*Hab.* Juan Vinas.

*Diloxis apicalis*, sp. n.

♂. Palpi, head, and collar lilacine brown. Thorax purplish brown. Abdomen greyish brown. Fore wings lilacine brown; a large pale yellow costal spot from costal tuft not quite reaching termen; lines darker brown, the antemedial outbent to median at vein 2, then vertical to inner margin; the postmedial deeply outbent and outcurved from vein 5 to vein 2, then downbent; the termen dark shaded. Hind wings fuscous. Wings below fuscous grey; the apex of fore wing whitish yellow.

Expanse 23 mm.

*Hab.* La Florida.

Near *Diloxis ochriplaga*, Hmps.

*Condylolomia obscura*, sp. n.

♂. Body and wings dark brown, the latter silky; a postmedial fuscous line. Fore wings also with an antemedial fuscous line. Wings below somewhat paler brown without markings.

Expanse 17 mm.

*Hab.* Carillo.

NAVURA, gen. nov.

*Male.*—Palpi porrect, fringed above with a triangular tuft; antennæ simple. Fore wing: costal margin straight; outer margin obliquely rounded; inner margin lobed beyond base, the lobe fringed with spatulate scales; vein 2 from well before end of cell; 3 from lower angle; 4 and 5 on short stalk; 6 from upper angle; 7-10 stalked; 11 from cell. Hind wing: vein 2 from well before angle of cell; 3 from lower angle; 4 and 5 from a point; 6 from upper angle; 7 and 8 stalked.

Type of genus, *Navura lobata*, Schs.

*Navura lobata*, sp. n.

♂. Head, collar, and thorax ochreous buff. Abdomen greyish brown. Fore wings buff-brown, the costal margin ochreous buff; a wavy whitish medial line from cell, with a few black irrorations, extending on outer edge of lobe; a black point at end of cell; a subterminal line, whitish on costa and inner margin, otherwise fuscous; cilia tipped with dark grey. Hind wings dark grey. Fore wings below paler, the disc shaded with dark grey; a black discal point and subterminal line. Hind wings buff-white; a black discal point and postmedial fuscous line.

Expanse 13 mm.

*Hab.* Tuis.

## ACALLIDIA, gen. nov.

*Male*.—Palpi obliquely upturned, roughly scaled, third joint half as long as second; frons smooth; antennæ annulate, finely ciliated; legs smoothly scaled; abdomen not extending beyond hind wings. Fore wing long and narrow; veins 3, 4, 5 stalked; 6 from upper angle; 7 absent; 8, 9, 10 stalked; 11 from cell. Hind wing: vein 2 from lower angle of cell; 3, 4, 5 stalked; 6 from upper angle; 8 and 9 on long stalk.

Type of genus, *Acallidia dentilinea*, Schs.

*Acallidia dentilinea*, sp. n.

♂. Palpi purplish red. Head, collar, and thorax light brown. Abdomen brownish buff. Fore wings purplish red, irrorated with black at base below subcostal, between the two lines, and on termen; a dentate whitish medial line; an outer whitish line, slightly sinuous and outangled on inner margin; a fuscous line on cilia. Hind wings whitish, faintly tinged with roseate on termen; cilia tipped with roseate.

Expanse 20 mm.

*Hab.* Poas.

*Bonchis phyllis*, sp. n.

♀. Palpi dark grey, shaded at base and above with brown-red. Head, collar, and thorax lilacine, the scales finely tipped with white. Abdomen above brownish grey, ventrally dark grey shaded with brown-red. Thorax below and legs brown-red, the mid and hind tibiae fringed with purple irrorated with white, the tarsi whitish. Fore wings: basal

half and termen lilacine, the intermediate space dark purple-brown; three fine antemedial purple lines; outer half of costa brown-red, finely edged in front with yellowish white and crossed by an outer white streak, faintly traceable as a paler line on dark space; terminal small purple spots. Hind wings white, the apex broadly, the termen narrowly fuscous; terminal small purplish spots. Fore wings below fuscous; costal margin purple, with postmedial and outer white lines; the apex broadly dark red. Hind wings below white; costal margin broadly lilacine, irrorated with purple extending to vein 4; the termen on apical half dark red.

Expanse 22 mm.

*Hab.* Juan Vinas.

*Bonchis albilinea*, sp. n.

♂. Palpi, head, collar, and thorax pale lilacine brown. Abdomen greyish brown, with darker transverse shades. Fore wings lilacine brown, palest at base, medially, and on termen; an antemedial straight white line, slightly outbent from costa; a black shade on discocellular; outer line thick on costa, white, faintly incurved, below costa, fine, whitish lilacine, slightly outcurved, preceded on costal margin by a reddish-brown shade; small terminal black-brown spots. Hind wings brownish grey. Wings below dull greyish, the apices reddish brown. Fore wings: traces of lines, the outer line well marked, white on costa. Hind wings: a dark discal point; a curved whitish postmedial line, inwardly dark shaded.

Expanse 20 mm.

*Hab.* Tuis.

*Streptopalpia misella*, sp. n.

♂. Head, collar, and thorax brown finely irrorated with white. Abdomen darker brown. Fore wings roseate brown, with scattered black irrorations and large terminal black spots; medial and postmedial lines whitish, faintly outcurved, parallel, curved and joined on cilia of inner margin; two small black spots at end of cell. Hind wings grey-brown. Fore wings below dark greyish, the costal margin brown; a whitish postmedial line. Hind wings below whitish, the costal margin broadly pale roseate irrorated with black; a dark discal spot and postmedial line.

Expanse 10 mm.

*Hab.* Banana River.

*Murgisca costinotata*, sp. n.

♀. Palpi dark purplish. Head and body dark brownish grey. Fore wings dark brown, shaded with purplish grey antemedially from below subcostal and on termen; an antemedial white streak above submedian; an inbent medial fuscous shade, marked by an oblique white costal spot; a fuscous postmedial shade and minute white spots on costa; a narrow fuscous subterminal shade. Hind wings dark grey. Wings below dark greyish brown, the costal margins shaded with darker purple-brown. Fore wings: small medial and postmedial whitish spots on costa. Hind wings: an outer indistinct pale line, faintly darker edged, almost subterminal.

Expanse 24 mm.

*Hab.* Sixola.

*Semnia elegans*, sp. n.

♀. Palpi black. Head, collar, thorax, and fore wings deep purple-red. Abdomen black. Hind wings deep yellow; the termen broadly fuscous brown from costa to vein 5, below it tinged with purple-red, and terminating at vein 2; veins 2 and 3 shaded with orange-red before terminal space. Fore wings below fuscous brown; the inner margin white on basal half; a large golden-yellow shade postmedially from inner margin to vein 5. Hind wings below golden yellow; a fine black edge to costa at base, expanding at apex, then narrowing to a point at vein 2.

Expanse 30 mm.

*Hab.* Tuis.

Subfam. *PYRAUSTINÆ*.*Neurophyseta cyclicalis*, sp. n.

♀. Body white; brown segmental lines on abdomen. Wings white, markings fuscous brown. Fore wings: a subbasal line marked by a black point on submedian; a curved antemedial line; an oblique medial line on costa shaded with yellow-buff; discocellular edged with black, crescent-shaped, followed by yellow lines on veins 6 and 7, edged with dark brown irrorations; a yellowish shade on costa above discocellular; postmedial geminate, preceded and followed by dark shades between veins 3 and 5; a subterminal line and finer terminal line, the margin brownish between them. Hind

wings: an antemedial and a geminate postmedial line; no terminal line.

Expanse 12 mm.

*Hab.* Juan Vinas.

Near *N. camptogramma*is, Hmps. n.

*Nacoleia angulinea*, sp. n.

♀. Body and wings white, markings dull greyish brown. Fore wings: a subcostal streak to middle of wing; an antemedial streak, slightly outbent, from median to inner margin; a small point in cell, somewhat nearer base; a streak on discocellular; a postmedial line outwardly oblique from costa to just below vein 3, angled, finer, and inbent along interspace, then downbent, broader to inner margin, somewhat obliquely; a terminal shade from vein 4 to apex. Hind wings: a spot on discocellular; an outer line nearly vertical to below vein 3, angled and upbent, and again bent medially to middle of inner margin; a faint shade at apex.

Expanse 23 mm.

*Hab.* Carillo.

*Pionea lagunalis*, sp. n.

♂. Palpi, head, and thorax dark brownish grey. Abdomen light brown, thickly irrorated with black; segmental white lines. Fore wings bone-white, thickly irrorated with fuscous brown, the outer margin considerably darker, the postmedial space palest and crossed by a fine dark line starting from a black spot on costa; three black points beyond it on costa; terminal black points; cilia divided by a fuscous line. Hind wings whitish irrorated with grey-brown; a fuscous point on discocellular; terminal black points from vein 2 to apex; veins dark tinged. Hind wings below: black points on discocellular at each end; an interrupted dark postmedial line; veins bone-white; terminal black points as above.

Expanse 15 mm.

*Hab.* Laguna, Cartago.



XXV.—Note on *Helix rufescens* of Pennant.

By E. A. SMITH, I.S.O.

THE object of the present note is to show that the shell universally regarded as the *Helix rufescens* of Pennant is not the form which was described and figured by that author.

The description appeared in the fourth volume of his 'British Zoology' (published in 1777) on page 134, and the figure of the specimen described is given on pl. lxxxv. fig. 127. His species is included in his second group, "Ventricose," and the description runs thus:—

"Snail with four spires, and minutely umbilicated; the exterior spire sub-carinated. Of a pale brownish red mottled with white. Inhabits woods.

"Tab. LXXXV. fig. 127."

It must also be observed that he referred to Lister's work of 1678, 'Hist. Anim. Angliæ,' quoting Lister's Latin diagnosis and referring to his figure.

Lister's shell\* I believe, from his description, to be the *rufescens* of authors, and Pennant was wrong in supposing that it was the same species as that which he himself was describing as *Helix rufescens*.

The actual shell described by Pennant is now in the British Museum, and proves to be merely a young example of the common *Arianta arbustorum*.

Pennant, having quoted Lister's description and figure as representing his own species, it seems probable that subsequent authors adopted that conclusion without ever seeing Pennant's type, and consequently this wrong identification has been perpetuated.

Da Costa in 1778 was the first to adopt the Listerian shell as the *rufescens* of Pennant. He was followed by Donovan in 1802, Montagu in 1803, and by nearly all subsequent authors up to the present time.

Although it may seem to some inadvisable to alter a well-established name, it appears to me that in the present case there is no help for it. I might here observe that, in addition to the type of *Helix rufescens*, the Museum has recently acquired fourteen other types from the Pennant collection, besides sixty-one specimens which, although not types, are of historic interest, being the actual shells figured in Pennant's classic work.

\* Lister referred to *cantiana*, Montagu, as "vel varietas vel alia species."

Since Pennant's death his collection has remained at Downing Hall, Holywell, Flintshire, where he resided all his life, from 1726 to 1798. The property subsequently came into the possession of the Denbigh family, and it is the present Earl of Denbigh to whom the Museum is indebted for the specimens here referred to.

It now becomes necessary to determine what name must be assigned to the *Helix rufescens* of authors.

It certainly is the *Helix turturum* of Gmelin\* in part, since he quotes the reference to Lister, but his other references to Schlotterbeck and Martini have nothing to do with the Listerian shell. In Gmelin's diagnosis the word *rotundata* occurs, which is applicable to the figures of Schlotterbeck and Martini, and even to that of Lister, which is drawn sinistral, and might be described as *rotundata*, for it resembles very little the shell (*rufescens*, auct.) which he evidently had before him.

Considering the confusion surrounding Gmelin's *Helix turturum*, I am inclined to disregard it entirely.

*Helix circinata*, *H. montana*, and *H. cœlata*, described very briefly (but not figured) by Studer in 1820 †, are said to be the same as *rufescens*, auct., but from the very short descriptions they are certainly not identifiable. Subsequently, in 1828, Carl Pfeiffer united *montana* and *circinata*, and the shell he described and figured ‡ is evidently the same as the British species. I would therefore suggest that the shell in question should at present § bear the name of *Hygromia montana* (Studer), Pfeiffer. *Helix striolata*, C. Pfeiffer, is apparently a synonym, and although the description of it appeared on p. 28, and that of *montana* on p. 33 of the same work, I prefer to suggest the adoption of the latter name, since it was proposed by Studer eight years before the appearance of Pfeiffer's book.

The *Helix corrugata*, Hartmann, with the varieties *clandestina*, *corrugata*, *cœlata*, and *charpentieri*, described and figured in the 'Neue Alpina,' 1821, vol. i. p. 236, are not identifiable with certainty from Hartmann's description and the figure of the var. *cœlata*, and therefore cannot be considered as antedating the *H. montana* properly established in 1828.

\* Syst. Nat. p. 3639.

† Syst. Verzeich. Schweizer-Conch. p. 12.

‡ Naturgesch. Land- und Süßwasser Moll. Abtheil. iii. p. 33, pl. vi. fig. 9 (fig. 10 by mistake in text, see p. 53).

§ Should *H. glabella* of Draparnaud eventually prove to be the same species, as is stated to be the case by some authors, that name should be retained instead of *montana*.

XXVI.—*New Local Races of Big Game from Central and Western Africa.* By ERNST SCHWARZ.

IN working out the collection of Ungulates made by the "Second Central African Expedition of H.H. Adolf Friedrich, Duke of Mecklenberg," a number of forms have been found to need description. The diagnoses in this paper are of a preliminary character only, a general account of the whole expedition is being prepared. Incidentally a new buffalo from the Cross River, obtained by Herr Diehl, is also here described. The types of the new forms are in the Senckenberg Museum, Frankfurt-a.-M.

During the present investigations the material of African game in the Berlin Museum has been studied, and it is my pleasant duty to acknowledge Prof. Matschie's kind advice and the liberal way he has put at my disposal the magnificent series of Ungulates in the collection under his charge.

*Phacochærus æthiopicus fossor*, sp. n.

*Type locality.* Ketekma, east of Tschekna, Bagirmi.

*Type.* Old ♂. Senckenberg Museum, Frankfurt-a.-M. Journal no. 654. Original no. A 175. Collected March 30th, 1911.

*Skull.* Heavier than in *Ph. æ. æliani*, Cretzsch., from Massaua. Occiput shorter and broader. Forehead broader. Profile of skull less concave at the forehead, but more convex in the nasal region. Jugal much broader and placed much less vertically. Alveoli of canines more horizontally placed, the tusks themselves therefore placed more horizontally, but their tips having a more backward direction. Paroccipital process distinctly slenderer.

*Dimensions of type skull.* Basal length 323 mm.; palatal length 236; zygomatic width 216; breadth of occipital plane 96; length of upper tooth-row (alv.) 93.

*Bubalis lelwel tshadensis*, subsp. n.

*Type locality.* Ketekma, east of Tschekna, Bagirmi.

*Type.* ♂ ad. Senckenberg Museum, Frankfurt-a.-M. Journal nos. 963 (skull), 894 (skull). Original no. A 179. Collected March 31st, 1911.

Most nearly allied to *B. l. lelwel*; mainly distinguished  
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by the shape of its horns. Hoof-bands present, but extremely narrow.

Dorsal colour ochraceous tawny, darker on posterior back. Rump and sides lighter, ochraceous buff; underparts, thighs, and shoulders buff. Top of head distinctly tawny; cheeks and throat light ochraceous buff, chin sharply contrasted by its brownish-black colour. A very narrow seal-brown band round hoofs, continuous with a large spot above hoof, and a stripe to the wrists and hocks of the same colour. Tail crest and tip black, base light buffy.

*Skull.* Distinguished by its general slender form and long and narrow nasals. Horns large. Chiefly differing from those of *B. l. lelwel* in being much less depressed. Horn-tips strongly curved, pointing inward or outward. Angle formed by the ascending portion of horns and the tips very large, whereas in *B. l. lelwel* it is about 90°. Anterior aspect of horns decidedly V-shaped, more so than in *B. l. lelwel*.

*Dimensions of type skull.* Basal length 397 mm.; palatal length 240; zygomatic width 125, postorbital width 135; mastoid width 110; length of nasals 220; length of upper cheek-teeth series (alv.) 102; distance from first premolar (alv.) to gnathion 146.

By the erect horns and the curved horn-tips this hartebeest is easily distinguished from its eastern representatives *B. l. lelwel* and *B. l. niediecki*. From *B. l. roosevelti* it differs in having narrow hoof-bands and seal-brown (not tawny) leg-stripes.

*Egocerus equinus scharicus*, subsp. n.

*Type locality.* Abilela, lower Shari River.

*Type.* ♂ ad. Senckenberg Museum, Frankfurt-a.-M. Journal no. 781. Original no. A 137. Collected February 25th, 1911.

Dorsal colour ochraceous buff, paler on sides of body; neck and withers strongly suffused with white, thus producing a slight greyish hue; hairs of neck-mane brownish buff at base, then Mars-brown, with short blackish tips. The pale brown spinal line is continued by a black one on the tail; tail-tip black. Thighs and legs ochraceous for the greater part of their length; only immediately above hoofs they are clay-coloured. False hoofs of fore and hind legs margined black. A seal-brown band on the anterior side of the fore legs runs to the wrists only in some specimens, but

is continued further in some other skins. Underside of body light buffy white. Ears very long, ochraceous posteriorly, with dark brown pencils at tip. Dark face-markings variable, sometimes only in front of the eyes, sometimes nearly covering the whole face.

*Skull and horns.* Skull chiefly distinguished by its large size and long and broad nasals. Horns very long and expanded; tips either pointing extremely outward or strongly inward. From the East-African *E. e. bakeri* this form differs in these characters and the strong backward curvature of the horns as well as the long horn-tips; from the western forms it is distinguished by its large size.

*Dimensions of type skull.* Upper length 455 mm.; basal length 425; palatal length 245; zygomatic width 170; orbital width 187; mastoid width 135; nasals, greatest length 191; length of upper tooth-row (alv.) 137.

In colour *Egocerus equinus scharicus* more nearly resembles *E. e. gambianus*; in the shape of the horns it is intermediate between the eastern *bakeri* and the western forms, while in size it comes nearer to the eastern forms. As a matter of fact, however, it is by far the largest of the "Sudan" races.

*Kobus unctuosus tshadensis*, sp. n.

*Type locality.* Mafaling, Shari River.

*Type.* ♂ ad. Senckenberg Museum, Frankfurt-a.-M. Journal no. 1084. Original no. A 259. Collected May 6th, 1911.

Chiefly distinguished from *K. u. defassa* by its narrower skull and the pale anterior portion of back.

Anterior portion of back, withers, and upper parts of shoulders fawn, markedly contrasted with the colour of neck, thighs, and flanks, which is distinctly ochraceous. Fore-head tawny, middle portion of face brownish black, paler posteriorly. Checks fawn. Back of ears pale reddish fawn with blackish tips. Buttocks buffy white. Limbs blackish brown from some distance above wrists and hocks. Light markings as follows: a narrow white band round muzzle, a narrow white stripe on each side above eye; a buffy band round the base of each hoof and false hoof.

*Skull.* Narrower and more slender than in *K. u. defassa*, profile of brain-case much more convex, especially behind; occipital plane much narrower. Nasals more convex transversely.

*Horns.* Apparently longer than in *defassa*. Very straight, only bent forward at the tips, and much laid backwards as a whole.

*Dimensions of type skull.* Basal length 380 mm.; upper length 386; palatal length 210; postorbital width 160; zygomatic width 140; mastoid width 125; nasals, greatest length 157, greatest breadth 38; breadth of rostrum across premaxillæ 56; length of upper tooth-row (alv.) 110; horns, greatest length (along curvature) 690.

This waterbuck is nearly allied to *K. u. defassa*, from which it is easily distinguished by the shape of its braincase. Although some specimens are darker than the one described, *K. u. tshadensis* is always much duller-coloured than the Senegambian *K. u. unctuosus*, from which it also differs in its much longer horns and larger size.

*Bubalus caffer diehli*, subsp. n.

*Type locality.* Manfe, Cross River, W. Cameroons.

*Type.* Old ♂. Senckenberg Museum, No. 2601. Collected and presented by Herr Diehl.

Decidedly intermediate in size and shape of skull and horns between the Gold Coast buffalo and the dwarf races of the Congo forest.

*Skull.* Shorter and broader than in the Gold Coast form. Nasals relatively longer and narrower. Orbits strongly projecting. *Horns:* palm distinctly edged, slightly directed backwards and slightly depending, rather thick, but without boss at base; the tips are rather abruptly compressed, sharply set off from the palm; they are short and directed backwards.

*Dimensions of type skull.* Basal length 390 mm.; palatal length 228; postorbital width 215; mastoid width 208; length of nasals 166; length of horns along outer curve 530; breadth of palm at base 130; distance of horns at base: proximally 53, distally 125; greatest width of horns 540, distance of tips 385.

From the Gold Coast buffalo *B. c. diehli* differs by its smaller size and projecting orbits. On the other hand, it is much larger than *B. c. nanus*, whose horns have longer tips and are more strongly recurved.

Only the skull of this interesting race has been examined.

## BIBLIOGRAPHICAL NOTICE.

*The History of the Collections contained in the Natural History Departments of the British Museum.*—Vol. II. Appendix. *General History of the Department of Zoology from 1856 to 1895.* By Dr. ALBERT GÜNTHER, F.R.S.

THE history of a museum is in the main a history of its collections, just as the history of a nation is in the main a history of its ordered generations: in the one case as in the other the creative designs of Directors and Dictators are limited by the condition of the material—whether crude and chaotic or fashioned and tempered—that they find ready to their hands.

In this volume we have a plain history of the zoological collections of the British Museum, comprehending a term of forty years, written by one who practically all that time moved among them, gave them shape, and strove to make them fertile—a most memorable work both in itself and in its authorship.

Like all the work of its author, it is a model of lucid method, full also of expert suggestion, and religiously free from ostentation. The growth and arrangement and vicissitudes of the collections, their maturation and fructification in monographs and descriptive catalogues, the conditions and circumstances of the famous donations, the changes and developments in the curatoriate, the distribution of the annual grants—all the arcana are revealed, period by period, in orderly sequence; and we survey the hidden machinery of a great educational institution with the same chastened feelings as a passenger who has been shown round the engine-room of a big ship by the chief engineer.

Quite outside its native and domestic value as an official epitome of the inner workings of a scientific department, this authoritative history of the premier natural history collection of the world will naturally become canonical to the whole fraternity of museum administrators, who in turning to it for guidance and policy will also get comfort and will even learn resignation.

“*Quæ caret ora cruore nostro?*” What Curator’s heart has not been filled with “hot unutterabilities” by the ligneous behaviour of his Board? Let the oppressed spirit be consoled. For here he will find it recorded of the wise Dr. Gray, whose first great administrative measure was to arrange the collections in the two reciprocating series—for exhibition and for study—now so universally adopted, that he had to carry out this reform in the face of considerable opposition, and found his most telling argument in its favour in the one that it saved room. So true is the paradox that the British governmental mind, which loves a smooth theory as a limpet loves a rock, can yet be moved more surely by taking

advantage of its inertia than by appealing to reason. Again: what balm may the Curator always lay to his smarting soul when he learns that even in the Metropolis of the Empire a request to the Treasury for an addition to the permanent museum-staff may be met with the penny-wise suggestion that the way to keep down expenditure on staff is to close the door on acquisitions. The far-off Curator will also be consoled to know that even in the Imperial Metropolis the estimates for accommodating zoological collections are usually pronounced to be extravagant by high official persons with quill and inkhorn.

The words of the wise are as goads, so that we may profitably attend to some of those questions of museum policy upon which the author has here set his seal. The strait path of the assistant is to conserve his own proper collection, with a single eye to cataloguing it when it is big and broad enough; but he must have licence to revel in the rare stuff brought in by intelligent travellers, for nothing hereafter hardens the enthusiastic collector's heart against the Museum more than to find his treasures reposing on a back shelf. Again: as to museum catalogues, the only kind that is any use to the world at large—also bringing in a manifold return to the museum—is the descriptive monograph, of which (we must and shall add) the author's 'Catalogue of Fishes' is a noble example. Or, regarding exchanges: dear as they may be to fancy, in practice they by no means always bring rare and refreshing fruit in their train; they make great inroads on time and they rarely give satisfaction to both sides: better is it to give away authentic duplicates, without money and without price, to all respectable institutions that apply for them. Or again: the idea of a Museum as a collection of labels illustrated by specimens is by no means divinely inspired. Is the long-suffering public, overfed with print from its youth up, never to escape long descriptive labels? The better way is to show forth *things*, and to relegate the talk to simple guide-books.

These are a few of the treasures of old experience that we extract from this rich little book. There are other things that might be noticed, such as the theory and practice of purchase of collections, the science of encouraging attendants, the art of labelling, the conduct of a departmental library, the segregation of specimens preserved in spirit, and the supreme effort—an epic in itself—of transferring the collections from Bloomsbury to Cromwell Road.

We may conclude this brief and inadequate notice with a reference to the Preface, which states with official impartiality that the work is by Dr. A. Günther, F.R.S., formerly Keeper of the Department of Zoology, and that the Index has been made by Mr. G. J. Arrow, Assistant in the Department of Zoology. The former Keeper has played such a part, and has gained such a place in our hearts, that he may say with Horace "*Mitte supervacuos honores.*" A. A.



## MISCELLANEOUS.

*Note on G. Fischer de Waldheim's 'Oryctographie du Gouvernement de Moscou,' 'Hist. Nat. Mosquensis,' and 'Entom. Mosquensis.'*  
By LOUIS B. PROUT and C. DAVIES SHERBORN.

FISCHER DE WALDHEIM, like many of his countrymen, suffered the loss of his manuscripts during the Napoleonic wars. As he says in his *Avertissement* to the 'Oryctographie': "Je m'étois proposé de réunir toutes les notices possibles, pour former une description physique, historique, statistique et pittoresque du gouvernement de Moscou. . . . J'avais réuni beaucoup de matériaux et un nombre considérable de dessins, dont cinquante étaient déjà gravés. . . . L'incendie de Moscou en 1812 m'enleva toutes mes collections, ainsi que les matériaux et les gravures pour l'ouvrage déjà commencé." He then proceeds to point out that his collaborators are dead, he has no longer the energy, and must confine himself to fossils. Therefore "Tout ce qui, dans mon travail, est étranger aux Fossiles, doit être regardé comme addition ou comme hors-d'œuvre, et par conséquent ne saurait aspirer à être considéré comme complet."

It may interest zoologists to be reminded that there are two editions (issues) of the 'Oryctographie,' a fact pointed out by Brunet ('Manuel du Libraire,' ii. 1271), but apparently forgotten since. It is the first edition (1830) to which Fischer refers in his *Avertissement*, although his same words appear in the *Avertissement* appended to the second edition (1837). This first edition seems to be somewhat scarce, and may be described as follows:—  
½ T., T.P. Oryctographie | du | Gouvernement de Moscou, | publiée  
| par | le Directeur de la Société Impériale des Naturalistes de  
Moscou | Gotthelf Fischer-de-Waldheim. | Map | Moscou, | de l'Im-  
primerie d'Auguste Semen, | Imprimeur de l'Académie Impériale  
Médico-chirurgicale. | 1830. | —IX sign. a-f [g'] (folio) Plates  
A-G (maps and sections) I.—XLIV. (fossils) I.—XVI. (Recent  
animals and 1 plant)

These last sixteen plates have distinct interest, and we therefore quote them from the copy in the Library of the Zoological Society of London:—

- I. *Pteromys volans*.
- II. do. do. (dissection).
- III. *Strix torquata*, Fisch.
- IV. *Emberiza aureola*, Pall.
- V. Plate of Land and F.W. Shells (Linn. & Drap.).

- VI. *Lycosa rossica*, Fisch.  
 VII. Spiders (not new).  
 VIII. *Hypera Pimpinella*, Fisch., and *Pelecotoma latreillii*, Fisch.  
 IX. *Hallomenus fasciatus*, Fisch.  
 X. *Sphinx tremula* (type figure of this species); *Triphæna chardignii*, Fisch. (Boisduval, 1828).  
 XI. *Ypomena* (sic) *evonymella* (life-history). [The text on sign. f 2 does not agree with the plate legend.]  
 XII. Papillons hermaphrodites. [The text does not agree with the plate, and that for Plates XI. and XII. seems to have been interchanged.]  
 XIII. *Ctenophora pectinocoris*, F. [Meigen].  
 XIV. *Ceratopogon*; *Loxocera*.  
 XV. *Medetera carnivora*, Fisch.; *M. morio*.  
 XVI. *Cypripedium guttatum*, Sw.

There is no text to these sixteen plates beyond a somewhat full description. They are all lettered "Hist. nat. Mosquensis."

The forty-four plates of fossils are also without text beyond the full description of the plates themselves. For nomenclatorial purposes this first edition naturally has priority. The first edition seems to have been unknown to H. G. Bronn and contains many interesting names.

The second edition (perhaps "issue" best describes it) was published in 1837. The collation is as follows:— $\frac{1}{2}$  T., Portrait of Fischer, T.P. Oryctographie | du | Gouvernement de Moscou, | publiée | par | Gotthelf Fischer-de-Waldheim. | Map | Moscou, | de l'imprimerie d'Auguste Semen, | Imprimeur de l'Académie Impériale Médico-chirurgicale. | 1830=1837. | —XVII, 1-202, Plates A-G (maps &c.), I.-LI. (fossils).

In this issue the nomenclature has been often altered, seven new plates of fossils have been added, and the sixteen plates of recent animals and plants have been omitted.

Fischer's 'Entom. Mosquensis,' according to Hagen (Bibl. Entom. 1862, p. 237), was in octavo form, and can hardly have had anything to do with the 'Oryctographie,' which is a folio with quarto copper plates.

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XXVII.—*Descriptions and Records of Bees.*—L.  
By T. D. A. COCKERELL, University of Colorado.

*Trichocolletes venustus* (Smith).

Three males before me with the following data: Toohey's Hill, Brisbane, Sept. 4, 1911 (*Hacker*; Queensl. Mus. 10); Stradbroke Island, Aug. 28, 1891 (*J. H. Boreham*; Froggatt coll. 202); Sydney, N.S.W. (*Froggatt*, 150).

The hitherto unknown female is represented by a specimen from Brisbane (*Hacker*; Queensl. Mus. 11), collected Sept. 12, 1911. It is less elongated than the male, with the light abdominal bands less distinct. The hair at end of abdomen is sooty, but light on middle of fifth segment. Mandibles red, except apically; face broad; clypeus shining, with strong scattered punctures; hair of face white, but golden on lower margin of clypeus and lower side of mandibles; the pale fulvous hair of vertex, mesothorax, and scutellum tipped with fuscous; scape black, red at base; flagellum obscure reddish beneath, but black basally and bright ferruginous apically; stigma obsolete; knees and tarsi ferruginous, so also tibiae to a considerable extent, but middle and anterior tibiae suffused or clouded with black behind, and the middle ones largely so in front and on outer side; hind tibiae red, with a plumose pale yellowish scopa, which is fuscous only at extreme base; hind spur pectinate with numerous very close-set long teeth, the effect rather like one side of a *Cycas* leaf.

In the obsolete stigma this resembles *Anthoglossa*, but the marginal cell is longer and the second s.m. is narrowed above. The eyes are hairy as in the male.

*Paracolletes marginatus*, Smith.

Victoria, Feb. 1901 (*C. F.*, Turner coll.) ; Cheltenham, Victoria, 1909 (*French* ; Froggatt coll.).

These are males, and are almost exactly like *T. venustus*, except that the eyes are entirely hairless, the first r. n. joins second s.m. well beyond the middle, and the abdominal segments have considerable black or dark fuscous hair above.

I take Smith's male (which bears the type label) as the type of *marginatus*. It seems very probable that *P. marginatus* arose as a mutation of *T. venustus*, but, according to the dates given, they fly at different times of the year, and presumably visit different flowers.

*Paracolletes tuberculatus*, sp. n.

♀.—Length about 11 mm.

Moderately robust; head and thorax entirely black; abdomen dark bluish green, with the hind margins of the segments, except the first, dark reddish; hair of head and thorax dull white, sooty on vertex (the scutellum in the specimen described is hairless). Legs black, with mostly pale hair, but it is shining red on inner side of anterior tarsi and reddish fuscous on inner side of the others; hind tibial scopa stained with fuscous behind and on outer side. Mandibles reddish apically; clypeus shining, with rather dense large punctures; flagellum obscurely reddish beneath except at base; front minutely and densely punctured, except the sides, which are broadly dullish, smooth, almost impunctate; mesothorax and scutellum finely and quite densely punctured; middle of mesothorax with a shining sparsely punctured area; scutellum depressed in middle; postscutellum with an obtuse median tubercle or very prominent angle; area of metathorax finely transversely striated, not carinate; punctures of mesopleura well separated; tegulae piceous and punctate in front, smooth and chestnut-red behind. Wings strongly suffused with reddish brown; stigma and nervures dark reddish; b. n. falling a little short of t.-m.; first r. n. joining second s.m. before the middle; third s.m. narrowed more than half above; hind spur with about five slender spines. Abdomen thinly clothed with pale hair, that at the apex dark fuscous.

♂.—Length about 10 mm.

With the usual sexual differences, but the postscutellum as in the female; sides of face densely covered with appressed silky white hair; cheeks beneath with very long white hair; femora beneath with long white hair, twice as long on the anterior ones as on the others; vertex and thoracic dorsum with sooty hair. Wings paler than in female, but very distinctly brownish; antennæ normal; fourth ventral segment with a very conspicuous and regular light golden hair-fringe.

*Hab.* Cheltenham, Victoria (*French*). The ♀ (=type) is 177 and the male 178 in the Froggatt collection.

Known by the tuberculate postscutellum, but otherwise closely allied to the *P. versicolor* group. From *P. tuberculatus*, *P. frontalis* (Sm.) differs by the smaller size, antennæ testaceous beneath, pale tibial scopa (shining golden above), and in the bright ferruginous mandibles of the male. The face of male *frontalis* is densely covered with hair; in male *tuberculatus* it is densely covered only at the sides. *P. versicolor* differs by the smooth and shining thorax, "with distant fine punctures," and the "silken gloss" of the abdomen. *P. providus* differs by the sparingly punctured thorax and the white tibial scopa. *P. obscuripennis* (♂) differs by the darker wings and the sparsely punctured mesothorax (this is, however, more sparsely punctured in ♂ than ♀ *tuberculatus*); also in the venation and the base of the metathorax.

*Paracolletes tuberculatus insularis*, subsp. n.

♀.—A little smaller and less robust than the type; underside of labrum with much copper-red hair; mesothorax more shining and less densely punctured; area of metathorax with the transverse striæ feeble, scarcely evident; thorax above with some dark hair; first abdominal segment more sparsely, feebly punctured; hind tibial scopa with black hair behind to apex; hair on inner side of hind basitarsi fuscous. The postscutellar tubercle, though short, is quite sharp.

*Hab.* Stradbroke Island, Queensland, Oct. 2, 1911 (*Hacker*; Queensl. Mus. 15).

The hair on the under side of the abdomen is white, not pale yellow as in *P. versicolor*.

*Paracolletes truncatulus*, sp. n.

♀.—Length about 9 mm.

Head and thorax black, abdomen clear red, with a pyri-

form black spot on each side of second abdominal segment ; hair of head and thorax dull white, partly fuscous on thoracic dorsum ; head broad ; clypeus shining, with sparse irregular, partly elongate, punctures ; sides of face with conspicuous white hair ; antennæ dark, flagellum very obscurely brownish beneath except at base ; mesothorax with a minutely tessellate surface but shining, with small scattered punctures ; scutellum shining, with sparse but very distinct punctures ; base of metathorax with a moderately salient transverse ridge, above which the surface is shining ; tegulæ reddish testaceous, dark in front. Wings dusky hyaline, the nervures and quite large stigma dark ferruginous ; marginal cell elongate, obliquely truncate at end and slightly appendiculate ; b. n. meeting t.-m. a little on the outer side ; second s.m. narrowed above, receiving the first r. n. near the end ; second r. n. meeting third t.-c. Legs reddish black, the anterior tibiæ bright red in front ; hind tibial scopa with fuscous hair above toward base ; hair on inner side of hind basitarsus pale yellowish. Abdomen without bands, the hair at apex very pale brownish or brownish white.

*Hab.* Blackwood, Australia, Oct. 16, 1891 (*Froggatt*, 168).

Related to *P. rubellus* (Sm.), but the nervures are not testaceous and the apex of the abdomen is neither dark in hair nor tegument. It has a close superficial resemblance to *Andrena shecodina*.

#### *Paracolletes platycephalus*, Cockerell.

This was described from two females. I have before me a male from Windsor, Victoria (*French* ; *Froggatt* coll. 180). It differs from the female in the usual manner, but also in having the hair of the face and thorax above pale ochreous, becoming a warm reddish on scutellum, but without fuscous ; supraclypeal area and mesothorax dull, opaque ; scutellum somewhat shining ; first two abdominal segments, seen from in front, with a beautiful purple lustre ; pale golden hair on apical part of abdomen. Antennæ long and dark, the flagellum conspicuously moniliform.

#### *Paracolletes maorium*, sp. n.

♀.—Length 11 mm. or slightly more.

Rather robust ; head, thorax, and legs black ; abdomen very dark blue-green, the hind margins of the segments rufous ; hind part of cheeks, and thorax below, with quite abundant long white hair ; on occiput, middle of face, and sides of thorax it is also white, with a slight creamy tinge,

but on front (going lower down at sides), vertex, mesothorax (except in front), and scutellum it is dark fuscous; mandibles red at extreme tip; clypeus shining, sparsely punctured, with a U-like depression enclosing a raised, smooth, ridge; middle of supraclypeal area shining, with a row of punctures; flagellum obscure brown beneath; mesothorax and scutellum brilliantly shining, with sparse feeble punctures; area of metathorax smooth, with a longitudinal median depression, a transverse impressed line running close to the base, and a slight one below that, broadly failing in middle; the large scopa of hind tibia creamy white except at extreme base, where it is fuscous; hair on inner side of basitarsi shining red; hind spur apparently simple, but the compound microscope shows it to be minutely ciliate; tegulae piceous. Wings dusky, the large stigma and the nervures dark reddish; b. n. moderately arched, falling just short of t.-m.; second s.m. narrowed above, receiving first r. n. before the middle; third s.m. elongated, narrowed more than half above, receiving second r. n. about half as far from end as first r. n. is from base of second s.m. Abdomen shining, without hair-bands, its apical hair dense and black.

*Hab.* New Zealand, 1909 (*French*, Froggatt coll. 99).

Related to *P. confusus* (Ckll.) and *P. imitatus* (Sm.), but distinguished by its rather large size, with dark hair on head and thorax above. Distinctive characters are also found in the metathorax and hind spur. It is also related to *P. metallicus* (Sm.), differing in the colour of the hair and in the venation.

*Paracolletes incanescens*, sp. n.

♀.—Length about 11 mm.

Robust, shining pure black; head and thorax very hairy, the hair mostly dull white, but dark fuscous on vertex, upper edge of front, mesothorax except in front and more narrowly behind, scutellum and upper part of mesopleura; mandibles dark red at apex; tongue very broad, the emargination slight; head broad; flagellum red at apex; clypeus shining, sparsely punctured, with a round flattened, even slightly concave disc, across which runs a median obtuse ridge, more or less continued on to the shining supraclypeal area; mesothorax and scutellum with evident but shallow punctures, not dense; area of metathorax brilliantly shining, with a very obtuse transverse ridge; tegulae piceous. Wings faintly dusky; stigma and nervures fusco-ferruginous, the stigma redder than the nervures; b. n. meeting t.-m.; first r. n. joining second s.m. a little before middle; second r. n. joining third

s.m. very near the end; third s.m. broad above, not greatly elongated; hair of femora dull white, of tibiæ and tarsi fuscous, red on inner side of anterior tibiæ; tibial scopa dark fuscous; hind spur with few long slender teeth (long-pectinate). Abdomen shining, without hair-bands, the dense hair at apex black; dorsal surface of abdomen with small but very distinct punctures, especially dense on basal two-thirds of second segment.

♂.—Length 9 mm.

Much smaller and less robust than the female, but structurally similar; face with thin white hair, not at all concealing surface of clypeus; flagellum entirely black; vertex black-haired, but the dark hair of thorax above much less conspicuous than in the female; apical half of hind tibiæ dark chestnut-red; hind tarsi pale ferruginous. Flagellum moniliform.

*Hab.* Female (= type) from Stradbroke Island, Queensland, Oct. 2, 1911 (*Hacker*; Queensl. Mus. 13). Male from Brisbane, April 1, 1912 (*Hacker*; Queensl. Mus. 58).

Related to *P. punctatus* (Sm.) and *P. obscurus* (Sm.). From *P. punctatus* (♀) it is known by the larger size and largely black or dark fuscous hair of head and thorax. From *P. obscurus* it differs by the smooth sparsely punctured clypeus and the colour of the tibial scopa. The male is very like that of *P. thornleighensis*, Ckll., differing by the larger size, the thin white hair of face, the black flagellum, the ferruginous tibial spurs, and the white hair of abdominal dorsum extending only to middle of second segment, beyond which it is short, sparse, and black.

#### *Paracolletes thornleighensis*, Cockerell.

Two males (*Froggatt*, 159) from Thornleigh, N.S.W., 1890–91, show that this species has a distinctly bluish abdomen. The colour is so faint in one of them that I placed it, as I did the type, among the species without metallic tints. The legs are dark reddish to black. Among Smith's species *P. thornleighensis* is nearest to *P. providus*, from which it is known (♂) by the dark hair of thorax above. The brilliantly shining area of metathorax separates it at once from *P. providellus*, Ckll.

The specimen which carries the number 159 also carries a number 30; the original types were marked by the same collector 32, so I infer that he regarded the specimens with evidently bluish abdomens as distinct. It is perhaps possible that there are two species, but with the evidence before me I cannot well separate them.



*Paracolletes euphenax*, sp. n.

♂.—Length 8 mm.

Black, looking just like *P. incanescens* ♂, but abundantly distinct by the following characters:—Face and front densely covered with long cream-coloured hair; flagellum hardly moniliform; mandibles broadly red at apex; hair of head above entirely creamy white, though that of mesothorax and scutellum is dilute brownish; hair of metathorax very long and abundant; abdomen dullish, without evident punctures, and with more and longer hair. Wings considerably shorter; marginal cell longer, more produced apically; b.n. falling short of t.-m.; third s.m. longer, more narrowed above. Anterior tibiæ and tarsi bright ferruginous, with a large black stain behind; the other tibiæ and tarsi black, the last tarsal joint red; middle knees red. On the venter of the abdomen the fourth and fifth segments are broadly fringed with orange-ferruginous hair.

*Hab.* Brisbane, Queensland, Sept. 4, 1911 (*Hacker*; Queensl. Mus. 12).

I thought at first that this might possibly be the male of *P. advena* (Sm.), but I believe it is distinct. The abdominal hair-bands of *P. advena* are wholly wanting.

*Paracolletes fervidus subdolosus*, subsp. n.

♀.—Length a little over 12 mm.

Differing from Smith's description of *P. fervidus* by the strong intermixture of fuscous hair on vertex, mesothorax, and scutellum; the anterior tibiæ bright clear red in front; hair on outer side of anterior tibiæ dull white, of the middle tibiæ dark fuscous, and the hind tibial scopa with a very broad fuscous-black band behind; hair on inner side of posterior tibiæ light ochraceous, of their basitarsi red-golden in front and whitish posteriorly. Wings evidently dusky. Apex of abdomen thickly clothed with greyish-chocolate coloured hair, with ochreous hair on each side of fifth segment, contrasting.

This ought perhaps to stand as a distinct species, *P. subdolosus*, but it must at least be very close to *P. fervidus*. The flagellum is red beneath (except at base), as Smith described for *fervidus*; my notes on Smith's type state that the antennæ are dark, but I now think this was a mistake, due to not looking sufficiently beneath. The broad, shining, well-punctured abdomen of *subdolosus* would at first sight be called black, but it is in fact *very* faintly æneous, with the broad hind margins of the segments dark reddish, exactly as

described for *fervidus*. The first r. n. in *fervidus* enters the second s.m. about the middle; in *subdolos* a little before the middle. Other characters of *subdolos* are: b.n. meeting t.-m.; third s.m. very broad above, receiving second r. n. some distance before the end; clypeus with strong, largely confluent punctures of various sizes; face with pale fulvous hair; mesothorax with large strong punctures, sparse in middle; area of metathorax shining, with a strong and sharp transverse keel, the channel above which is crossed by raised lines or ridges as in species of *Colletes*; the margin of the area is finely striate; tegulæ rufo-piceous; hind spur long pectinate, the teeth numerous but well apart; tubercles with bright orange-fulvous hair.

*Hab.* Cheltenham, Victoria (*French*; Froggatt coll. 175).

*Paracolletes gallipes*, sp. n.

♀.—Length about 11 mm.

Rather slender, black and clear ferruginous red; head seen from in front broad, squarish, black, with the clypeus, supraclypeal area, mandibles (except at apex), and labrum dark red, the lower margin of the clypeus broadly chestnut-red; clypeus and supraclypeal area shining, with coarse irregular punctures, the middle of the clypeus with a smooth raised line; mandibles broad, with a short inner tooth; cheeks small; antennæ light ferruginous, the scape darker and suffused with black; face, except clypeus, densely covered with very pale ochreous-tinted hair; cheeks and occiput with similar hair; thorax also densely covered with pale hair, strong clear ochreous above; thorax black, with the prothorax, scutella, metapleuræ, and metathorax ferruginous; mesothorax shining, with strong punctures, widely scattered in middle; area of metathorax short, concave, smooth and shining; posterior face of metathorax vertical; tegulæ small, light testaceous. Wings hyaline, unusually pointed, almost subfalcate, apically; nervures and the small stigma ferruginous; marginal cell subtruncate at apex; b. n. very straight, almost reaching t.-m.; second s.m. quite large, nearly square, receiving first r. n. very near its base; third s.m. large, broad above. Legs clear ferruginous, with pale hair, that on hind legs abundant, reminding one of the condition in certain fowls. Abdomen rather long and narrow, clear ferruginous, shining, with feeble minute punctures, the apical margins of the segments broadly depressed and pale testaceous; the abdomen has the usual long hair on first segment, short pale hair thinly covering the basal halves of

segments 2 to 4, rather long hair on the depressed apical parts; on fifth segment and apex a thick fringe of very pale brownish hair, but at sides of apex the hair is almost white; pygidial plate large, triangular, obtuse at end. Mouth-parts Colletiform as usual; last two joints of both labial and maxillary palpi very slender, the penultimate joint of labial palpi produced at end beyond the insertion of last joint.

*Hab.* Poonarunna, S. Australia (Nat. Mus. Victoria, 109).

A very singular species, not closely allied to any of those previously described. It will be readily known by its pointed wings and unusual venation. When the male is known it may be necessary to propose a new generic name.

*Paracolletes melbournensis*, Ckll.—Victoria, Sept. 1901 (C. F.; Turner coll.). Variety (♀) with red tarsi: Sydney, N.S.W., Nov. 29, 1910 (Froggatt, 125).

*P. turneri*, Ckll.—Kelvin Grove, Brisbane, Nov. 27, 1911 (Hacker; Queensl. Mus. 8).

*P. advena* (Sm.).—Sunnybank, Brisbane, Sept. 12, 1911 (Hacker; Queensl. Mus. 14).

*P. carinatus* (Sm.).—Bathurst, N.S.W., Feb. 16, 1912 (Froggatt, 147); Nagambie, Victoria, 1909, male (French; Froggatt coll. 80).

*Euryglossa hamatura*, Ckll.—Brisbane, Queensland, Dec. 11, 1911, ♀ (Hacker). In better condition than the type; the abdomen shows broad reddish bands, interrupted in middle, on hind margins of second and third segments, and a very broad entire rust-red band on hind margin of fourth.

*E. subsericea*, Ckll.—Kelvin Grove, Brisbane, Nov. 27, 1911 (Hacker).

*E. reginæ*, Ckll.—Kelvin Grove, Brisbane, Nov. 27, 1911 (Hacker).

*E. neglectula*, Ckll., var. *a.*—A little smaller than the type, with red anterior tibiæ, middle tibiæ red in front, hind tibiæ red at base and largely so in front. Kelvin Grove, Brisbane, Jan. 15, 1912 (Hacker).

*Callomelitta picta*, Sm.—Magnet, Tasmania (Lea).

*Prosopis elegans*, Sm.—Kelvin Grove, Brisbane, Nov. 27, 1911 (*Hacker*).

*P. chrysognatha*, Ckll.—Stradbroke Island, Oct. 2, 1911 (*Hacker*).

*P. aureomaculata*, Ckll.—Kelvin Grove, Brisbane, Jan. 15, 1912 (*Hacker*).

*P. aureomaculata subnubilosa* (Ckll.).—Stradbroke Island, Oct. 2, 1911 (*Hacker*).

*Allodape simillima*, Sm.—Brisbane, Sept. 4, 1911 (*Hacker*).

#### *Bombus trifasciatus*, Smith.

In the course of some work on Asiatic *Bombi* I came to seriously doubt the identity of Bingham's Indian "*trifasciatus*" with the genuine species of that name described by Smith from China. Mr. Meade-Waldo has kindly examined the specimens in the British Museum, with the result of abundantly confirming my doubts. His report is as follows:—"We have two specimens labelled '*Bombus trifasciatus*, Sm.,' by Bingham among his Sikkim material. The exact locality was 'Lintu, Sikkim, 12,500 ft.' We have also got a specimen in very poor condition, but agreeing with them in every respect, from some other source, but with locality 'Sikkim,' from coll. Schlagintweit. I have compared these specimens with true Chinese *trifasciatus* (Smith's type)—all Smith's series is 'Shanghai.' I find that the fourth antennal joint of Smith's type is *very short*, broader than long, whereas the corresponding joint in the Sikkim insects is certainly longer than broad. They have a very different appearance as well. The Chinese insect has a much more *tidy* appearance, the pubescence is shorter and more velvety; in Sikkim specimens it is long and irregular. The colour, too, is different; the black band on Sikkim specimens is much reduced. I do not notice much or any difference in the malar space of the two forms." (*Litt.*, Dec. 6, 1912.)

I possess a Chinese co-type of *B. trifasciatus* from F. Smith's collection; it has the characters indicated by Mr. Meade-Waldo. I also possess a specimen, labelled "Sikkim (*Bingham*)," from the Berlin Museum, and it is evidently Bingham's so-called *trifasciatus*. So far as I can at present determine, it has the characters of *B. pyropygus*,

Friese, found in arctic Siberia. *B. bizonatus*, Sm., is a superficially similar insect, but is easily separated by the entirely black hair of the face and vertex. The malar space also is considerably shorter in *bizonatus* than in the Sikkim so-called *trifasciatus*. I have no authentic *pyropygus*, but I have *B. kirbyellus*, Curtis, of which Friese considers *pyropygus* a subspecies, and on close comparison it seems to agree structurally with the Sikkim bee. It seems therefore that we may safely add *B. pyropygus* to the fauna of the Himalayas—a very interesting extension of range. We have indeed a somewhat parallel case in America, for a male of the arctic *B. kirbyellus* (det. Franklin) was taken by my wife in the arctic-alpine zone on the Truchas Peaks, New Mexico.

*Cælioxyys grindeliæ*, Cockerell.

Santa Fé, New Mexico, Aug. 2, 1912, 2 ♂ (*Cockerell*).

I have described the fourth ventral segment as entire, but the smooth median space is bounded on each side by a tooth, and if the segment is looked at from in front these teeth appear prominent, the interval between them becoming a shallow emargination. In *C. ribis kincaidi* the middle of the apical margin of the fourth segment is truncate, without any teeth.

*Cælioxyys ribis*, Cockerell.

Nova Scotia, ♀ (F. Smith's collection; British Museum).

This agrees with a specimen from Beulah, New Mexico, except that the apical part of the fourth ventral segment is quite closely beset with minute punctures, whereas in New Mexico *ribis* these punctures are much less evident and more nearly confined to the margin of the segment. With only a single specimen it cannot be determined whether there is a Nova Scotian race, distinguished by the character indicated.

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XXVIII.—On the Geographical Races of *Vipera ammodytes*.  
By G. A. BOULENGER, F.R.S.

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[Plate V.]

ON two previous occasions\* I have briefly dealt with the varieties of *Vipera ammodytes*, and expressed my regret at

\* Proc. Zool. Soc. 1903, i. p. 185, and Ann. & Mag. Nat. Hist. (7) xiv. 1904, p. 134. These papers have been entirely overlooked by Dr. E. Schreiber in his second edition of the 'Herpetologia Europæa' (1912).

being unable, through want of material, to deal with specimens inhabiting Bulgaria and Transcaucasia. Having since obtained a specimen from Panagurishta, Bulgaria, through Prof. Kovatcheff, I am able to add Bulgaria to the habitat of the form described by me from Roumania under the name of var. *montandoni*. Col. Kaznakoff, Director of the Tiflis Museum, having been so kind as to send me, on loan, three specimens from Borzom, in the district of Gori, Prov. Tiflis, collected by Dr. G. Radde, I have reached the conclusion that, as I expected from Strauch's description\*, the Transcaucasian form deserves to be distinguished as a further variety, for which I propose the name *transcaucasiana*.

This variety agrees with var. *montandoni* in the scutellation of the snout and in the number of ventral shields, but is distinguished by the dorsal markings, which agree with those of the typical *Vipera aspis*.

Snout narrower than in the typical form, with perfectly vertical loreal region, the canthus rostralis slightly raised. Naso-rostral shield not reaching the canthus rostralis nor the summit of the rostral shield, which is deeper than broad (this shield is transversely divided in the largest of the three specimens, but I regard it as an individual anomaly); rostral "horn" with two or three transverse series of scales between the rostral shield and the apex. Ventral shields 150 to 162. The dorsal zigzag band characteristic of the typical form and other varieties is absent; it is replaced by a series of narrow, transverse, black or dark brown bars which, on some parts of the body, break up into pairs, forming two alternating series; a  $\Lambda$ -shaped dark marking on the occiput; the dark colour on the lower lip broken up by light bars as in the typical form; end of tail pale yellow or yellowish green inferiorly.

I append a tabulation of the particulars of the specimens of *Vipera ammodytes* which I have been able to examine.

1. Total length (in millimetres). 2. Length of tail. 3. Number of scales across body. 4. Number of ventral shields. 5. Number of subcaudal shields (pairs). 6. Number of whorls of scales on rostral "horn." 7. Width of rostral shield. 8. Depth of rostral shield. 9. Number of scales across vertex between supraoculars (I. indicates a frontal shield). 10, 11. Number of upper labial shields (right and left). 12, 13. Upper labial shields (4th, 5th, or 6th) below the eye (right and left). 14, 15. Number of scales round the eye, supraocular excluded (right and left).

\* 'Schlangen des Russischen Reichs,' p. 215 (1873).

Forma *typica*.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. ♂ ..	710	85	23	153	36	3	4½	4	6	9	9	4·5	4	11	11
2. ♀ ..	710	75	22	148	29	3	5	4	5	9	9	4·5	4·5	10	10
3. „ ..	670	75	23	153	29	3	5	4	5	10	9	4·5	4·5	12	10
4. ♂ ..	680	75	21	159	33	4	4	3½	6	9	9	4·5	4·5	11	12
5. „ ..	550	70	21	150	36	3	4	3	6	9	9	4·5	4·5	11	11
6. „ ..	670	80	21	158	33	3	4½	4	6	8	10	4	4·5	11	12
7. „ ..	620	75	23	155	34	4	4	3	6	9	9	4·5	4·5	11	13
8. „ ..	550	65	21	152	33	3	4	3	5	8	8	4·5	4·5	10	11
9. ♀ ..	660	60	25	156	27	3	4	3	6	9	9	4·5	4·5	13	10
10. „ ..	560	55	21	153	28	4	4	3	5	10	10	5·6	5·6	12	12
11. „ ..	500	55	21	148	29	3	4	3	5	9	9	4·5	4·5	11	11
12. „ ..	670	70	23	155	32	3	5	4	5	9	9	4·5	4·5	12	10
13. ♂ ..	760	90	21	155	37	4	5	4	6	10	10	4·5	4·5	13	12
14. „ ..	335	40	21	156	33	2	2½	2	2. I. 2	9	9	4·5	4·5	11	11
15. „ ..	760	95	21	157	27	3	5	4	5	8	9	4	4	10	9
16. „ ..	580	70	21	153	36	3	4	3½	2. I. 2	9	9	4·5	4·5	11	12
17. „ ..	560	65	21	157	35	3	3½	3	2. I. 2	9	9	4·5	4·5	12	13
18. ♀ ..	650	65	21	159	29	3	4	3	7	9	9	4·5	4·5	11	12
19. „ ..	580	55	21	159	24	3	3½	3	2. I. 2	8	8	4·5	4	10	9
20. „ ..	535	55	23	153	30	3	3	3	5	9	8	4·5	4·5	11	10
21. „ ..	420	43	21	154	29	3	2½	2½	5	9	8	3·4	3·4	10	11
22. „ ..	350	40	21	151	34	3	3½	2½	5	9	9	4·5	4·5	11	11
23. „ ..	640	70	21	154	30	3	4	3½	5	9	9	4·5	4·5	10	10
24. „ ..	340	38	21	154	30	3	2½	2½	7	10	10	4·5	4·5	11	11
25. ♂ ..	550	80	21	153	38	3	3½	3	7	9	9	4·5	4·5	11	11
26. ♀ ..	580	60	21	150	31	3	4	4	6	9	9	4·5	4·5	11	10
27. ♂ ..	730	?	21	155	?	3	5	3½	5	9	10	4·5	4·5	12	12
28. „ ..	670	70	22	157	33	3	4½	3½	5	9	9	4·5	4·5	13	12
29. ♀ ..	655	?	23	152	?	4	4	3	6	11	10	4·5	4·5	12	11
30. „ ..	610	70	22	162	37	3	4	3	5	9	9	4·5	4·5	12	12
31. „ ..	665	60	23	163	28	3	4	3	5	9	10	4·5	4·5	12	12
32. „ ..	480	50	21	160	33	3	3	2½	5	9	9	4·5	4·5	12	11
33. ♂ ..	670	80	21	154	36	3	4	3½	5	8	8	3·4	3·4	11	10
34. ♀ ..	500	50	21	160	30	4	4	3	5	11	12	4·5	5·6	11	13
35. ♂ ..	580	75	21	150	35	3	4	3	7	9	9	4·5	4·5	11	10
36. ♀ ..	620	70	21	159	35	3	4	3½	5	9	9	4·5	4·5	11	11
37. „ ..	520	60	21	154	33	3	3½	3½	7	11	10	5·6	4·5	10	11
38. ♂ ..	445	55	21	154	35	3	3	2½	2. I. 2	10	10	4·5	4·5	12	12
39. ♀ ..	320	35	23	147	28	2	2½	2	7	10	10	4·5	4·5	12	12
40. „ ..	540	60	23	157	34	4	4	4	7	10	10	4·5	4·5	12	12
41. „ ..	235	28	23	151	33	3	2½	1½	2. I. 2	9	9	4·5	4·5	11	13

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
42. ♂ ..	740	95	23	155	38	3	4	3½	5	10	10	4·5	4·5	11	11
43. „ ..	610	80	21	149	36	3	3½	3	6	9	9	4·5	4·5	11	13
44. ♀ ..	590	65	23	154	30	3	4	3	6	10	10	4·5	4·5	11	12
45. ♂ ..	470	50	21	159	39	3	3	2½	5	9	9	4·5	4·5	10	10

1-3. Lastnitsch, Styria. 4, 5. Zabukoji, Styria. 6. Redschach, Styria. 7-11. Mahenberg, Styria, 12. Fautsch, Styria. 13. Pischätz, Styria. 14. Bozen, S. Tyrol. 15-22. Carinthia. 23, 24. Friesach, Carinthia. 25, 26. Landskron, Carinthia. 27-30. Villach, Carinthia. 31, 32. Feldkirchen, Carinthia. 33. St. Peter, Carniola. 34. Herkulesbad, Hungary. 35-37. Deva, Transylvania. 38. Dalmatia. 39. Zara, Dalmatia. 40. Vrlika, Dalmatia. 41. Sincar, Dinaric Alps, Bosnia. 42-44. Travnik, Bosnia. 45. Montenegro.

### Var. *montandoni*.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. ♂ ..	555	70	21	158	38	3	4	5	5	9	9	4	4	11	11
2. „ ..	535	65	21	150	36	3	3½	4½	5	9	9	4·5	4·5	11	10
3. „ ..	470	55	21	152	37	3	3½	4½	7	10	9	5·6	4·5	12	12
4. ♀ ..	480	50	21	155	31	2	3½	4	5	9	10	4·5	4·5	11	11
5. „ ..	420	40	21	153	30	3	3	4	5	10	9	4·5	4·5	12	11
6. „ ..	195	25	21	149	33	4	2	2½	7	9	9	4·5	4·5	10	10
7. „ ..	520	60	21	153	32	3	3½	4	6	9	9	4·5	4·5	11	11
8. ♂ ..	510	?	21	155	?	3	4	4½	5	9	9	4	4	11	11
9. „ ..	380	45	21	156	34	3	3	4	7	9	9	4·5	4·5	11	10
10. ♀ ..	600	55	21	154	30	3	4	5	5	9	9	4·5	4	11	11
11. „ ..	490	50	21	155	30	3	3	4	7	9	9	4·5	4·5	10	10
12. „ ..	480	50	21	155	31	2	3½	4	5	9	10	4·5	4·5	11	11
13. „ ..	310	30	21	156	31	3	3	3½	6	9	9	4·5	4·5	10	10
14. „ ..	270	30	21	154	30	3	2½	3½	5	9	9	4·5	4·5	10	11
15. „ ..	305	28	21	160	30	3	2	3	6	9	9	4·5	4·5	10	10

1-6. Greci, Roumania. 7. Cocosu Monastery, Roumania. 8-14. Macin, Roumania. 15. Panagurishta, Bulgaria.

### Var. *transcaucasiana*.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. ♂ ..	605	70	21	160	36	3	4	5	6	10	10	4·5	4·5	12	12
2. „ ..	200	23	21	155	36	3	2	3	8	11	11	5·6	5·6	11	11
3. ♀ ..	370	?	21	162	?	2	2½	3½	7	10	10	4·5	4·5	12	12

1-3. Borzom, Prov. Tiflis.



Var. *meridionalis*.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.
1. ♀ ..	290	33	21	135	27	5	2½	2½	7	10	9	4·5	4·5	11	11
2. „ ..	205	25	21	137	30	4	2½	2	8	9	9	4·5	4·5	12	12
3. ♂ ..	355	45	21	142	34	3	3	3	6	9	9	4·5	4·5	12	11
4. „ ..	340	40	21	146	34	4	3	3	7	10	10	4·5	4·5	14	12
5. ♀ ..	275	35	21	142	27	4	3½	3½	7	9	9	4·5	4·5	12	12
6. „ ..	330	30	28	139	26	4	2½	2	7	10	9	4·5	4·5	11	11
7. „ ..	280	35	21	137	32	4	2½	2½	5	9	9	4·5	4·5	12	10
8. „ ..	210	22	21	138	27	3	2	2½	8	10	10	4·5	4·5	13	13
9. „ ..	230	28	21	137	32	5	2½	2	5	9	9	4·5	4·5	12	12
10. „ ..	275	35	21	145	34	3	2½	2½	8	9	9	4·5	4·5	10	11
11. „ ..	315	25	21	138	24	4	3½	3	7	9	9	4·5	4·5	12	12
12. ♂ ..	260	23	21	133	35	4	3	2½	5	9	9	4·5	4·5	11	12
13. ♀ ..	310	32	21	137	26	3	3	3	7	9	9	4·5	4·5	11	11

1. Tarsos, N. Morea. 2. Xenochori, N. Eubœia. 3-5. Athens. 6. Delos. 7. Tenos. 8. Mykonos. 9. Syra. 10. Adampol, Asia Minor. 11. Lebanon. 12, 13. Syria.

## EXPLANATION OF PLATE V.

*Vipera ammodytes*, var. *transcaucasiana*. Head and anterior part of body of male, natural size, and enlarged side view of head of same.

XXIX.—*Some Notes on the Reedbucks, with a Description of Two new Subspecies.* By GILBERT BLAINE.

THE reedbucks are one of the most widely distributed groups of all the African antelopes. Their range extends over the whole of Africa below a line drawn at about 15° lat. N.

They inhabit grassy uplands where the bush is thin and scattered in the neighbourhood of streams, or wide plains bordering big rivers or lakes, generally consorting together in pairs or in small family parties. I have seen them in the open glades and grassy meadows that intersect dense forest-tracts on a high mountain-range, and also in a flat low-lying plain at the foot of the same mountain-range, where they frequented the borders of a large swamp during the day, forming dry beds in the reeds above the surface of the water, and emerging in the early mornings and evenings to feed on the coarse grass that grew on the adjacent open flats.

In this particular locality they were very numerous, over two hundred being observed grazing together.

The reedbucks of the mountain and those of the plain were quite distinct from one another.

These antelopes are not invariably found near water. I have met them in the dry season scattered all over the great alluvial plain that extends from the edge of the swamps at Meshra-er-Rek westwards for some 70 miles into the Bahr-el-Ghazal country.

Precipitous dry and stony hillsides over which kudu range are also the home of mountain reedbuck. With the exception of forests and deserts it is evident that there are very few localities in which one or another form of these antelopes cannot exist, and consequently many local races of the genus are still to be discovered and described. I have always noticed slight degrees of difference in reedbuck from various localities, and the uniformity of type in each particular case.

With regard to the general geographical distribution of this genus. S. Africa from the Cape as far as the extreme northern limit of the Zambesi watershed on the Tanganyika Plateau covers the range of *Cervicapra arundinum* in the east, while in the west it is said to extend to Angola. Central Africa from Abyssinia southwards as far as the northern edge of the Tanganyika Plateau covers the range of *C. bohor*. *C. redunca*, of which the type specimen was procured in the island of Goree, off the coast of Senegal, by Adanson, and subsequently described by Buffon in 1764, I have reasons for considering distinct from either of the above, based chiefly upon the size of its teeth, which are smaller than those of any other known species. I shall therefore place all the other reedbucks of the Central-African group under the specific name of *bohor*.

There is a reedbuck resembling *C. arundinum* found in open country 25 miles N.E. of Wau, in the Bahr-el-Ghazal Province of the Sudan, of which I have a mounted head in my own collection, and have seen another similar to it, presented by Captain P. E. Vaughan, in the B. M. collection.

This reedbuck is not common, and I was unable to procure a specimen of it on the first occasion that I visited this locality in 1907. But I at once noticed the difference between it and the numerous small red reedbuck of the *bohor* type that are found not only on the alluvial plains to the east between Wau and Meshra-er-Rek, but also along the river-valleys to the west, viz. those of the Pongo and Chell.

On my second visit, in 1910, I shot an adult male of this species, and found that it resembled *arundinum* in its general

grey-brown body-coloration and in the horns being similarly flexed and having soft, swollen, spongy bases, which are not present in fully adult *C. bohor*; but it was smaller and the horns were relatively shorter than in the former species. At Lake Rikwa, which lies to the east of the southern end of Lake Tanganyika in German East Africa, I have shot reed-buck of the *bohor* type, a specimen of which is in my collection.

From these observations it is evident that the ranges of *C. arundinum* and of *C. bohor* overlap.

In the following key the figures given are to be taken as average measurements in millimetres of adult male specimens.

### Key to the *Reedbucks*.

#### Skulls.

- A. Size generally greater, narrower comparatively across the orbits, with the rostrum longer; orbits smaller; horns longer and more hooked forwards at ends.
- a. Size greater, length 290; rostrum longest, length 164; teeth largest, upper dental series 70; horns longest and less abruptly hooked at ends . . . . . *C. arundinum* (including [*C. thomasine*]).
- b. Size smaller; rostrum shorter; teeth smaller; horns shorter and stouter in proportion and abruptly hooked at ends.
- a<sup>2</sup>. Size smallest, length 225; teeth smallest, upper dental series 54; horns shortest, ends hooked strongly forwards and inwards . . . . . *C. redunca*.
- b<sup>2</sup>. Size larger; teeth larger; horns longer.
- a<sup>3</sup>. Less massive and shallower vertically, length 255; upper dental series 63; horns thinner, longer, and more divergent from their bases outwards . . . . . *C. bohor cottoni*.
- b<sup>3</sup>. More massive and deeper vertically; horns shorter and stouter.
- a<sup>4</sup>. Shorter, length 240; upper dental series 58; horns shorter . . . . . *C. bohor ugandæ*.
- b<sup>4</sup>. Longer; horns longer.
- a<sup>5</sup>. Length 255; upper dental series 62; general axis of horns rising above level of frontal plane . . . . . *C. bohor* and *C. bohor*
- b<sup>5</sup>. Length 256; upper dental series 63; horns slightly lyrate, with their general axis depressed below level of frontal plane . . . . . [*wardi*].
- C. bohor nigeriensis*.

B. Size lesser; wider comparatively across the orbits, with the rostrum shorter; orbits very large; horns shorter and straighter, less hooked at ends.

- a. Size larger, length 230; upper dental series 57 .....
- b. Size smaller, length 225; upper dental series 60 .....

*C. fulvorufula* (including  
[var. *subalbina*].  
*C. fulvorufula chanleri*.

#### Skins.

A. Colour greyer, more grizzled and less fulvous; tail very bushy; head and neck fulvous, contrasting with body-colour.

- a. Colour richer and darker, tinged with rufous .....
- b. Colour lighter, with more or less fulvous tinge .....

*C. fulvorufula* and  
[subspecies.  
*C. arundinum* (including  
[*C. thomasiæ*: colour pure grey)].

B. Colour yellower, less grizzled, and more fulvous; head and neck not contrasting with body-colour.

- a. Colour yellowish fawn.  
a<sup>2</sup>. Colour darker; hair longer .....
- b<sup>2</sup>. Colour paler; hair shorter .....
- b. Colour grizzled fawn.  
a<sup>2</sup>. Colour yellower.....
- b<sup>2</sup>. Colour browner.....

*C. redunca*.  
*C. bohor nigeriensis*.  
*C. bohor*, *C. bohor wardi*,  
[*C. bohor cottoni*.  
*C. bohor ugandæ*.

#### *Cervicapra bohor nigeriensis*, subsp. n.

Similar in size to *C. bohor wardi* and larger than *C. redunca*, but with the body-colour of a uniform shade of fawn as in *redunca*.

Colour of hair on head, neck, and upper parts of body light fulvous fawn, slightly darker down the centre of the back and paler on the flanks, where it merges gradually into the white of the belly. Underparts white. A pale dusky stripe down the front of the fore legs. Hair short and close, not waved.

Dimensions of skull:—Greatest length 256 mm.; occiput to nasals 129; nasals 100; orbit to gnathion 139; premaxillaries 63; supraorbital width 110; mean width between orbits 72; vertical diameter of orbits 38; vertical height from alveolar edge of first molar to top of orbit 80; zygomatic width 95; length on palatal suture 139; length of upper dental series 63; central molar 13.5 × 12.

Horns: main axis depressed below the level of the frontal plane; stout at their bases, slightly curved downwards and outwards centrally, the ends being hooked forwards and inwards, but not as strongly as in *C. bohor* or *C. redunca*.

*Hab.* N. Nigeria. Type from Ibi.

*Type.* Ad. ♂ skin and skull. B.M. no. 7. 7. 5. 234.  
Collected and presented by G. B. Gosling.

*Cervicapra bohor ugandæ*, subsp. n.

Size rather smaller than the above, with a shorter skull and shorter horns. Body-colour grizzled, as in *C. bohor wardi*.

Colour of hair as in *C. bohor wardi*, only richer and darker, more brown, and less fulvous.

Dimensions of skull:—Greatest length 234 mm.; occiput to nasals 124; nasals 88; orbit to gnathion 128; premaxillaries 64; supraorbital width 108; mean width between orbits 71; vertical diameter of orbits 38; vertical height from alveolar edge of first molar to top of orbits 75; zygomatic width 98; length on palatal suture 128; length of upper dental series 56; central molar 13 × 12.

Horns short and stout, without a pronounced hook forward at ends.

*Hab.* Ankole, S.W. Uganda.

*Type.* Old ♂ skin and skull. B.M. no. 5. 4. 3. 34. Presented by Col. Delmé-Radcliffe.

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XXX.—*On the Relationship of Gazella isabella to Gazella dorcas, with a Description of a new Species and Subspecies.*  
By GILBERT BLAINE.

SINCE Gray first described *Gazella isabella* in 1846, a difficulty has always existed in distinguishing it from *Gazella dorcas*, and no satisfactory description has hitherto been formulated to show how the two species differ, or by what geographical limits they are separated from one another. The type of *isabella* is said to have come from Abyssinia. It is an immature male, and consists of a skin and a skull which is very imperfect, and Gray's description\* of it is short and rather vague. He subsequently refers to *isabella* as being found both in Egypt and in Kordofan. There are in the B.M. collection four other specimens of gazelles from Abyssinia, two males and two females, with which Gray's type agrees fairly well. They are all adult, and so have longer horns, the tips of which are hooked inwards nearly at a right

\* Gray, Ann. & Mag. Nat. Hist. (1) xviii. pp. 214, 231 (1846).

angle, the horns themselves being more evenly divergent outwards from their bases than is usual in *dorcas*. The skins agree perfectly with that of the type of *isabella*, being of a reddish-fawn colour with distinct darker lateral band, the pelage being short and firm in texture.

It was John Ray who first published a scientific description of *Gazella dorcas* in 1693\*, which he called "*Gazella africana cornibus brevibus*." His description is a very lucid one, and he makes special reference to the outward and inward bend of the horns, which is a well-known character of this species. There is an interesting paragraph in which he mentions a living specimen that D. Willughby saw in the Royal Menagerie at Westminster, which I venture to quote:—"Hæc, nisi fallor, species est, quam D. Willughby in vivario Regio Westmonasteriensi enutritam vidit et descripsit."

No locality is given by Ray for his gazelle, but it must have come from N. Africa, and most probably from Lower Egypt. This opinion is also held by Mr. Walter Rothschild, and I shall therefore assume that place to be the type locality of *dorcas*.

We have therefore Lower Egypt as the type locality of *dorcas*, and Abyssinia as that of *isabella*.

I have made a careful comparison of skins and skulls of this group of gazelles in the B.M. Museum collection, to which has been added a series sent from Tring by Mr. Rothschild. The localities from which they came are Abyssinia, Suakin and the desert west of Suakin, Nakheila on the Atbara River near its junction with the Nile, Wadi Natrun west of Cairo, Kordofan, Tripoli, Biskra, the Central Algerian Sahara, Lake Chad, and Rio de Oro in the extreme Western Sahara. With the material thus provided it has been possible to determine the true relationship of these gazelles to one another.

A comparison of the skulls tends to prove that the gazelles from Suakin on the Red Sea littoral, together with the adjacent Nubian Desert, and a small series from Nakheila, form a distinct group by themselves. *G. isabella* from Abyssinia shows some affinities both to the Red Sea group and to the others, but resembles *dorcas* in skull-characters. It will therefore be classified as a subspecies of *dorcas*.

Of the remainder the extreme Western (Rio de Oro) and Central Saharan specimens appear to be a smaller form of

\* Ray, Quad. p. 80 (1693).

*dorcas*. But the material on which to base this supposition is rather scanty and imperfect.

Before describing the gazelles from the Red Sea and adjacent regions I will endeavour to point out the characters that distinguish them from the *dorcas* group.

The difference lies principally in their skulls.

In placing the skull of a Red Sea gazelle in profile beside that of a *dorcas*, the former appears relatively lower and flatter, with the parietal region less domed, while the latter has its frontal outline rising more abruptly, and the parietal region more prominently domed, and descending in a steeper curve posteriorly. The premaxillaries of the former are straighter and more obliquely directed forwards, while those of the latter have a more vertical downward direction at first, forming an angle of about  $70^\circ$  with the obliquely directed anterior part. Their outline is suggestive of a boomerang.

The gnathion of the Red Sea gazelle is finer and more contracted than that of *dorcas*.

Turning the skulls over to examine their under surfaces it will be seen that the angle formed by the basisphenoid with the palatal plane is more acute in *dorcas*, but in the Red Sea gazelle it is more obtuse, or, in other words, the posterior half of the lower surface is more nearly in line with the anterior half.

In *dorcas* the palate is wider and forms a simple arch, while in the Red Sea gazelle it is narrower, with the palatal surfaces of the maxillaries convex and merging into a central groove anteriorly\*. The alveolar margin is also longer with the molars narrower. The bullæ are smaller.

The horns of *dorcas* are longer and turn upwards and forwards at the tips, but are much more variable in form than those of the other species, which are shorter, but always hooked strongly inwards at the tips at a right angle or less than a right angle.

In colour the Red Sea gazelles are of a bright reddish fawn, the light lateral stripes being distinct and the dark lateral stripe rufous or dusky rufous. The nose-spot is present in most specimens. In *dorcas* the colour is sandy fawn, with an indistinct light lateral stripe, and the dark lateral stripe only slightly deeper in tone than the colour of the back. The nose-spot is rarely present.

Having examined nearly forty skulls, both male and female, of these gazelles and measured many of them, I have chosen

\* This character is also noticeable in *G. d. isabella*, though less pronounced.

	Greatest length.	Occiput to nasals.	Orbit to gnathion.	Depth from lower margin or maxillary at centre of last molar to highest point on parietal suture.	Greatest width across orbits.	Length of upper dental series.	Square measure of central molar.
<i>G. dorcas</i> , Upper Egypt .....	165	89	83	77	77	50	11×9.5
Ad. ♂, Tring Mus.							
<i>G. dorcas</i> , Bishra .....	184	101	91	86	85	55	11×9.5
Ad. ♂, B.M. no. 93. 4. 10. 1.							
<i>G. dorcas</i> , Lake Chad .....	177	94	89	82	81	54	11.5×9.5
Ad. ♂, B.M. no. 7. 7. 8. 209.							
<i>G. dorcas</i> , Kordofan .....	178	94	91	85	82	55.	11.5×9.5
Ad. ♂, B.M. no. 9. 7. 3. 1.							
<i>G. d. isabella</i> , Dembelas, Abyssinia ..	178	100	88	81	81	54	11.5×9.5
Ad. ♂, B.M. no. 69. 10. 24. 101.							
<i>G. littorata</i> , Nubian Desert .....	174	105	88	75	77	56	12×9
Ad. ♂, B.M. no. 11. 10. 29. 8.							
<i>G. l. osiris</i> , Nakheila, Upper Egypt ..	171	94	86	74	73	55	12×9
Ad. ♂, B.M. no. 4. 11. 3. 108.							



a few typical examples from different localities, measurements of which are given in the table (p. 294). Only those are given which I have found by practice to be reliable in showing constant proportions.

*Gazella littoralis*, sp. n.

Rather smaller than *G. dorcas*. General colour soft reddish fawn, with lighter lateral stripe, and dark lateral stripe rich rufous or madder-brown. Under parts white, sharply divided from colour on flanks and on pygal border. Facial markings: central band deep rufous, light facial band white, dark facial band blackish. Nose-spot blackish. Ears very long, from inner lower angle to tip 140 mm., in *dorcas* 125 mm.

*Skull*.—Long and low, with the brain-case flatter and with the parabola from crown to occiput less vertically inclined than in *dorcas*. Basisphenoid more horizontal than in *dorcas*. Palatal surfaces of the maxillaries in the region of the palatine bones convex, but running into a central groove anteriorly, being flattened out above the foramina into two converging flanges, the gnathion being very fine and contracted. Premaxillaries nearly straight. Bullæ small. Upper alveolar row longer than in *dorcas*, with the molars narrower.

Horns shorter than in *dorcas*, evenly divergent from their bases slightly outwards and curving backwards, the tips being sharply crooked inwards in the form of a hook at a right angle or less than a right angle.

*Skull-measurements* (in millimetres) of three adult male specimens, those of the type being placed first:—

Greatest length 174, 174, 167; occiput to nasals 95, 105, 95; orbit to gnathion 88, 88, 84; premaxillaries 55, 48, 53; vertical diameter of orbits 33, 33, 31; depth from lower margin of maxillary at centre of last molar to highest point on interparietal suture 75, 75, 73; greatest width across orbits 77, 77, 77; length of upper dental series 56, 56, 53; square measure of central molar  $12 \times 9.5$ ,  $12 \times 9$ ,  $11.5 \times 8.5$ .

*Hab.* The shores of the Red Sea from Suakin northwards and adjacent desert regions.

*Type.* Ad. ♂, head-skin and skull, B.M. no. 11. 10. 25. 6, from Khorasot, Nubian Desert; collected and presented by W. B. Cotton, Esq.

*Gazella littoralis osiris*, subsp. n.

Similar to *G. littoralis* but much paler in colour, in which

respect it is indistinguishable from *dorcas*. Nose-spot present. Ears long, from inner lower angle to tip 128 mm. Pelage long and soft as in *littoralis*. Horns as in *littoralis*, but bleached in appearance, especially in the hollows between the ridges, as though engrained with sand. In *littoralis* the horns are very black.

Skull-measurements of two adult male specimens, of which the first is the type:—

Greatest length 171, 174 mm.; occiput to nasals 94, 94; orbit to gnathion 86, 87; premaxillaries 50, 54; vertical diameter of orbits 31, 33; depth from lower margin of maxillary at centre of last molar to highest point on interparietal suture 74, 75; greatest width across orbits 73, 77; length of upper dental series 53, 55; square measure of central molar 11.5 × 8.5, 11 × 9.5.

*Hab.* Nakheila, near the junction of the Atbara River with the Nile, Upper Egypt.

*Type.* Ad. ♂ skin and skull, B.M. no. 4. 11. 3. 104, from Nakheila; collected and presented by the Hon. N. C. Rothschild.

### XXXI.—Two new Mammals from the Malay Archipelago.

By ERNST SCHWARZ.

THE name of the Macaque now described has already been published by some accident in my account of Dr. Elbert's collection in connection with the Sumbawa race, referred to as *Pithecus fascicularis* aff. *limitis*. It is for that reason only that I give a diagnosis of the Timor monkey previous to a general account of Herr C. B. Haniel's mammals from that island.

#### *Pithecus fascicularis limitis*, subsp. n.

Skull distinguished from that of *P. f. mordax* from Java by its smaller size, narrower postorbital region, wider zygoma, and weaker canines.

*Colour of type.* General appearance of upper parts dark yellowish olive (about "orangé-jaune 15," 'Code des Couleurs' [Klincksieck et Valette]), the hairs being banded black and dark olive-yellow. Top of head dark olive-yellow, the dark bands of the hairs being less conspicuous. No distinct superciliary black nor whitish stripe; only a few elongated

blackish and greyish hairs above the eyes. Hairs on cheeks whitish grey, with a pale yellow subterminal band and black tip. Limbs light yellowish grey, somewhat speckled with pale yellow; fingers and toes whitish. Tail above blackish, and whitish below. Underside of body pale silvery white.

In one specimen the tail is above dark greyish green, speckled with yellow.

*Skull.* Much smaller and comparatively broader than in *P. f. mordax*. Brain-case broader and more rounded, with shorter postorbital constriction. Supraorbital region much narrower and more rounded laterally. Orbits trapezoid, less rounded than in *mordax*. Rostrum shorter and broader; zygoma wider. Mastoid process more delicate and less projecting. Opening of posterior nares shorter and narrower. Check-teeth, and especially canines, smaller. Incisors comparatively broad.

*Type.* Old ♂. Zoological Museum, Munich. Original no. 19. Collected by C. B. Haniel on May 28th, 1911.

*Type locality.* Lelogana, Timor.

*Specimens examined.* Ten.

*Dimensions of type* (taken on the flat skin):—

Head and body 530 mm.; tail 300.

*Skull:* basilar length 83; palatilar length 44.5; width of brain-case at roots of zygoma 58; mastoid breadth 67; postorbital breadth 57.7; width of zygoma 86; vertical length of canine on anterior edge 20.1; length of upper cheek-teeth series (alv.) 28.9.

The skull of this form, although similar in size to *P. f. fascicularis* from Sumatra, appears to be much more closely related to *P. f. mordax*. Like the Java Macaque it differs from *P. f. fascicularis* in the convex frontal profile, longer postorbital constriction, smaller orbits, and lower occiput.

From the female skull from Sumbawa, in the Senckenberg Museum, Frankfurt-a.-M., above referred to as *P. f. aff. limitis*, the female skull of this form is distinguished by its longer and narrower brain-case.

#### *Arctogalidia bancana*, sp. n.

Most nearly allied to *A. major*, Miller, from the Malay Peninsula, but smaller.

Upperside a mixture of dark brown and creamy buff, with three longitudinal blackish-brown stripes from behind the shoulders. Crown, occiput, back of ears, face except forehead (where the hairs have brownish tips), and vibrissæ deep black; no whitish longitudinal stripe on forehead. Nape

mixed black and ochraceous buff, becoming paler towards the shoulders. Sides of neck distinctly ochraceous buff, contrasted both with the colour of the shoulders and that of the throat, the latter being greyish white slightly tinged with buffy. Underside of body buffy white. Limbs and tail except at base brownish black.

*Skull.* In size similar to that of *A. fusca*, Miller, from Kundur and Bintang, but with much narrower brain-case and zygoma, as well as broader rostrum.

*Dimensions* of flat skin (original no. 88 ; paratype):—

Head and body 590 mm. ; tail 485.

*Skull* (of type): basilar length 91 ; condylo-basilar length 96 ; greatest breadth 52·1 ; mastoid breadth 36·5 ; nasals 21·2 × 9·2 ; intertemporal constriction 13 ; width of brain-case 33·5 ; palatilar length 50 ; palate, greatest breadth (including teeth) 31·8, least breadth (between canines and incisors) 10·4 ; breadth of rostrum across roots of canines 18·5 ; foramina incisiva 4 ; front of  $p_1$  to back of  $m_2$  (alv.) 28·8 ;  $p_4$ , length on outer edge 5·7, breadth 5·1, greatest diameter 6·1.

*Type.* Old ♀ (skull). Zoological Museum, Munich. Original no. 4. Collected by Dr. B. Hagen on June 3rd, 1905.

*Type locality.* Simpang, Banka.

*Specimens examined.* 3 skins without skulls ; 1 skull (old female ; type).

This *Arctogalidia* appears to be most nearly related to *A. major* from Malacca: it may be distinguished by its smaller size and lighter coloration; the sides of the neck, though in general style very much as in that species, are also a little paler. From *A. fusca* this new form differs especially in its more buffy colour. *A. minor*, from Billiton, on account of its much inferior size, needs no special comparison with *A. bancana*.

The skull of *A. bancana* is recognized at once by the comparatively narrow zygoma.

### XXXII.—*New Species of Erycinidæ from Costa Rica.*

By W. SCHAUS, F.Z.S.

#### *Mesosemia cachiana*, sp. n.

♂. Body above fuscous, underneath whitish. Wings bright metallic blue. Fore wings: a round black spot at end of cell ; a curved fine black postmedial line, not extending

below vein 2; apex and outer margin broadly black; some blue irrorations near apex, and traces of a paler subterminal line; costa fuscous grey irrorated with blue. Hind wings slightly incurved below apex and angled at vein 4; termen narrowly black, with some blue irrorations forming a line at anal angle; traces of a fine black subterminal line at apex. Fore wings below: base dark grey; a geminate medial brown line across cell, inangled on median and outbent below it, divided by a grey line; a large black ocellus over discocellular, containing three blue points, circled with an orange-yellow line, outwardly more broadly so and divided by a fine brown line; space below ocellus dark grey, with a fuscous spot and brown lines; a postmedial brown line outcurved around ocellus, then vertical, followed by a whitish-grey shade; outer margin brown, much darker towards costa; a whitish subterminal line from vein 5 to inner margin; a pale blue shade at apex. Hind wings below consisting of alternate brown and blue-grey lines, the basal, subbasal, antemedial, and medial slightly wavy, the last preceded by a brown spot at vein 5; postmedial line straighter, the space beyond to termen brown crossed by an outer blue-grey shade; a similar subterminal line and interrupted marginal line.

Expanse 29 mm.

*Hab.* Cachi.

The female referred in the 'Biologia' to *M. cœlestis*, G. & S., with angled hind wings belongs to this species.

*Mesosemia esperanza*, sp. n.

♂. Body above fuscous clothed with grey hairs. Wings bright blue. Fore wings: a black line across middle of cell; a large round black spot over discocellular, containing a small blue and white spot; a black postmedial line outcurved on costa, then vertical to submedian; outer margin broadly black; a subterminal blue line. Hind wings: a subterminal black line only distinct near apex; a marginal and a terminal fine black line. Wings below grey, lines fuscous brown. Fore wings: a medial line from subcostal to submedian; ocellus containing three blue points, circled with yellow, preceded and followed by dark lines, suffusing between vein 2 and submedian, or separate with a dark spot in space between them; postmedial expanding slightly towards inner margin; a broad outer shade, tinged with reddish brown below vein 4; termen fuscous crossed by a bluish marginal line. Hind wings: a basal, antemedial, and medial line, the last with a black spot edged with whitish at vein 5; a postmedial line; all the intermediate lines whitish grey; outer

and subterminal broader lines, the marginal line fine ; termen and cilia fuscous brown.

Expanse 27 mm.

*Hab.* Limon, Esperanza.

The female, of which only a single poor specimen was found, is greyish white crossed by fuscous lines, placed the same as on underside of male ; underneath the wings are somewhat darker.

· Near *M. dulcis*, Stichel.

*Xenandra nigrivenata*, sp. n.

♀. Body black. Fore wings: base to near middle, inner margin, veins broadly, and a spot on discocellular velvety black ; interspaces from submedian fold to costa greenish slate-colour. Hind wings velvety black ; a large orange-red spot from costa and near base to median and vein 3, extending to near termen. Fore wings below the same, duller. Hind wings below the same, but the dark space greenish slate-colour crossed by black veins.

Expanse 27 mm.

*Hab.* Juan Vinas.

Near *X. vulcanalis*, Stichel.

*Mesene mygdon*, sp. n.

♂. Body fuscous brown. Wings crimson, the outer margins black. Fore wings: base, cell partly, and costa narrowly black ; a broad black line on discocellular ; cilia at apex white. Hind wings: base narrowly black ; inner margin yellow-white, black towards anal angle. Wings below duller red, the outer margins black. Fore wings: the cell entirely black, also beyond it ; the red space narrowest between veins 5 and 6 ; a short outbent black shade below cell and vein 2 ; the inner margin narrowly yellowish.

Expanse 24 mm.

*Hab.* Carillo.

Above like *M. phareus*, Cr., underneath like *rubella*, Bates. A form from Guapiles has the costal margin more broadly black, filling the cell completely, only interrupted by a red line beyond discocellular.

*Phænochitonia ignipicta*, sp. n.

♂. Body and wings black. Abdomen above from near base to near end crimson. Hind wings: costa to beyond middle white ; a crimson space on inner half of wing from close to base to termen, its outer edge incurved, broader in

cell than terminally; inner margin narrowly black. Wings below dark slate-grey, the markings brown-black. Fore wings: three lines across cell, two below it; a line across discocellular to inner margin; a line beyond cell from vein 6 to vein 3; traces of finer outer and subterminal lines. Hind wings: three lines across cell, two above it, and two below it; a line on discocellular; a postmedial line, inset below vein 3; outer and postmedial lines fainter, but more distinct than on fore wings. Cilia of fore wings partly tipped with white.

*Female*.—Body and wings dark grey-brown. Fore wings: a broad orange-yellow fascia from middle of costa to tornus; apical space black; cilia at apex white; fuscous subbasal, antemedial, and medial lines on inner area. Hind wings: fuscous basal, antemedial, medial, and postmedial lines, also a line on discocellular. Fore wings below as on upper side, but inner area slate-grey with fuscous lines. Hind wings below whitish irrorated with grey; the veins grey; the lines as in male but more distinct on paler ground; the subterminal broad.

Expanse, ♂ 20 mm., ♀ 19 mm.

*Hab.* Guapiles.

*Pachythone nigriciliata*, sp. n.

♀. Frons white, shaded with brown above. Vertex fuscous brown. Body above and wings bright brownish red; costa of fore wings and termen finely black; cilia black. Body below yellowish. Wings below yellow-brown, the costa and termen as above, but preceded by some narrow purplish-brown shading. Fore wings: an oblique dark brown shade from costa beyond cell to termen between vein 2 and submedian fold.

Expanse 26 mm.

*Hab.* Carillo, San Mateo.

*Echenais petronia*, sp. n.

♂. Head and thorax brown; abdomen white. Fore wings brown, the markings fuscous brown; subbasal and antemedial spots in cell, and vertical lines below cell; a line across discocellular; a vertical postmedial line from vein 6 to vein 3, then indented to discocellular, and slightly indented to inner margin; a small spot above vein 6 slightly beyond line; large darker brown marginal spots on interspaces. Hind wings: base and outer margin brown; medial space white, widest on inner margin, its outer edge incurved between veins 4 and 2; a faint whitish subterminal line,

lunular from vein 4 to inner margin. Fore wings below, pale greyish brown, the markings similar, finer, more linear, and broken into spots; some whitish shading above submedian beyond lines and at tornus. Hind wings below white; small subbasal and antemedial brown spots; the outer edge of fascia above indicated by a fine broken brown line; termen shaded with brown.

Expanse 15 mm.

*Hab.* San Mateo.

*Nymphidium lenocinium*, sp. n.

♂. Head, thorax, base and tip of abdomen fuscous; abdomen otherwise white. Wings white. Fore wings: costal margin broadly fuscous brown, extending to base of inner margin; the extreme costa bluish white; a fine dark streak on discocellular and minute postmedial line on vein 5; traces of small blue-edged spots in cell and outwardly on costa; outer margin fuscous, its inner edge crenulate; a fine blue subterminal line, lunular to termen from vein 4 to inner margin, followed by a blue shade at vein 6; a terminal blue line, preceded by blue and white shading at tornus and between veins 3 and 4; cilia fuscous, with white spots at apex, between 3 and 4, and just above tornus. Hind wings: base narrowly black; outer margin brown-black, the subterminal line as on fore wing; the termen and cilia white. Wings below white. Fore wings: costal margin broadly fuscous, thickly irrorated with bluish white; cell-spots defined by bluish-white edging; an antemedial, medial, and discocellular spot; a small subbasal spot below cell; small postmedial and outer spots on costa; outer margin fuscous from costa to vein 4; a subterminal white line, defined from below vein 4 by narrow fuscous shadings preceding it and marginal black spots; cilia as above. Hind wings: a subterminal broad fuscous line, interrupted, somewhat lunular; large marginal black spots between veins 4 and 6, 2 and 3, and near anal angle.

Expanse 22 mm.

*Hab.* La Florida, Santa Clara.

*Theope phineus*, sp. n.

Body above fuscous. Fore wings fuscous; cell behind, space below cell to beyond middle of wing, and between veins 3 and 5 to near termen bright blue, a few blue scales



beyond the area described. Hind wings blue; costa and apex narrowly black; termen finely black; inner margin grey; tips of cilia brown-grey. Wings below pale brownish grey; marginal black spots on hind wings, minute towards apex, the largest at anal angle, and below vein 3.

Expanse 30 mm.

*Hab.* Limon.

XXXIII.—*A new Species of Rhysodina (Coleoptera Heteromera).* By K. G. BLAIR, B.Sc., F.E.S.

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[Plate VI.]

AMONGST the Heteromera collected by Mr. G. A. K. Marshall in South Africa and recently presented by him to the British Museum are contained three species of particular interest belonging to the highly anomalous group Rhysopaussidæ (Wasmann). One of these is undescribed, and having regard to the scarcity of the members of this group, both in species and in individuals, and to our very meagre knowledge of them, it appears desirable to describe it.

I place it provisionally in the genus *Rhysodina* of Chevrolat, since, though it differs considerably from the typical *R. mni-zehi*, even more so perhaps than does *Apistocerus wasmanni*, Fairm., for which the author created a new genus, it seems inadvisable, in the present state of our knowledge, to multiply too hastily the number of genera.

*Rhysodina marshalli*, sp. n.

Elongata, rufo-picea, nitida; capite elongato, ante et post oculos constricto, antice valde bulboso; antennis 9-articulatis, sub apice insertis, longitudine capiti eum prothoracis dimidio æqualibus, articulo 1° crasso pyriformi, sequentibus 3 transversis lenticularibus, 5° valde crassiore apice oblique truncato, 6° reniformi dorso-ventraliter expanso, inter lobos pediculato, 7° lenticulari pediculato, pediculo sexti oriendo et utrinque ad lobos hujus laterales per fasciculam pilorum connexo, 8° transverso reticulari, 9° præcedenti simili sed majore, sat oblique lenticulari, apice rugoso-punctato setigero; prothorace elongato, nitido, medio longitudinaliter sulcato, lateribus medio angulatis ante apicem et basin

constricto; clytris elongatis parallelis, sutura elevata, singulo costis tribus ornato, costa subsuturali elevata rotundata, costis humerali atque intermedia obsolete, intervallis biserialim punctatis, punctis versus latera et postice obsolescentibus.

Long. 12 mm.

*Hab.* Salisbury, Mashonaland.

In form and facies this species resembles *R. mnizechi*, Chev., except that the sharp sculpture of the latter is very much smoothed down and rounded, with a marked tendency to obsolescence. It is dark red-brown in colour, smooth and shining; the head is more elongate than that of *mnizechi*, more strongly constricted between the base and the eyes, with the puncturation obsolete; the antenniferous protuberance is much more bulbous, equal in length to the part behind the eyes, the total length of the head being about equal to that of the prothorax. The antennæ are nine-jointed: the first is massive and pyriform, followed by three lenticular perfoliate joints; the fifth is much more massive, obliquely truncate at the apex; the sixth joint is very peculiar, seen from in front it is very strongly transverse and reniform, the two lobes are rather far apart and between them is a short pedicle with which the stalk of the succeeding joint articulates, from each of the lobes arises a stout fascicle of hairs which connects the sixth joint to the seventh, seen from above this joint appears narrower than those on either side of it; the seventh joint consists of a lenticular portion attached by a distinct basal stalk to the sixth and further supported by the fascicles of hairs arising from the lobes of the latter; the eighth again is lenticular, and the terminal joint resembles the eighth but is larger and somewhat oblique, with the apical surface strongly convex, punctured, and setulose. The prothorax compared with that of *mnizechi* has the costæ broad, low, and rounded, so that the space between the two inner costæ is represented by a dorsal median furrow, while that between the discal and lateral costæ is visible only as a shallow depression above the lateral angles. The elytra are about three times as long as together broad, each with a single distinct though rounded costa on the disc; the two rows of punctures between this and the suture, and that bounding it externally, are composed of rather large coarse punctures, in the remaining rows the punctures are much smaller, becoming obsolete behind and to the outside; the humeri are prominent and rounded, with another obsolete costa.

Two examples were taken by Mr. Marshall (Feb. '04 and Jan. '05), crawling up a gate-post.

*R. mnizechi*, Chev., was also represented by two examples from Salisbury, Mashonaland, both taken at light, Feb. 1894.

The structure of the antennæ is essentially similar to that described above, the main points of difference being as follows:—The fifth joint is similar to joints 2–4, and that described by Chevrolat, followed by Westwood, as the sixth is equivalent to the sixth and seventh of *R. marshalli*; the dorso-ventral prolongation of the sixth is not so marked, and the fascicles of hairs supporting the seventh are extended almost completely round it, concealing the junction of the two joints; the seventh of Chevrolat corresponds to our eighth, and his eighth to our ninth; the apical surface of the latter, however, is flat in *mnizechi*. The antenna is therefore complete, and does not lack the terminal joints as supposed by Chevrolat and Westwood.

*Stemmoderus singularis*, Spin., one specimen of which was taken by Mr. Marshall at Salisbury, must also be assigned to this group. It was associated by Spinola, and subsequently by Lacordaire, with *Rhysodes*, as, indeed, was *Rhysodina* by Chevrolat at a much later period. Both these genera, however, have heteromerous tarsi, and, in spite of the difference in facies, the structure of the head indicates that the relationship between them is fairly close. Spinola's species was described upon a single example from Senegal, and no further specimen appears to have been recorded. That captured by Mr. Marshall differs a little from the description and figure of the type in not having the hind legs distinctly longer and more slender than the others; but considering the extremely scanty nature of the material, I do not feel justified in describing it as new.

The example in question was taken at light, so that its capture gives us no information upon the habits of the species. The slender legs and long tibial spurs suggest that it is a good runner, and are perhaps hardly in accordance with the termitophilous mode of life of those species of the group of which anything of the life-history is known.

#### EXPLANATION OF PLATE VI.

*Rhysodina marshalli*, sp. n.  
Antenna viewed from in front,

XXXIV.—*On a Remarkable Gall-producing Psyllid from Syria.* By Professor R. NEWSTEAD, F.R.S., and BRUCE F. CUMMINGS.

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[Plate VII.]

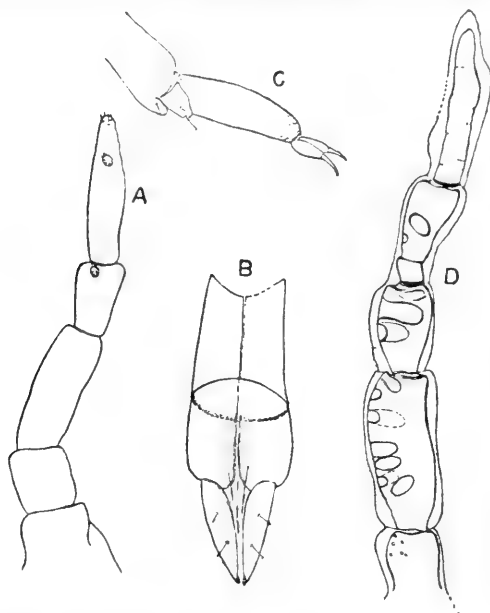
A CORRESPONDENT, Mr. S. Wightman, recently forwarded to the Botanical Department of the British Museum a "pod" which had been gathered in the autumn of 1911 at Brumana, a summer resort in the Lebanon, about eight miles from Beyrout and about 2500 feet above sea-level. On examination this proved to be a large pod-shaped insect-gall, hollow inside and containing an immense quantity of immature "mealy" Psyllids. Unfortunately, efforts to obtain adults and more specimens of this remarkable gall have so far proved unavailing, so it was thought desirable to publish at once a short account of both the gall and the insects, which were the larvæ and pupæ of a species belonging probably to the subfamily Triozinæ, F. Loew. The gall appears to have excited curiosity on account of the living Psyllids discovered in its interior and because it seems, from inquiries made, to be a far from common object in the district in which it was found. The name of the tree on which it grew was not forthcoming, but from the piece of twig accompanying it Dr. A. B. Rendle, F.R.S., was able to say that in all probability the tree was the Tamarind (*Tamarindus indica*, L.).

*The Gall* (Pl. VII.).—It is attached laterally to a slender twig. From the spiral arrangement of the buds the gall is presumably axial and not a bud-gall. The twig measures only 3 millimetres in width and the gall at the base measures 5 millimetres, increasing to 26 millimetres. Total length 180 millimetres, broad cylindrical, but pointed at the tip. Texture (dry) is hard, rugose, brittle, only 2 millimetres thick.

*Larva* (taken from gall).—Form doubtful, but apparently somewhat elongated. Antennæ (fig. A, p. 307) stout; of five segments, of which the third and sixth are the longest and about equal in length; fourth and fifth each with a single circular gland (*sensorium*) beset with a fringe of fine short hairs. Mentum (fig. B) trimerous, relatively stout and about two-thirds the length of the antennæ; terminal segment with a few fine hairs. Legs stout and relatively long; tarsus (fig. C) shorter than tibia; claws long and slender,

with a marked central constriction. Abdomen with a few fine hairs, most numerous at the distal extremity.

*Pupa* with the abdomen somewhat pyriform, being much the widest in the region of the central segments. Antennæ short and stout and very similar in form to that of the larva, the most marked difference being that there are six instead of five segments. Legs practically hairless, similar in form to those of the larva, but larger. Wing-pads well developed. Abdomen nude, and the stigmata apparently obsolete.



One pupa, evidently arrested at the period of ecdysis, shows the sub-lying adult insect, which differs to a marked degree from the pupal stage already described. The antennæ (fig. D) consist, as far as one is able to trace, of five segments only, and they are of a very remarkable form, bearing on the segments 2-5 inclusive a number of clear ovate or ellipsoidal patches surrounded by dark chitinous rings. Legs similar in form to those of the pupa, but the segments are clothed with fine short spines. Tergites of the abdomen each with a series of (? 4) large, isolated, and compound groups of minute spinnerets. Penultimate segment with a large transverse setiferous plate, and immediately beyond it there are two minute ones also clothed with short hairs.

As far as one can ascertain, this insect belongs to the sub-family Triozinæ, F. Loew. Most unfortunately, however, the examples are all immature, the majority being larvæ, while the pupæ associated with them in the interior of the gall are relatively scarce. In the absence of adults it would be unwise to describe the insect as a new and undescribed species, but, so far as one can gather, the immense gall produced by the hordes of Psyllids which were found in its interior is not only strikingly characteristic but much larger than that of any other known gall-producing Psyllid with which we are acquainted.

## EXPLANATION OF PLATE VII.

Giant Psyllid Gall from Syria.  $\times 1$ .

XXXV.—*Apropos of the First Maxillæ in the Genus Dipseudopsis, Walk., Trichoptera.* By BRUCE F. CUMMINGS.

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I AM indebted to Mr. Martin E. Mosely, of London, for the opportunity of examining and describing the peculiar mouth-trophi of *Dipseudopsis*, Walk., a genus of Trichoptera, a specimen of which he was good enough to put into my hands, with the remark that the head appendages seemed to be of a very abnormal kind.

The outer lobe of the first pair of maxillæ proved to be extremely long and pendulous, recalling the proboscis in some Lepidoptera, such as *Zeuzera*, where the two elements remain separate and hang down loosely from the mouth as two elongated lobes.

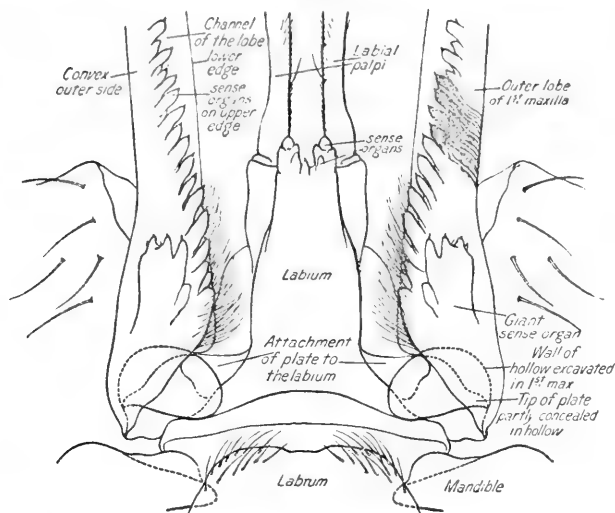
Geo. Ulmer\* has already remarked upon the mouth-parts of *Dipseudopsis*, but as his description does not pretend to be more than summary, the following further details are given in the belief that the structures merit a more extended notice, especially as Ulmer does not draw attention to the likeness of these pendulous maxillæ to those of the Lepidoptera.

The *labial palpi* are 3-jointed, almost as long as the tubular outer lobes of the first maxillæ. The first joint is the longest, trumpet-shaped, the second short, and the

\* Zool. Anz. 1905, Bd. xxviii. p. 56.

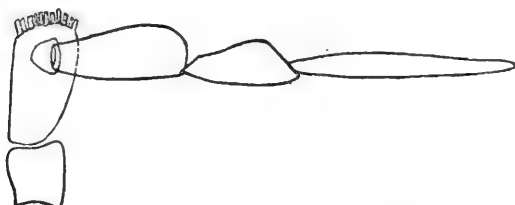
third longer than the second but shorter than the first and composed of numerous subsegments. The *hypopharynx* is covered with small teeth and completed behind by a trans-

Fig. 1.



Mouth-parts of *Dipseudopsis*, seen from above, somewhat diagrammatic, the ends of the labial palpi and maxillary lobes being left out and the palpi of the first maxillæ omitted. The labrum and mandibles have been drawn back to show the labium and hypopharynx; the sense-organs on the lower edge of the maxillary lobes are not shown, and on the right lobe a small area of the convex outer side is given in detail.

Fig. 2.



The palpus of the first maxilla, showing the columnar sense-organs on the second segment.

verse narrow plate. In front numerous hairs and sense-organs. There is no haustellum. The *maxillary palpi* are very long, 5-jointed. The third segment is attached, not to

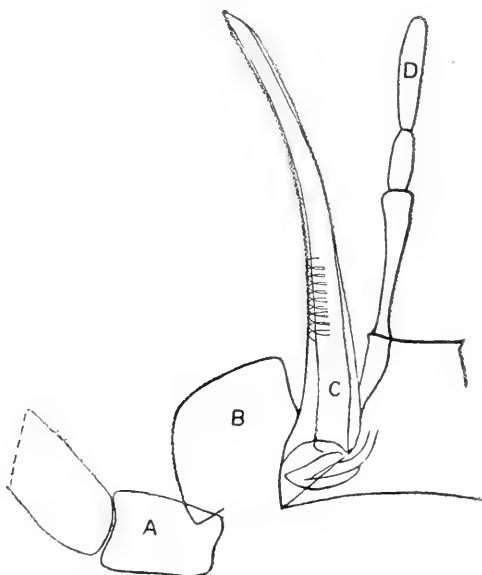
the distal extremity of segment 2, but at a point about two-thirds of the way along the length of the second segment, thus giving the palpus an elbowed appearance, as in some other Trichoptera. On the "elbow"—*i. e.*, the end of the second segment—stands a group of peculiar columnar sense-

Fig. 3.



One of the columnar sense-organs, highly magnified.

Fig. 4.



Mouth-parts of *Dipseudopsis*, diagrammatic.

- A. Two basal joints of palp of first maxilla.
- B. Extension of the gena from the head.
- C. Outer lobe of first maxilla.
- D. Labial palp.

organs. They are about twenty in number, each with a swollen pedestal, a fine central canal, and a somewhat cup-shaped extremity. Terminal joint of the palpus longest and composed of subsegments.



The lobes of the first pair of maxillæ are extraordinary. Each is a long tapering semi-tube, convex on the outside lateral margin, concave on the inside. Along each of the edges which on each side accompany this concavity or channel are a row of peculiar sense-organs—plate-like structures of two sizes, the broad and narrow plates being for the most part arranged alternately, each carrying a small conical papilla at the end. The sense-organs in the Lepidoptera figured by Breitenbach \* and called "saft bohrer" display a considerable resemblance to these, there being the central part homologous with the hair-shaft, and the outer area or "plate" homologous with the outer ring of the hair-shaft.

Each of the pendulous lobes is cross-barred, but the chitin rings are not perfectly regular, for under a high power they are seen to be broken, to branch, and to anastomose. Between the rings the chitin is clear, membranous, and delicate. Part of the proboscis of *Agraulis juno* figured by Breitenbach † bears a strong superficial resemblance to the ringing in the proboscis of *Dipseudopsis*. A small ridge or ledge runs along the inside of the walls of the channel. The walls are grooved and are possibly capable of meeting each other and converting each lobe into a tube. A thick chitinous flap is situated obliquely across the base of each lobe and impinges on the hypopharyngeal plate. At the base, each lobe above is hidden by long hairs and by a giant sense-organ of the same nature as those on the lobe.

#### *Comparison with the Lepidoptera.*

Ulmer at the conclusion of his paper remarks: "dass der Rüssel der Schmetterlinge sowohl seinem Bau wie seiner Entstehung nach von dem rüsselförmigen Anhang der Trichopteren gänzlich verschieden ist." Now the evidence of *Micropteryx* goes to show that the two elements of the proboscis in the Lepidoptera are the homologues of the outer lobes of the first pair of maxillæ. The lobes in *Dipseudopsis* are also probably the outer lobes, as I think the densely chitinous mass on the outside of each lobe is probably a prolongation of the gena of the skull. At all events the maxillary palp arises on its inside margin and at the base of the pendulous lobe.

Again, in some Heterocera, such as *Zeuzera*, *Arctia*, and others, the two elements of the proboscis are not co-adapted,

\* "Beiträge zur Kenntniss des Baues der Schmetterlings-Rüssel," Jenaische Zeitschrift, Bd. xv. (1881-2).

† *Loc. cit.* Taf. iv. fig. 9.

but remain separate as two long tapering lobes, just as in *Dipseudopsis*, which shows further resemblance in the cross-barring and sense-organs of these lobes.

Indeed, many characters point to the close relationship of the Lepidoptera to the Trichoptera. But the mouth-parts of such forms as *Micropteryx* and *Eriocephala* suggest mandibulate ancestors within the Lepidoptera, so that it is extremely improbable that in *Dipseudopsis* the proboscis of the first maxillæ, which have already become elongated, is really homologous with the proboscis of the Lepidoptera. This is a case of parallelism as opposed to homoplasy, having regard to the close phyletic relations of the Lepidoptera and Trichoptera. Other instances of great interest are given by Dr. Willey in his book on "Convergence."

XXXVI.—*Note on the Brachyuran Genera Micippoides and Hyastenus.* By W. T. CALMAN, D.Sc.

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*Micippoides angustifrons*, A. M.-E.

*Micippoides angustifrons*, A. Milne-Edwards, Journ. Mus. Godeffroy, Bd. i. Heft iv. p. 78, pl. i. figs. 2-2 c (1873); Rathbun, Trans. Linn. Soc. London, (2) Zool. xiv. p. 256, pl. xviii. fig. 14 (1911).

*Hyastenus andrewsi*, Calman, Proc. Zool. Soc. London, 1909, p. 711, pl. lxxii. figs. 6 & 7.

The figure published by Miss Rathbun has made me aware that the specimens from Christmas Island which I described under a new name belong, with little doubt, to Milne-Edwards's species. While I cannot attempt to excuse my oversight, it may be of interest to call attention to the characters in which the Christmas Island specimens differ from the original figures. I have also compared them with four old dried specimens in the Museum collection from the Fiji Islands and "Australian Seas," doubtless the specimens examined by Miers in preparing his "Classification of the Maioid Crustacea" (Journ. Linn. Soc., Zool. xiv. p. 658, 1879). In all of these, as in Miss Rathbun's specimen, the rostral spines are less deflexed than in Milne-Edwards's figure, while in the Christmas Island specimens they are rather more slender and more curved upwards at the tip than in any of the others. More important are the differences in the orbital region. Milne-Edwards figured the

upper orbital margin as projecting in a well-marked corner anteriorly and the basal segment of the antenna as hardly longer than broad. In all the specimens I have seen the anterior corner of the upper orbital margin is practically obliterated. In the old Fiji and Australian specimens the basal antennal segment is nearly as broad as long, with the outer margin expanded into a semicircular lobe which forms a distinct floor to the orbit and is separated by a rather narrow gap from the postorbital process. In the Christmas Island specimens, as shown in the figure given in my former paper, the basal segment is not more than three-fourths as broad as long, its outer margin is only slightly convex, and the gap between it and the postorbital process is widely open. The result of all this is that the orbits—which in Milne-Edwards's figures look so tubular as to lead Alcock (Journ. Asiatic Soc. Bengal, lxiv. pt. 2, pp. 167 & 255) to place the genus in his alliance Periceroida, and to suggest that it might "without any unnatural stretch" include *Macrocaloma* and *Entomonyx*—are not only, as Miss Rathbun notes, "much less tubular than in *Macrocaloma*," but are even, in the Christmas Island specimens, less completely enclosed than in some species of *Hyastenus*. There can be little doubt that Miers was right when he placed the genus in the vicinity of *Hyastenus* and *Navia*, and even the resemblance which he admits to the Periceroid *Prionorhynchus* is, perhaps, not more than superficial.

The only other species that I find referred to the genus *Micippoides* is *M. longimanus*, Haswell (Proc. Linn. Soc. N. S. W. iv. p. 444, pl. xxvi. fig. 5, 1879), of which I have examined a specimen. It is hardly possible to regard this species as congeneric with *M. angustifrons*, from which it differs considerably in the structure of the orbital region, but I am not prepared to suggest its proper place in the classification.

#### GENUS HYASTENUS, White.

*Hyastenus*, White, Proc. Zool. Soc. 1847, p. 56.

"*Halimus*, Latreille," Rathbun, Proc. Biol. Soc. Washington, xi. p. 157 (1897); nec *Halimus*, Latreille, Règne Animal, nouv. éd. iv. p. 60 (1829).

The name *Hyastenus*, proposed by White in 1847, was used for half a century, without any ambiguity or inconvenience, to denote a well-known genus of Indo-Pacific Brachyura. In 1897, however, Miss Rathbun proposed to transfer to this genus the name *Halimus*, which had been employed till then for an entirely different genus from

Australian and New Zealand seas. In this change Miss Rathbun has been followed by nearly all writers who have since had occasion to refer to White's genus. Mr. Stebbing, in pt. iv. of his "South African Crustacea" (Ann. S. Afr. Mus. vi. p. 5, 1908)\*, rehearses her argument and adopts her conclusion. It is somewhat surprising, therefore, to find that the supposed necessity for the transference of the name *Halimus* appears to rest upon a mistake.

Miss Rathbun, having shown that the genotype of *Halimus* is *H. aries*, Latreille (Guérin, Iconogr. Règne Anim., Crustacea, pl. ix. fig. 2, 1834?), goes on to add, "*aries* having been put in *Hyastenus*, White, 1847, which genus now becomes a synonym of *Halimus*." Mr. Stebbing repeats this statement, but neither author gives any reference for the supposed transfer of *Halimus aries*. As a matter of fact, I can find no evidence that it ever took place. What did happen was that A. Milne-Edwards in 1872 (Nouv. Arch. Mus. Paris, viii. p. 250) included as one of the species of *Hyastenus* the *Pisa aries* of Latreille ('Encyclopédie Méthodique,' x. p. 149, 1825-28), which is an entirely different species from *Halimus aries* (cf. Milne-Edwards, Hist. Nat. Crust. i. pp. 315 & 341).

### XXXVII.—On African Bats and Shrews.

By OLDFIELD THOMAS.

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#### *Rhinolophus foxi*, sp. n.

Closely allied to *R. deckeni*, Peters, of East Africa, but greyer in colour and with smaller teeth.

Size rather less than in *R. deckeni*. General colour above "drab-grey," below more whitish grey. Nose-leaf and ears apparently as in *deckeni*.

Skull as in *R. deckeni*, but rather smaller; the nasal

\* Mr. Stebbing here places the species he is discussing in his family Blastidæ, the Pisinæ of Alcock's classification; but in pt. v. of the same work (t. c. p. 284, 1910) he removes the same species without explanation to the family Inachidæ (Alcock's Inachinæ). The first position is appropriate to *Halimus*, Rathbun, the second to *Halimus*, Latreille. It seems possible that the names and not the characters of the specimen may have been the cause of this uncertainty.

swelling just about as in *deckeni*, larger than in *ferrum-equinum* and *augur*\*. Bony palate extending slightly further forward, to the level of the junction between  $p^4$  and  $m^1$ . Teeth all slightly smaller than in *deckeni*, the combined length of  $p^4-m^2$ , on outer edge, being 5.3 mm. as against 5.8 in that species. Minute premolar still further reduced, absent on one side in each of the specimens, and on the other quite minute, smaller than an incisor, and placed in the narrow outer angle between the closely jammed canine and large premolar.

Dimensions of the type (the italicised measurements taken in the flesh):—

Forearm 50 mm. (♀ 51).

Head and body 57; tail 29; ear 25; third finger, metacarpal 36.5, first phalanx 16; lower leg and foot (c. u.) 30.

Skull: greatest length to front of canines 22.2; naso-occipital length 18.7; palatal length 3; front of canine to back of  $m^3$  8.5.

*Hab.* Kabwir, Bauchi Plateau, Northern Nigeria. Alt. 2500 feet.

*Type.* Adult male. B.M. no. 13. 2. 5. 1. Original number 45. Collected 14th November, 1912, and presented by Mr. J. C. Fox, of the Cambridge University Mission. Two specimens, male and female.

This is evidently a western representative of *R. deckeni*, but the difference in the general size of the teeth and the reduction of the small premolar prevent my treating it as a subspecies of that bat, from which it is most readily distinguished by its much paler colour.

The British Museum possesses a good example of *R. deckeni* from Tanganiko, near Mombasa, collected and presented by Mr. A. Blayney Percival.

### *Ipistrellus fuscipes*, sp. n.

Near *P. rueppelli* and *pulcher*, but outer incisors larger.

General characters, including the striking contrast between the white or buffy underside and the greyish upperside, as in *P. rueppelli* and *pulcher*, but the membranes rather paler, while the forearms, hind legs, feet, and tail are darker, apparently black, so as to form a marked contrast with the pale

\* I may note here that the bats from Mt. Kilimanjaro collected by Mr. R. Kemp on the Rudd Expedition to East Africa and referred by me to *R. deckeni* (Ann. & Mag. Nat. Hist. (8) vi p. 309, 1910) prove on renewed examination to be examples of *R. augur zambesiensis*, K. And.

membranes. Feet large in proportion. Calcar long, without post-calcareal lobule. Wings to the base of the fifth toe.

Skull rounder and more swollen than in *P. rueppelli*, the frontal region broader and more convex, and the brain-case more inflated. Supra-orbital edges more rounded, less ridged. Bony palate slightly shorter posteriorly.

Inner upper incisors not so long as in *P. rueppelli*, bicuspid, the secondary cusp well developed. Outer incisor much larger than in *rueppelli*, its longer cusp falling not far short of the outer cusp of the inner incisor, its base with two small secondary cusps, postero-internal and postero-external. Small upper premolar well developed, nearly half the height of the large premolar, quite visible from without, in the centre of the fairly large space between the canine and large premolar.

Dimensions of the type (the italicised measurements taken in the flesh) :—

Forearm 36 mm.

Head and body 49; tail 41; ear 12; third finger, metacarpal 34·5, first phalanx 12·6, second phalanx 11; tibia 14; hind foot (c. u.) 10.

Skull: greatest length 13·5; basi-sinual length 9·8; front of canine to back of  $m^3$  4·8.

*Hab.* Uganda. Type from 60 miles W. of Entebbe. Alt. 3700'.

*Type.* Adult male. B.M. no. 6. 7. 1. 5. Original number 1. Collected during the Ruwenzori Expedition by R. E. Dent. Several specimens.

In both *P. rueppelli* and *P. pulcher*\* the outer incisor is minute, and in the type of the latter species, which in other respects seems nearest to *P. fuscipes*, there is no indication of the characteristic contrasted coloration of the limbs and membranes.

#### *Pipistrellus musciculus*, sp. n.

A very minute species with unicolor fur.

Size excessively small, smaller than in any known bat. General colour perfectly uniform umber-brown, slightly darker than Ridgway's "burnt umber," the hairs of the same colour from base to tip; under surface similar, though appearing slightly lighter owing to the glossy tips to the

\* The typical skull of *P. pulcher* has unfortunately been mislaid, but Dobson's statements (especially that in the synopsis of species) as to the size of its incisors are explicit.

hairs. Ears and membranes very dark, practically black. Inner margin of ears strongly convex at base, straight above; outer margin concave above, convex below. Tragus of medium size, its inner margin slightly concave, its outer convex, with an unusually large angular basal lobe. Wings to the base of the toes. Post-calcareal lobule well developed.

Skull very small, rounded, with short broad muzzle and proportionally high brain-case, not so flattened as in *P. minusculus* and other pigmy species. Palate extended posteriorly further than in any of the allied forms.

Upper inner incisor bicuspid, outer incisor probably also bicuspid, but too much worn down in the type for exact description, its tip about equalling the posterior cusp of the inner incisor. Anterior premolar small, not visible externally and not exceeding in height the cingular cusps of the canine and large premolar. Lower incisors small, tricuspid, not crowded or overlapping.

Dimensions of the type (the italicised measurements taken in the flesh):—

Forearm 24.4 mm.

Head and body 40; tail 24; ear 9.5; third finger, metacarpus 23.5, first phalanx 10.6; lower leg and hind foot (c. u.) 15.2.

Skull: greatest length 10.7; condylo-basal length 10.4; basi-sinual length 8; zygomatic breadth 7.5; intertemporal breadth 3.2; breadth of brain-case 5.5; palato-sinual length 4.4; front of canine to back of  $m^3$  3.5;  $p^4$ - $m^2$ , length on outer edge 2.5.

*Hab.* Bitey, Ja River, S.E. Cameroons. Alt. 2000'.

*Type.* Old male. B.M. no. 13. 2. 8. 1. Original number 622. Collected 3rd September, 1912, by Mr. G. L. Bates.

"Caught in hollow palm-leaf stalk—another got away."—*G. L. B.*

This minute species appears to be the very smallest bat as yet described, its forearm being less than an inch in length. It is readily distinguishable from the other small African species by its short stumpy skull, elongated palate, and unicolor fur, the allied species having the fur dark basally and pale terminally. In *P. pusillulus*, Peters, which was described as having a forearm only 25 mm. in length, the skull is as large as in *P. nanus*, to which Dobson was probably right in referring it; its fur, as in the other small species, was bicolor.

*Nyctinomus ansorgei*, sp. n.

Allied to *N. cisturus*, Thos., with which alone it shares a somewhat *Chærephon*-like shape of skull combined with typical *Nyctinomus m*<sup>3</sup> and premaxillæ.

Size about as in *N. cisturus*; distribution of fur as in that species, except that the tail and interfemoral are less hairy; a partly naked patch on the crown behind the junction of the ears, and another across the nape just in front of the shoulders. General colour above dark chocolate-brown, the tips of the hairs paler. Below, succeeding the naked chin, the throat is blackish brown, considerably darker than any other part of the animal, and suggesting the blackish beard of certain species of *Taphozous*; chest and belly lighter brown, the tips markedly lighter than the bases, but not anywhere white. Ears of medium size, rounded; basal keel not specially thickened; antitragus triangular, rounded above, about half as high as long, separated behind by a deep notch. Tragus small, subquadrangular, very different from the triangular pointed tragus of *N. cisturus*. Tail apparently without special glands.

Skull on the whole very similar to that of *N. cisturus*, but rather larger throughout; upper profile not so convex in the frontal region. Teeth as in *cisturus*; anterior upper premolar in the tooth-row, not crowded, but just filling up the space between the canine and *p*<sup>4</sup>. Lower incisors 4. Anterior lower premolar broader than the posterior.

Dimensions of the type (the italicised measurements taken in the flesh):—

Forearm 47 mm.

Head and body 70; tail 32; ear 19; tragus (dry) 1·5; third finger, metacarpus 46, first phalanx 18·6, second phalanx 19; fifth finger, metacarpus 28.

Skull: greatest length 19·2; zygomatic breadth 11·4; interorbital breadth 4·2; mastoid breadth 10·7; front of canine to back of *m*<sup>3</sup> 7·4.

*Hab.* Malange, North Angola. Alt. 1150 m.

*Type.* Adult male. B.M. no. 10. 4. 8. 4. Original number 5. Collected 17th February, 1909, by Dr. W. J. Ansorge.

The Angolan species described by Sr. de Seabra all have the low skull of typical *Nyctinomus*, *N. cisturus* being the only known species combining a high skull with the complete *m*<sup>3</sup> and divided premaxillæ which distinguish *Nyctinomus* from *Chærephon* and *Mops*. From *N. cisturus* the



new species is readily recognizable by its dark beard and non-glandular tail.

*Chærephon nigeriae*, sp. n.

Closely allied to *Ch. plicatus*, conspicuously larger than in any of the members of the *Ch. pumilus* group.

Size about as in *Ch. plicatus*. General colour dark brown throughout, except that the band of fur on the under side of the wing-membrane bordering the body between the humerus and femur is white, strongly contrasting with the uniformly dark body. Wing-membranes dull brown above and distally below, whitish proximally below. Ears and other soft parts apparently all as in *Ch. plicatus*.

Skull about the size of that of *Ch. plicatus*, but much lower and flatter, the upper profile almost straight instead of being strongly sinuate. Teeth as in the Indian species.

Dimensions of the type (measured on the spirit-specimen):—

Forearm 46 mm. (47 in second specimen).

Head and body 68; tail 37.5; ear 21; third finger, metacarpus 47.5, first phalanx 20, second phalanx 21; fifth finger, metacarpus 27, first phalanx 15; lower leg and hind foot (c. u.) 24.

Skull: condylo-basal length 18.6; mastoid breadth 11.5; front of canine to back of  $m^3$  7.7.

*Hab.* Zaria Province, Northern Nigeria.

*Type.* Adult female. B.M. no. 11. 3. 22. 1. Collected and presented by A. C. Francis, Esq. Two specimens.

This bat is no doubt most closely allied to the Abyssinian *Ch. bivittatus*, Heugl., a species we have not got, but which is said to be almost identical with the Indian *Ch. plicatus*. Heuglin's bat has, however, a pale under surface, which would distinguish it from *Ch. nigeriae*, whether it proves to have the high brain-case of *Ch. plicatus* or the more flattened one of the present species.

*The Generic Position of two large Shrews.*

At the instance of Mr. E. Heller I have again carefully considered the question of the generic position of the two giant African shrews described by me as *Crocidura goliath* and *Sylvisorex somereni*, and have come to the conclusion that they might each form the basis of a special genus, on the characters described below.

*Crocidura goliath.*

This shrew is distinguished externally from all its allies by the characters of the fur, which, instead of being close, velvety, and practically all of one sort, as is the case with all *Crocidura*, is long, loose, coarse, and composed of two sorts of hair, an underfur and a number of elongated bristles double the length of the underfur. In fact the fur is more like that of a rat than a shrew. No approximation to the condition in *C. goliath* is shown by any of the large number of species of *Crocidura*.

In the skull most of the characters are those ordinarily correlated with the unusually large size of the animal, such as the great development of the cranial ridges and the roughening of the surface of the bones. In the pterygoid region, however, there is a peculiarity distinctive of *C. goliath*—namely, that there is practically none of the inflation and broadening of the pterygoids so marked in typical *Crocidura*, the ectopterygoids being scarcely perceptible and the entopterygoids being mere thin vertical plates parallel with each other, and with the hamular processes set symmetrically at their tips instead of converging inwards over the mesopterygoid fossa. As a result of the reduction in the dilation of the pterygoids, the whole pterygoid region is much narrower, as may be gauged by the fact that the distance between the notches at the inner ends of the glenoid processes of the two sides is little more than the breadth of either of the glenoid processes themselves, while in *Crocidura* this distance is nearly twice the breadth of each glenoid process.

This character of the breadth between the glenoid notches will readily separate *C. goliath* from any members of *Crocidura*, even where, as is the case in certain large African species, the inflation of the pterygoids is not so marked as it is in the small and more typical species, such as *C. russula* and *C. leucodon*. On the other hand, some of the large Indian species of *Pachyura* have the pterygoid region more like that of *C. goliath*, but these are of course distinguished by their greater number of teeth.

As a generic name for *C. goliath* I would suggest *Præsores*.

*Sylvisorex somereni.*

The moment that *Præsores goliath* is removed from the genus *Crocidura* the reasons which induced me, though with much hesitation, to include in the genus *Sylvisorex* the remarkable species described under the above name fall to the

ground. For Van Someren's shrew shows certain analogies with *P. goliath*, and I argued that if *Crocidura* could vary so widely as to include *goliath*, a similar variation should be allowed in *Sylvisorex*, large as is the gap between *somereni* and the other species. I therefore now propose to create a genus, to be called *Scutisorex*, for *S. somereni*, the chief characters of which would be the long thick fur, quite different from the short velvety coat of *Sylvisorex*, and the great development of the cranial ridges, as compared with the practically smooth unridged skull of *Sylvisorex*. The structure of the pterygoid region is as in *Crocidura*, not as in *Præsores*.

*Sylvisorex ollula*, sp. n.

A large species, with narrow elongated skull.

Size larger than in any known species of *Sylvisorex*, after the removal of *Scutisorex somereni* from the genus. Form slender. Fur soft, velvety; hairs of back about 5 mm. in length. General colour above dark slaty grey, slightly browner and darker than Ridgway's "mouse-grey." Under surface rather paler, the belly inconspicuously tinged with bistre. Ears unusually large, their vertical height from the outer base appearing much greater than in other species. Hands and feet brownish white. Tail rather shorter than the body without the head, slender, finely scaled, uniformly dark grey.

Skull in general shape like that of *S. lunaris*, but much larger; the brain-case high, narrow, not flattened, the muzzle long and slender. A slight sagittal and well-marked lambdoidal crests present, though the specimen is by no means old.

Third unicuspid rather larger than second, fourth nearly equal to second in height, and about two-thirds its area, not crowded or out of line, a space between it and the large premolar.

Dimensions of the type (measured in the flesh):—

Head and body 100 mm.; tail 57; hind foot 16; ear 12.

Skull: condylo-incisive length 24.6; condylo-basal length 23.8; breadth across brain-case 11; front of  $i^1$  to back of  $m^3$  11.1.

*Hab.* Bitey, Ja River, S.E. Cameroons. Alt. 2000'.

*Type.* Adult male. B.M. no. 13. 2. 8. 5. Collected 6th August, 1912, by Mr. G. L. Bates.

This shrew is readily distinguishable from any other *Sylvisorex* by its large size. The skull of the next largest species, *S. lunaris*, from Ruwenzori, is only 22 mm. in condylo-basal length.

XXXVIII.—*Descriptions of new Species of Pyralidæ of the Subfamily Pyraustiniæ.* By Sir GEORGE F. HAMPSON, Bart., F.Z.S., &c.

[Continued from vol. x. p. 573.]

(2 a) *Cliniodes seriopunctalis*, sp. n.

*Margaronia innotata*, Druce, Biol. Centr.-Am., Het. ii. p. 228 (part.).

♂. Head, thorax, and abdomen white, the head and legs tinged with rufous. Fore wing silvery white; the costa tinged with rufous; subterminal and terminal series of black points. Hind wing semihyaline white.

*Hab.* COSTA RICA, Rio Sucio (*Rogers*), 1 ♂ type. *Exp.* 32 mm.

(1 a) \**Heortia polyplagalis*, sp. n.

♂. Differs from *H. dominalis* in the fore wing having only a slight trace of orange at base of inner area; a yellow lunulate spot on each side of discocellulars; a broad pale yellow subterminal patch between veins 7 and 4 and a small quadrate spot further from termen above vein 1.

*Hab.* CELEBES, Palos B., Tawaya (*Doherty*). *Exp.* 50 mm. Type in Coll. Rothschild.

(1 a) *Lepyrodes lacustrinalis*, sp. n.

(Fore legs wanting); fore and hind wings normal.

♂. Head and thorax pale brown; palpi white in front and at tips; sides of frons with white streaks; vertex of head white; tegulæ and patagia with white fascia on outer edge; pectus and base of legs white, the tibiæ and tarsi tinged with fuscous; abdomen dorsally pale brown, with series of white spots, the ventral surface white, with black segmental bands, anal tuft black. Fore wing pale brown with fuscous-edged white markings; a narrow band close to base; a subbasal band from below costa to inner margin; an antemedial band from below costa to inner margin, its inner edge slightly angled outwards on median nervure; two bars in end of cell enclosing a round brown spot between them, the outer bar confluent with a quadrate patch from cell to vein 1; an oblique, rather irregular, wedge-shaped postmedial patch from below costa to vein 4; an oblique conical patch from beyond lower angle of cell to near tornus; a bar from below costa towards apex to vein 5 and a subterminal band from

vein 5 to below 3; cilia whitish, with a fine dark line near base. Hind wing white, with pale brown markings edged with fuscous; an irregular discoidal spot; a postmedial irregular N-shaped band, bent outwards between veins 5 and 2, where it is connected with the terminal band, then retracted to lower angle of cell, then oblique, expanding into a triangular mark below vein 2 and ending in a curved blackish line at tornus; a terminal band expanding into a patch at apex and narrowing to a point at tornus; cilia blackish at base, white at tips.

*Hab.* NEW GEORGIA (*Meek*), 1 ♂ type. *Exp.* 32 mm.

(2 a) *Analyta nigriflavalis*, sp. n.

♂. Head, thorax, and abdomen pale yellow; palpi with black patch at side of second joint; tegulæ, shoulders, patagia, pro- and metathorax with black patches; fore tibiæ with black band; abdomen with black dorsal patch on second and third segments and the anal tuft black. Fore wing pale yellow; a small black spot at base of costa; a rather diffused double black subbasal band; an indistinct orange-yellow spot in end of cell, discoidal bar, and obscure spot below middle of cell; a postmedial black patch from costa to discal fold, then a line bent outwards and waved between veins 5 and 2, with slight streaks before it on the veins, their basal ends connected by a diffused band, with a line from it to inner margin and an elongate patch beyond the line above inner margin; an obscure orange subterminal line oblique below apex, angled inwards at vein 5, then bent outwards and waved. Hind wing pale yellow; an orange-yellow discoidal spot; a postmedial blackish line from costa to discal fold and an oblique line from below angle of cell to above tornus; a black subterminal patch from costa, along which it is bent inwards, to discal fold, with some orange-yellow suffusion below it and a blackish striga from submedian fold to vein 1; cilia with an orange-yellow line near base and white tips.

*Hab.* L. NIGERIA (*Sampson*), 1 ♂ type. *Exp.* 26 mm.

(5 a) *Leucinodes melanoleuca*, sp. n.

♂. Head, thorax, and abdomen white irrorated with some black scales, especially on abdomen except at base; palpi above and sides of frons black; pectus, legs, and ventral surface of abdomen white, the fore tibiæ black. Fore wing white, semihyaline except the marginal areas, which are irrorated with a few black scales; the base largely irrorated

with black and with two indistinct waved black subbasal lines; a discoidal spot defined by a few black scales, its upper part filled in with pale red-brown and with a pale red-brown spot above it below costa; postmedial line represented by a slight brown mark from costa, a curved series of black points on veins 7, 4, 3, 1, and a bar from vein 6 to below 5, with some black irroration just beyond the bar and on termen and above inner margin before termen. Hind wing white, semi-hyaline except the terminal area; some black at base; a pale brownish discoidal spot defined by some black scales and dilated below; two striæ of black scales on inner area towards tornus; a diffused postmedial black spot below costa, followed by minute pale brown and black spots to vein 3, and a larger spot below vein 2; a subterminal pale brown and black shade from below costa to vein 3 and a diffused mark towards tornus; a series of black points and striæ on termen; cilia with dark line at middle to vein 4, where the tips are dark.

*Hab.* PERU, Cerro de Pasco, Huancabamba, 1 ♂ type.  
*Exp.* 34 mm.

(3 a) *Sameodes microspilalis*, sp. n.

♀. Yellow-brown; palpi white at base; pectus brown mixed with grey; abdomen with white segmental lines. Fore wing with small hyaline spots defined by black; two obliquely placed antemedial spots in and below cell; medial spots in and below cell usually with a small elongate spot between them above base of vein 2; small spots beyond the cell above and below vein 6, with others rather nearer termen above and below vein 7 and below veins 5 and 4; some slight black and whitish streaks on costa towards apex; a fine punctiform black terminal line; cilia whitish tinged with fuscous except at base. Hind wing slightly tinged with fuscous towards termen, with hyaline white markings defined by black; the base white, with black line on its outer edge; an oblique medial band from subcostal nervure to vein 1; a spot beyond the cell defined by black on inner side; a black postmedial line with series of small white spots on its outer edge, oblique from below costa to vein 5, excurved to vein 2, then retracted to outer edge of the medial band; a black terminal line; cilia white, with a black line through them. Underside of both wings grey irrorated with fuscous.

*Hab.* MASHONALAND, Salisbury (*Marshall*), 3 ♀ type.  
*Exp.* 22 mm.

(6 a) *Sameodes argentifera*, sp. n.

♀. Head and thorax yellow tinged with rufous, the dorsum of thorax tinged with brown; abdomen ochreous white, with dorsal brown bands except on basal segments, the ventral surface with brown band before the anal tuft. Fore wing yellow suffused with blood-red, leaving a yellow point at base of costa, a subbasal spot on median nervure, antemedial streak in submedian fold, a spot in end of cell, and spots on termen below apex and middle; subbasal black streaks on costa and in cell; the scale-tooth on inner margin tipped with black; an oblique antemedial series of black and silver spots, bent inwards to costa; small black and silver spots at and beyond upper and lower angles of cell, with a small spot above them below the costa; a postmedial series of black and silver spots oblique from costa to vein 7, then inwardly oblique, and the spot in submedian interspace displaced towards base; two silvery streaks below apex, points just before termen above and below vein 5, a small spot above vein 2 and spot at tornus; cilia yellow tinged with red. Hind wing yellowish suffused with fuscous brown; cilia pale yellow, with a slight dark line at middle towards tornus. Underside of fore wing fuscous, the cell at base, a spot in its extremity and the area below it, the costa towards apex, and the terminal area except below apex yellow; hind wing fuscous, with the costal area yellow to beyond middle.

*Hab.* QUEENSLAND, Kuranda (*Dodd*), 1 ♀ type. *Exp.* 16 mm.

(6 b) *Sameodes flavispila*, sp. n.

♂. Head and thorax pale crimson-red, the pectus and abdomen fulvous yellow. Fore wing crimson-red; a large round pale yellow patch, defined by deeper red on medial area from middle of cell to inner margin, and a similar smaller patch beyond the cell between veins 8 and 4. Hind wing pale fulvous yellow.

*Hab.* N. NIGERIA (*Dudgeon*), 1 ♂ type. *Exp.* 14 mm.

(7 a) *Sameodes rufiscripta*, sp. n.

♂. Head and thorax yellow suffused with rufous; palpi deep rufous, white below; pectus and legs white, the fore legs and mid femora suffused with rufous; abdomen yellow, the ventral surface white. Fore wing yellow, the costal area and inner margin bright rufous; antemedial line rufous,

oblique to vein 1, then incurved; a rufous spot in middle of cell and oblique discoidal bar; postmedial line brown, crenulate, bent outwards below vein 5, then oblique and ending at vein 2; a rufous terminal line. Hind wing yellow; postmedial line pale brown, slightly angled outwards below vein 5, then slightly waved to vein 2, where it is bent inwards to below end of cell, and not reaching inner margin; a rufous terminal line.

*Hab.* PERU, Cerro del Pasco, Huancabamba, 1 ♂ type.  
*Exp.* 32 mm.

(8 b) *Sameodes brunneoflavalis*, sp. n.

♂. Fulvous brown; palpi and frons darker; tegulae blackish at sides and extremity, tarsi banded black and white; abdomen with dorsal series of dark points, the third segment with subdorsal points. Fore wing with the costal area fuscous, irrorated with grey to beyond middle; the antemedial line oblique and sinuous; large grey-centred spots in middle of cell and on discocellulars and a smaller spot below middle of cell; the postmedial line crenulate, excurved between veins 5 and 2, where it is retracted to below end of cell, then somewhat excurved again; the terminal area greyish fuscous, narrower at middle; a pale line at base of cilia. Hind wing with blackish discoidal bar; the postmedial line minutely waved, bent outwards between veins 5 and 2, then retracted to below end of cell; a terminal greyish-fuscous band, expanding on apical area and with waved inner edge; a black terminal line and a fine line at base of cilia.

♀ much yellower.

*Hab.* JAMAICA, Newcastle. *Exp.* 40 mm. Types in Coll. Rothschild and B.M.

(8 c) *Sameodes citrostictalis*, sp. n.

♂. Head and thorax red-brown mixed with some pale yellow; abdomen red-brown, with pale yellow segmental bands; palpi at base, pectus, legs, and ventral surface of abdomen white; fore legs brown in front, with pale band at end of tibiae. Fore wing red-brown; two small pale yellow spots in cell, a spot below cell, and two small spots below vein 1; a round brown spot in middle of cell, followed by an oblong yellow spot and brown discoidal lunule with slight pale centre; an oblong yellow spot below middle of cell and small spot above base of vein 2; two small postmedial spots



above veins 7, 6, five rather wedge-shaped spots nearer the cell between veins 7 and 2, and a small spot below end of cell below vein 2, with traces of three small spots beyond them between veins 5 and 2; a fine yellow line at base of cilia. Hind wing pale yellow; a brown discoidal bar; postmedial line sinuous, bent outwards between veins 5 and 2, then retracted to lower angle of cell and not quite reaching inner margin; a terminal brown band narrowing to tornus, with three small yellow spots near its inner edge between veins 5 and 2; cilia chequered yellow and brown.

*Hab.* BOLIVIA, 1 ♂ type. *Exp.* 34 mm.

(8d) *Sameodes diopalis*, sp. n.

♂. Head and thorax pale ochreous mixed with brown; palpi brown except at base; brown bars on frons and between antennæ; pectus and legs white, the fore legs tinged with brown; abdomen white, dorsally tinged with ochreous brown. Fore wing ochreous yellow; the costal area brown; a somewhat diffused brown subbasal line; antemedial line brown, oblique to submedian fold, then erect, with some brown beyond it above vein 1 and somewhat annulate mark below it; a brown annulus in middle of cell and quadrate spot with ochreous bar on it on discocellulars; postmedial line brown, waved, excurved between veins 6 and 2, then retracted to below end of cell and erect to inner margin, the area beyond it brown, with small round ochreous spots above and below vein 7 and between veins 5 and 2; cilia chequered brown and ochreous. Hind wing semihyaline ochreous white; a brown discoidal bar and sinuous line from just beyond lower angle of cell to vein 1; a waved postmedial line, incurved at discal fold and ending on termen at vein 2; a lunulate terminal line expanding into a patch at apex; cilia white, chequered with brown from apex to vein 2.

*Hab.* JAMAICA, Castleton (*Kaye*), 1 ♂; BR. GUIANA, Potaro R. (*Kaye*), 1 ♂ type. *Exp.* 34 mm.

(8e) *Sameodes subcostalis*, sp. n.

Fore wing of male with the basal part of costa slightly dilated and with a slight groove below it, the apex produced.

Head and thorax ochreous yellow, the head and tegulae suffused with red-brown; palpi white except at tips; pectus and legs white, the fore legs suffused with brown; abdomen ochreous suffused with brown, the ventral surface white. Fore wing yellow; the costal area tinged with red-brown; a

slight waved brown subbasal line and curved antemedial line ; a brown annulus in middle of cell and quadrate discoidal patch with yellow bar in centre ; postmedial line brown, slightly incurved below vein 7, then minutely waved, at vein 2 retracted to below angle of cell, with which it is connected by a small brown spot, then oblique to inner margin and slightly excurved at vein 1, the area beyond it reddish brown, with a series of small yellow spots between veins 8 and 2 just beyond the line, the spot at discal fold obsolete ; a punctiform whitish line at base of cilia. Hind wing semihyaline yellow ; a pale brown discoidal bar ; postmedial line pale brown, bent outwards and waved between veins 5 and 2, where it is connected with the brown terminal band, narrowing to a point above tornus ; cilia white, chequered with brownish from apex to vein 2.

*Hab.* U.S.A., California, Colusa Co. (*Walsingham*), 4 ♂, 4 ♀ type ; Shasta Co. (*Walsingham*), 2 ♂. *Exp.*, ♂ 38, ♀ 32 mm.

(8 i) *Sameodes citronalis*, sp. n.

♀. Head and thorax ochreous white mixed with brown ; palpi white, brown towards tips ; pectus and legs white ; abdomen white, dorsally suffused with greyish fuscous. Fore wing lemon-yellow, the base and costal area brownish grey ; antemedial line brown, oblique from costal area to submedian fold, then erect, a brown-defined spot beyond it below vein 1 ; a brown annulus in middle of cell and small brown spot above vein 1 ; a lunulate brown discoidal patch with some ochreous in centre ; postmedial line brown, incurved below costa, then sinuous, excurved between veins 6 and 2, then retracted to below end of cell ; terminal area grey-brown, with yellow spots just beyond the postmedial line above and below vein 7 and small spots between veins 5 and 2. Hind wing semihyaline white, the terminal half suffused with lemon-yellow ; a small brown spot at lower angle of cell ; postmedial line brown, bent outwards and waved between veins 5 and 2 ; a brown terminal band, narrowing to a line below submedian fold ; cilia brownish, with a pale line near base from apex to vein 2, then white, with some brown striae near base.

*Hab.* MEXICO, Oaxaca (*Schaus*), 1 ♀ type. *Exp.* 34 mm.

(8 k) *Sameodes griseicincta*, sp. n.

*Sciorista oriolalis*, Druce, Biol. Centr.-Am., Het. ii. p. 212 (nec Guen.).

Head and thorax red-brown tinged with grey ; palpi

white, brown towards tips; pectus and legs white, the fore tibiæ brown in front; abdomen reddish brown, the ventral surface white. Fore wing yellow irrorated with brown, the basal and costal areas pale brown; antemedial line brown, oblique from the costal area to submedian fold, then erect; rounded brown spots in and below middle of cell, a quadrate discoidal patch, and minute spots beyond and below the lower angle of cell; postmedial line brown, dentate, at vein 2 retracted to below angle of cell; terminal area leaden-grey, its inner edge brown and slightly bent inwards at vein 2, leaving a series of yellow spots just beyond the postmedial line from below costa to vein 2; cilia brownish grey with an ochreous-white line at base. Hind wing pale semi-hyaline yellow; a brown discoidal lunule; postmedial line slight, brown, bent outwards and dentate between veins 5 and 2, where there is some brown irroration before it; terminal area leaden-grey with brown inner edge, not quite reaching tornus; cilia white, with slight brownish spots at base.

*Hab.* MEXICO, Jalapa (*Trujillo*), 1 ♀; GUATEMALA, El Tumbador (*Champion*), 1 ♀; COSTA RICA, Irazu (*Rogers*), 2 ♂, 1 ♀, Caché (*Rogers*), 1 ♂, R. Sucio (*Rogers*), 1 ♂, 1 ♀, Godman-Salvin Coll.; COLOMBIA, Popayan (*Lehmann*), 1 ♂ type. *Exp.* 26-36 mm.

(80) *Sameodes flavibaccata*, sp. n.

*Samea phyllisalis*, Druce, Biol. Centr.-Am., Het. ii. p. 555 (nec Wlk.).

♂. Head and thorax dark brown mixed with some greyish; palpi yellowish white, brown at tips; pectus and legs yellowish white suffused with brown; abdomen brown, ventrally whitish. Fore wing yellowish white, the basal and costal areas suffused with dark brown; antemedial line dark brown, oblique to median nervure, then erect, a brown patch beyond it on inner area conjoined to a spot below the cell; a rounded brown spot in middle of cell and quadrate discoidal patch; postmedial line brown, sinuous, excurved between veins 6 and 2, then retracted to below end of cell; terminal area leaden-grey suffused with dark brown towards inner edge and leaving small yellow spots just beyond the postmedial line above and below vein 7 and between veins 5 and 2; a fine dark terminal line; cilia chequered white and brown. Hind wing yellowish white; a slight brown streak below base of cell; a black-brown discoidal bar; postmedial line incurved at discal fold, excurved between veins 5 and 2, then retracted to below angle of cell and oblique to above

tornus; terminal area leaden-grey suffused with dark brown towards its inner edge and leaving a yellow band just beyond the postmedial line from below costa to vein 2; a black terminal line; cilia chequered white and blackish.

♀. Wings much yellower, the terminal area black-brown with a purple gloss.

*Hab.* GUATEMALA (*Sadler*), 1 ♂ type, Sabo (*Champion*), 1 ♀; V. de Atitlan (*Champion*), 1 ♀; Zapote (*Champion*), 1 ♀; COSTA RICA, Candelaria Mts. (*Underwood*), 1 ♂, Godman-Salvin Coll.; PANAMA, La Chorrera (*Dolby-Tyler*), 2 ♂, 1 ♀; Taboga I. (*J. J. Walker*), 1 ♀; BRAZIL, Pará (*Trumbill*), 1 ♂, Manaos (*Trumbill*), 1 ♀. *Exp.* 18-26 mm.

(9 a) *Sameodes stictoperalis*, sp. n.

♂. Head and thorax dark brown mixed with fiery red and yellow; palpi white at base; antennæ white ringed with brown on basal half; abdomen dark brown and red on dorsum, white at base; pectus, legs, and ventral surface of abdomen white, the fore tibiæ banded with red. Fore wing semihyaline yellow with slight fuscous irroration; the costa dark brown mixed with fiery red, expanding at base to inner margin, at middle of cell into a triangular spot, at end of cell into a discoidal lunule, and at apex into a large semi-circular patch extending to vein 5, with waved inner edge and with red-edged yellow spots on it below veins 8, 7, 6; traces of an antemedial line strongly excurved above inner margin and of an oblique waved postmedial line; small brown and red spots on termen at veins 4, 3, 1 and a larger spot at vein 2. Hind wing semihyaline yellow with slight fuscous irroration; a faint spot at upper angle of cell and black point at lower angle; traces of an irregularly waved postmedial line; a fiery red and brown patch at apex, small terminal spots at veins 5, 4, 3 and larger spots at vein 2 and tornus.

*Hab.* PERU, Huancabamba, 2 ♂ type. *Exp.* 36 mm.

(11 a) *Sameodes furvipicta*, sp. n.

♂. Head and tegulæ brownish ochreous; thorax and abdomen pale grey-brown, the latter whitish at extremity; palpi blackish above and white below, the tips yellow; pectus, legs, and ventral surface of abdomen white, the fore legs tinged with brown. Fore wing grey-brown with a leaden gloss; the base of costal and inner areas fulvous red; the costa pale yellow; an antemedial white spot defined by

fulvous red from costa to below the cell ; a medial white band defined by fulvous red from costa to above inner margin, formed by two spots separated by a red streak on median nervure ; a postmedial white spot defined by fulvous red from costal area to vein 3 ; the terminal area yellow except at apex and expanding between veins 6 and 2. Hind wing with the basal half fulvous red ; a large hyaline white patch beyond the cell and an oblique spot below end of cell ; a dark postmedial band tinged with leaden-grey ; the terminal area yellow, narrowing to tornus ; the inner margin yellow.

*Hab.* DUTCH N. GUINEA, Snow Mts., Up. Setekwa R. (*Meek*), 1 ♂ type. *Exp.* 22 mm.

(15 a) *Sameodes roseocinctalis*, sp. n.

♂. Head white ; palpi and antennæ fulvous ; thorax yellow suffused with pink ; pectus rufous ; legs black, the tarsi white ; abdomen yellow. Fore wing pale yellow ; the costal area pink ; the terminal area pink, rather broad at apex, narrowing to a point at tornus. Hind wing ochreous white. Underside of fore wing with the costa black irrorated with white to towards apex ; hind wing with the costal area tinged with pink, the base of costa white irrorated with black.

*Hab.* CAPE COLONY, Rosmead (*S. Juby*), 1 ♂ type. *Exp.* 22 mm.

(5 a) *Thliptoceras xanthocraspia*, sp. n.

♀. Head, thorax, and abdomen yellowish white mixed with some reddish brown ; pectus, legs, and ventral surface of abdomen white. Fore wing pale yellow suffused with reddish brown and dark brown, the apex and termen yellow ; a triangular yellow patch from middle of costa to just below the cell ; an indistinct dark postmedial line, excurved from below costa to vein 3, then retracted to lower angle of cell. Hind wing yellowish white faintly tinged with brown.

*Hab.* TRANSVAAL, White R. (*Cooke*), 1 ♀ type ; NATAL, Victoria Distr. (*Gooch*), 2 ♀. *Exp.* 16 mm.

(3 a) *Archernis albicostalis*, sp. n.

Palpi with the third joint very long ; fore wing with the termen excurved at middle, then excised.

♀. Head white ; palpi with some dark scales on second joint above ; thorax pale brown, whitish in front ; abdomen pale brown ; pectus, legs, and ventral surface of abdomen

white. Fore wing pale brown, the costal area white to near apex; a quadrate white spot in end of cell conjoined to the costal area; cilia white at base. Hind wing pale brown, the costal area white to near apex; cilia whitish at base. Underside of both wings white.

*Hab.* BORNEO, Sandakan (*Pryer*), 1 ♀ type. *Exp.* 28 mm.

(11) *Archernis fulvalis*, sp. n.

♂. Head and thorax fulvous yellow; pectus, legs, and abdomen yellowish white. Fore wing pale fulvous yellow; traces of an oblique, waved, rufous antemedial line from subcostal nervure to submedian fold, with more prominent spot below the cell; a brown discoidal spot; traces of a waved postmedial line, incurved from below costa to vein 5, excurved to vein 2, then retracted to below end of cell and oblique to inner margin. Hind wing pale yellow; the underside with slight brown point on upper discocellular, a postmedial series of brown points incurved from below costa to vein 5, excurved to vein 3, then retracted to below angle of cell.

*Hab.* SOCIETY IS. (*J. J. Walker*), 1 ♂ type. *Exp.* 28 mm.

(1 a) *Megastes meridionalis*, sp. n.

♂. Head and thorax pale ochreous mixed with red-brown; abdomen brown with some whitish at base of dorsum. Fore wing whitish, the basal area except towards inner margin, the costal area, and the terminal area suffused with pale reddish brown; some dark brown at base and on outer part of the basal brownish area; antemedial line black-brown, oblique and sinuous to median nervure, then incurved, an elongate brown spot beyond it in submedian fold, and a brown-defined spot below vein 1; a round brown spot in middle of cell and diffused discoidal patch; postmedial line brown, obliquely excurved from costa to vein 6, incurved at discal fold, excurved and waved between veins 5 and 2, then retracted to below end of cell and oblique to inner margin, small brown spots in its sinus between veins 5 and 3, defined on outer side by a maculate whitish band, with slight dark marks on its outer edge and with some whitish before it in the sinus. Hind wing semihyaline white; a small brown discoidal spot; postmedial line maculate from costa to discal fold, then slight and bent outwards between veins 5 and 2, where it terminates; some brownish on termen from apex to vein 3.

*Hab.* ARGENTINA, La Plata, 1 ♂ type. *Exp.* 34 mm.

(1 c) *Megastes brunnealis*, sp. n.

♀. Head and thorax grey-brown mixed with rufous; palpi, pectus, and legs grey-brown; abdomen grey-brown, with some rufous at base of dorsum. Fore wing rufous slightly suffused with brown, the basal area except towards inner margin, costal area, and the terminal area grey-brown; antemedial line fuscous, wavy; brown annuli in and below middle of cell, a quadrate discoidal patch, and some dark suffusion beyond lower angle of cell; postmedial line dentate, oblique to vein 6, at vein 2 retracted to below angle of cell and oblique to inner margin, a series of hyaline lunulate spots beyond it from below costa to vein 2 and beyond the retracted portion; the dark terminal area expanding widely on inner area. Hind wing semihyaline white tinged in parts with brown; brown points at middle of discocellulars and lower angle of cell; postmedial line brown, wavy, bent outwards between veins 5 and 2, then retracted to below angle of cell and oblique to tornus, the area beyond it brown, leaving a lunulate hyaline band beyond the line.

*Hab.* JAMAICA, Prattville, 1 ♀ type. *Exp.* 52 mm.

(1 d) *Megastes septentrionis*, sp. n.

*Megastes praxiteles*, Druce, Biol. Centr.-Am., Het. ii. p. 215 (part.).

Head, thorax, and abdomen ochreous mixed with red-brown. Fore wing ochreous, the basal and costal areas suffused with reddish brown; antemedial line brown, excurved below the cell and slightly angled inwards at vein 1, brown annuli beyond it in and below cell, and a brown-defined mark below vein 1; a large quadrate brown discoidal patch; postmedial line brown, obliquely incurved from costa to vein 5, slightly bent outwards and wavy to vein 2, then retracted to lower angle of cell, and oblique and sinuous to inner margin, a series of spots beyond it defined by a wavy brown subterminal line from costa to vein 2 and a brown mark below vein 2; a slight brown terminal line. Hind wing ochreous; a subbasal brown bar below the cell; an antemedial line from cell to inner margin; an ochreous discoidal lunule defined by brown; postmedial line brown, oblique and slightly wavy to vein 6, bent outwards and wavy between veins 5 and 2, then retracted to lower angle of cell and oblique to above tornus, a series of spots beyond it defined by an irregularly wavy subterminal line; a brown terminal line.

*Hab.* MEXICO, Jalapa (*Trujillo*), 1 ♂; GUATEMALA, Las Mercedes (*Champion*), 1 ♀ type, Godman-Salvin Coll. *Exp.*, ♂ 42, ♀ 48 mm.

(5) *Omphisa caustalis*, sp. n.

Antennæ of male laminate.

♂. Head rufous mixed with whitish; palpi white at base; thorax deep red-brown with whitish spots on pro- and meta-thorax; pectus and legs white, the fore tibiæ with fuscous band at extremity; abdomen rufous, with dorsal series of small pure white spots, the basal segment with two spots, the penultimate with three, the ventral surface white except at extremity. Fore wing deep rufous, the costal area except at base and the terminal area whitish tinged with rufous; an indistinct, curved, red-brown, antemedial line, defined by whitish on inner side except towards inner margin; a small hyaline spot towards extremity of cell; postmedial line brown, wavy, incurved at discal fold, below vein 3 retracted to lower angle of cell, then oblique, with large, irregular, whitish patch before it beyond lower end of cell and small spots beyond it between veins 8 and 3 defined by brown, the spot below vein 7 larger, below vein 2 defined by yellowish on outer side and with slight yellowish mark on inner side; a slightly wavy brown terminal line. Hind wing whitish tinged and irrorated with rufous, leaving the base and a medial band whiter; an oblique deep brown line before the medial band from the discoidal spot to near tornus; postmedial line bent outwards and minutely wavy between veins 5 and 2, then retracted towards lower angle of cell, defined by white on outer side towards costa and with small brown-edged spots beyond it between veins 5 and 2; a slightly wavy brown terminal line; cilia white tinged with rufous, intersected by rufous and with rufous patch towards tornus. Underside white; fore wing with small fuscous annuli in cell and on discocellulars, the postmedial line represented by incomplete fuscous annuli; hind wing with fuscous discoidal annulus and maculate, postmedial, irregular line.

*Hab.* UGANDA, Ketoma (*Doggett*), 1 ♂ type. *Exp.* 32 mm.

Genus PYRALAUSTA, nov.

Proboscis well developed; palpi porrect, the second joint extending about twice the length of head and fringed with long hair below, produced to a point in front, the third long,



naked, acuminate; maxillary palpi triangularly scaled; frons with tuft of hair; antennæ of female ciliated; tibiæ with all the spurs long. Fore wing triangular; veins 3 and 5 from near angle of cell; 6 from below upper angle; 7 straight and well separated from 8, 9; 10, 11 from cell. Hind wing with veins 3, 4, 5 from angle of cell; 6, 7 from upper angle; 8 anastomosing with 7 to two-thirds of wing.

*Pyralausta bivialis*, sp. n.

♀. Pale cupreous brown; palpi white at base; pectus, mid and hind legs, and ventral surface of abdomen white. Fore wing with oblique white antemedial band from subcostal nervure to inner margin, defined by a brown line on outer side; a white discoidal lunule; an oblique white postmedial band from just below costa to inner margin, defined by a brown line on inner side and slightly excurved at middle; a terminal series of fuscous points. Hind wing whitish suffused with cupreous brown, especially towards termen; an oblique whitish postmedial band, defined on inner side by a slight brown line; a slight fuscous terminal line.

*Hab.* BORNEO, Sarawak (*Wallace*), 2 ♀ type. *Exp.* 22 mm.

(6 a) *Evergestis canalesialis*, sp. n.

Head and thorax black mixed with grey and white; palpi white at base; sides of frons white; abdomen black irrorated with whitish and with white segmental lines, the ventral surface greyer. Fore wing black irrorated with ochreous white; slight white marks at base of cell; antemedial line white, slightly angled inwards at submedian fold; medial line white, slightly angled outwards in cell and inwards at vein 1; two more or less distinct white discoidal points; postmedial line white, oblique from vein 5 to submedian fold, then outwardly oblique; subterminal line white, oblique towards costa, angled inwards and more or less obsolescent at discal fold, excurved at middle, and interrupted at submedian fold; cilia chequered black and white and with a black line near base. Hind wing blackish, the costal area whitish to beyond middle; postmedial line white, slightly excurved at vein 5 and ending at submedian fold; a subterminal white bar between veins 4 and 2; cilia chequered blackish and white and with a blackish line near base; the underside with some white in, below, and beyond the cell, a black discoidal lunule, the postmedial line continued to inner

margin and angled inwards at discal and submedian folds, some white marks just before termen.

*Hab.* SPAIN, Castille, Canales (*Chapman*), 2 ♂, 2 ♀ type.  
*Exp.* 20 mm.

(3 a) *Ischnurges rhodographalis*, sp. n.

Head and thorax ochreous suffused with pink; legs whitish; abdomen ochreous dorsally suffused with pink, irrorated with a few dark scales, and with slight white segmental lines. Fore wing yellow irrorated with pink; the costal area suffused with pink, the costal edge white; a diffused, erect, pink antemedial line; a dark point in cell towards extremity and discoidal bar; postmedial line pink, diffused, slightly curved from costa to vein 3, then bent inwards to below end of cell and erect to inner margin; the terminal area suffused with pink, broadly at costa, narrowing towards tornus; cilia pale yellow. Hind wing pale yellow; a slight curved pink postmedial line from costa to vein 2; the terminal area tinged with pink, broadly at apex, narrowing to a point at vein 1; cilia yellowish white.

*Hab.* BR. E. AFRICA, Eb Urru (*Betton*), 1 ♂, 1 ♀ type.  
*Exp.*, ♂ 20, ♀ 22 mm.

(9 a) *Hyalobathra inflammata*, sp. n.

♀. Head, thorax, and abdomen crimson-red; antennæ tinged with brown. Fore wing crimson-red, the costa fuscous; antemedial line fuscous, oblique to submedian fold, then inwardly oblique, a small spot just beyond it in cell and a discoidal bar; postmedial line fuscous, dentate and produced to streaks in the interspaces from costa to vein 2, below vein 4 bent inwards to below end of cell, then oblique to inner margin; a terminal line and the cilia fuscous. Hind wing crimson-red; a terminal line and the cilia from apex to vein 2 greyish fuscous, then the cilia whitish.

*Hab.* JOBI, Ansus (*Doherty*), 1 ♀ type. *Exp.* 38 mm.

(1 a) \**Azochis camptozonalis*, sp. n.

♀. Ochreous white; palpi black towards tips; abdomen with black dorsal bands on two medial segments. Fore wing with short subbasal black streak below costa and two spots above inner margin; an antemedial line oblique from costa to vein 1, then bent inwards to inner margin; a large spot in middle of cell and an oblique discoidal bar; the postmedial line thick, very oblique from middle of costa to

vein 5, then excurved to vein 3, where it is retracted to lower angle of cell, then very oblique and broad to inner margin; short subterminal streaks above veins 6, 7, dentate spots above veins 3, 4, 5, and a spot from above vein 2 to just above inner margin; cilia pale fulvous, with a series of black points. Hind wing semihyaline, with black discoidal spot; a postmedial spot between veins 5 and 6, with an excurved line from its outer edge to vein 3; two subapical points, a double spot on vein 5 and point below 4, and a bar between veins 2 and 1; a small spot on middle of inner area; cilia pale fulvous.

*Hab.* ECUADOR, Paramba (*Rosenberg*). *Exp.* 42 mm. Type in Coll. Rothschild.

(5) *Azochis cubanalis*, sp. n.

♂. Head and thorax red-brown mixed with whitish; palpi orange, white at base; tegulæ with black tips; patagia with black spots at base and blackish tips; pectus and legs white, the latter streaked with brownish, the fore tibiæ with black band; abdomen white, with dorsal patch of deep red suffusion on second to fifth segments, the anal tuft with fuscous mixed. Fore wing white; the basal area suffused with brown, a basal black spot on costa, subbasal spot below the cell and streak on inner margin, and a patch at middle of outer edge of the brown area formed of large raised black scales; a blackish spot in middle of cell and rather quadrate patch in end of cell connected with a curved patch from beyond upper angle of cell to below vein 2 below the cell, with some red-brown above it on costa; traces of a diffused brownish subterminal line; a lunulate black spot just before termen above and below vein 5. Hind wing semihyaline white; a minute black point at lower angle of cell, with traces of a line from it to a patch of blackish hair above tornus; traces of an oblique dark line from vein 6 to termen at vein 2; three slight blackish marks just before termen from apex to vein 4.

*Hab.* CUBA, Baracoa (*Schaus*), 1 ♂ type. *Exp.* 30 mm.

(18 a) *Crocidophora craspedalis*, sp. n.

♀. Head and thorax ochreous tinged with brown; palpi brown, white at base; frons with lateral white streaks; abdomen ochreous, dorsally suffused with brown and with slight white segmental lines. Fore wing ochreous slightly irrorated with brown, the costal area suffused with brown, the terminal area broadly suffused with brown; an indistinct

antemedial dark line excurved below cell ; a dark discoidal bar ; an oblique postmedial line excurved between veins 5 and 2 ; a terminal series of small black spots ; cilia brown, with fine pale line at base. Hind wing ochreous, the termen suffused with brown, rather broadly at apex, narrowing to a point at submedian fold ; traces of a postmedial line between veins 5 and 2 ; a terminal series of dark points from apex to vein 2 ; cilia brownish white, with dark line near base.

*Hab.* SIERRA LEONE (*Clements*), 2 ♀ type. *Exp.* 22-26 mm.

(4 a) *Polygrammodes atricosta*, sp. n.

♂. Head and thorax ochreous yellow, the head and front of thorax suffused with black ; palpi black ; antennæ pale ; fore legs suffused with black in front ; abdomen ochreous yellow. Fore wing pale yellow, the costa black to beyond middle and with some blackish suffusion below it ; traces of a brownish antemedial line ; a black discoidal bar ; an indistinct fulvous postmedial line with black point below costa, bent outwards and slightly waved between veins 5 and 2, then retracted to below end of cell ; an indistinct, waved, fulvous subterminal line, excurved between veins 5 and 2. Hind wing pale yellow ; a black discoidal point ; an indistinct fulvous postmedial line bent outwards between veins 5 and 2, then retracted to below end of cell and oblique to above tornus ; a faint, minutely waved, fulvous subterminal line from costa to vein 2.

*Hab.* AMBOINA (*Doherty*), 1 ♂ type. *Exp.* 28 mm.

(13 b) *Polygrammodes citrinalis*, sp. n.

Antennæ of male ciliated, the basal joint with large tooth on inner side and the base of shaft excised.

♂. Head, thorax, and abdomen yellow tinged with rufous ; antennæ brownish, the basal joint white at tip ; shoulders brown ; palpi white below ; legs white, the fore tibiæ brown except at extremity, the mid tibiæ streaked with brown above ; abdomen with the anal tuft grey-brown, the ventral surface whitish. Fore wing yellow irrorated with brown, the costal edge brown ; antemedial line brown, oblique to submedian fold, then erect ; orbicular and reniform with whitish centres defined by brown, the former round, the latter elliptical ; postmedial line brown, oblique to discal fold, angled outwards above and below vein 4, then again oblique ; a rather diffused, crenulate, brown subterminal

line, excurved at middle and bent inwards below vein 3; a brown line near base of cilia. Hind wing yellowish white, a brown subterminal line, excurved and slightly waved below vein 5 and ending at vein 2; cilia white, with a brown line near base.

*Hab.* DUTCH N. GUINEA, Fak-fak (*Pratt*), 2 ♂ type.  
*Exp.* 38-40 mm.

(18 a) *Polygrammodes sanguiguttalis*, sp. n.

Head and thorax ochreous yellow; palpi deep crimson, white at base; sides of frons, tips of tegulæ, and shoulders crimson; pectus and legs whitish, the fore coxæ, femora, and tibiæ crimson in front; abdomen whitish, dorsally tinged with ochreous and with crimson lateral stripes. Fore wing yellow; the costal area pink to beyond middle; a subbasal pink spot below cell; an antemedial spot in cell and another further from base below the cell; a round spot in cell towards extremity and two small discoidal spots; the inner margin pink from middle to tornus; a postmedial series of pink spots, slightly excurved between veins 5 and 2, then bent inwards and forming a band from vein 2 to inner margin, interrupted at vein 1; a subterminal series of small spots curved from costa to vein 2, then forming an oblique band; cilia pink. Hind wing pale yellow.

*Hab.* BRAZIL, Castro Paraña (*D. Jones*), 1 ♂; PARAGUAY, Sapucay (*Foster*), 1 ♀ type. *Exp.* 42 mm.

(18 c) *Polygrammodes semirufa*, sp. n.

♂. Head and thorax bright rufous mixed with some yellow; palpi deep rufous, white at base; sides of frons deep rufous; pectus and legs white, the fore legs dark brown in front, the tarsi brown and whitish; abdomen yellow suffused with rufous except at base, the ventral surface white. Fore wing deep rufous on costal area to beyond middle, on inner area to middle, the rest of wing yellow; a faint brown antemedial line, oblique from costa to submedian fold, then erect; postmedial line brownish, waved, excurved below costa and dentate between veins 5 and 2, then retracted to lower angle of cell and origin of vein 2, and excurved in submedian interspace, with white spots before it on the rufous area in discal fold and below end of cell and yellow spots between veins 5 and 2; subterminal line formed by a series of brown lunules, incurved at discal and submedian folds; a series of slight brown marks just

before termen; cilia with a series of black points at base. Hind wing yellow, the inner area slightly tinged with rufous; a rufous discoidal spot; postmedial line rufous, arising below costa, produced to three teeth enclosing small yellow spots between veins 5 and 2, then oblique to above tornus; an indistinct lunulate subterminal line, incurved at discal fold and below vein 2; slight brownish spots just before termen towards apex and tornus; cilia with series of black points at base; the underside yellowish white, with dark discoidal spot and postmedial line.

*Hab.* BRAZIL, São Paulo (*D. Jones*), 1 ♂ type. *Exp.* 46 mm.

(24a) \**Polygrammodes ectangulalis*, sp. n.

♀. Both wings with the termen excised below apex and strongly excurved, almost angled, at vein 4.

Head and thorax brown and black, with white marks on vertex of head and prothorax; the tegulæ, patagia, and thorax with large scales which are blue-black at tips; pectus and legs white, the latter pale red-brown above; abdomen whitish, pale red-brown with some black at base and extremity, the medial part mostly black with some brown and whitish scales, the ventral surface white. Fore wing very pale red-brown; the basal area suffused with black; a curved ante-medial black line; small red-brown bar-shaped spots with dark edges in middle of cell and on discocellulars, with a blackish mark on costa above the latter; traces of a line just beyond the cell excurved to vein 3, then strongly incurved to below end of cell, becoming well marked and angled in submedian fold; the postmedial line oblique from costa to vein 5, then curved to tornus, where it develops into a black spot; a terminal series of black points and a spot above vein 5; some dark points on cilia and patch at tornus. Hind wing semihyaline white; a black discoidal point; the median nervure and veins at lower angle of cell white; the postmedial fuscous line much interrupted, obsolete towards costa, bent outwards between veins 5 and 2, then retracted to below angle of cell, and ending in a black patch above tornus; a terminal black band from apex to vein 4, broad at costa, and interrupted by the white veins.

*Hab.* S. BRAZIL, São Paulo. *Exp.* 48 mm. Type in Coll. Rothschild.

(25 c) *Polygrammodes sanguifrons*, sp. n.

♂. Head and thorax pale yellow, the tegulae deep yellow, the shoulders blood-red; palpi black, white at base; sides of frons blood-red; antennæ ochreous; fore coxæ and femora above blood-red, the fore tibiæ black, the mid and hind femoro-tibial joints black, the fore and mid tarsi banded with blackish; abdomen pale yellow. Fore wing pale yellow, the veins and costal area deeper yellow, the costal edge black to beyond middle; an antemedial pale fuscous point below the cell and faint fuscous discoidal mark; postmedial line pale fuscous, maculate from costa to vein 3, then bent inwards to vein 2 near its origin, angled outwards above vein 1 and oblique to inner margin; a subterminal series of pale fuscous spots in the interspaces, slightly incurved at discal fold. Hind wing pale yellow, the termen deeper yellow; postmedial line pale fulvous, arising as a spot in discal fold, bent outwards between veins 5 and 2, where it is retracted to below end of cell, then oblique to above tornus; a subterminal series of pale fuscous spots from costa to vein 2, below which it terminates in an oblique striga. Underside of fore wing with the costal area red to beyond middle, the costal edge black to near apex.

*Hab.* PERU, Agualani (*Ockenden*), 2 ♂ type. *Exp.* 52 mm.

(25 d) *Polygrammodes hyalescens*, sp. n.

Head, thorax, and abdomen yellowish white, the tegulae near tips and shoulders with orange-yellow patches; sides of palpi and frons brown; fore tibiæ tinged with brown, the tarsi ringed with brown. Fore wing yellowish white, thinly scaled, the costal area more ochreous and the costal edge fuscous; a slight brownish antemedial spot in cell and faint excurved line from cell to inner margin; a small brownish spot in middle of cell and slight discoidal bar; postmedial line pale brownish, waved, bent outwards between veins 5 and 2, then retracted to below end of cell and excurved in submedian interspace; a minutely waved brownish subterminal line and brownish terminal line. Hind wing semi-hyaline yellowish white; a faint brownish postmedial line, arising at vein 6, excurved and waved between veins 5 and 2, then retracted and ending at submedian fold; a very indistinct, minutely waved, brownish subterminal line from costa to submedian fold.

*Hab.* PERU, Carabaya, St. Domingo (*Ockenden*), 1 ♂, 1 ♀ type. *Exp.*, ♂ 30, ♀ 40 mm.

(29) *Polygrammodes brunneivena*, sp. n.*Glyphodes nervosa*, Warr. Trans. Ent. Soc. 1889, p. 262, ♀ (nec ♂).

♀. Head, thorax, and abdomen yellowish white, the back of head and tegulæ tinged with orange, the patagia slightly tinged with brown; antennæ brown; abdomen with slight dorsal brown streak towards base. Fore wing semihyaline white, the veins pale red-brown, the costal area creamy white and thickly scaled; cilia pale red-brown. Hind wing semihyaline white, the veins and cilia pale red-brown.

*Hab.* BRAZIL, Amazons, Solimoes R., Uananaá (*Trail*), 1 ♀ type. *Exp.* 46 mm.

(30) *Polygrammodes phæocraspis*, sp. n.

♂. Head, thorax, and abdomen white, the back of head tinged with orange; antennæ fuscous; fore tibiæ brown above, the tarsi tinged with brown. Fore wing semihyaline white, the veins brownish, the costal edge fuscous. Hind wing semihyaline white, the veins brownish.

*Hab.* PERU, 1 ♂ type. *Exp.* 40 mm.

[To be continued.]

XXXIX.—*New Species of Heterocera from Costa Rica*.—XXI. By W. SCHAUS, F.Z.S.

Geometridæ.

Subfam. BOARMINÆ.

*Semiothisa pandaria*, sp. n.

♀. Head and abdomen brown tinged with yellow. Thorax lilacine grey. Wings grey, with darker grey striæ and fuscous irrorations, the lines yellow-brown; fine terminal fuscous-brown shading; cilia light brown. Fore wings: antemedial line faint, slightly outcurved; medial line darker, well marked, vertical; postmedial faint, more yellowish, outcurved on costa, followed by a vertical dull brown shade, its outer edge slightly outcurved between veins 7 and 5 and outwardly darker shaded from vein 4 to inner margin; termen brown; subterminal line pale; the apex slightly greyish. Hind wings: outer margin bluntly angled, the lines as on fore wings, but the termen not so brown. Fore wings below yellow striated with fuscous grey; the medial line fine; a fuscous line on discocellular; a fuscous outer



vertical shade; the outer margin brown; a white shade at apex, crossed by fuscous-grey striæ. Hind wings yellow except postmedial space between veins 4 and 6, inner margin postmedially, and outer margin, which are white; the wing heavily striated with fuscous grey; medial line distinct; outer line fuscous, outwardly broadly edged with brown.

Expanse 24 mm.

*Hab.* Guapiles.

*Apicia deoia*, sp. n.

♂. Antennæ simple. Body and wings buff; collar slightly darker; a few dark irrorations on abdomen and wings; abdomen shaded with greyish brown on terminal half. Fore wings: the veins and lines yellow-brown; a black point at base below cell; antemedial line outangled in cell, inbent, sinuous, with dark points on veins, the angle connected by a fine yellow-brown line with a black point on middle of discocellular; postmedial line sinuous, inbent to before middle of inner margin, followed by two dull greyish-brown parallel lines, the inner line with black points on veins; a subterminal line of ground-colour indicated by yellow-brown shadings on either side; apex acute, outer margin outbent. Hind wings: some darker striæ on basal half; a dark point on discocellular; the lines beyond as on fore wings, but straighter. Wings below paler, thinly darker irrorated; discal points black, more pronounced, larger on fore wings, where the lines are all indicated; the outer line fuscous from vein 6 to inner margin, punctiform from vein 4 to costa. Hind wings: the lines very faintly indicated; the outer line followed by a series of black points on veins.

Expanse 35 mm.

*Hab.* Turrialba, 5800 feet.

*Apicia demoleon*, sp. n.

♂. Antennæ simple. Wings broad, the outer margins slightly rounded. Frons fuscous. Vertex and body brown, the collar darker shaded. Wings brown, with black striæ; cilia reddish brown at base, tipped with greyish brown; outer line straight, reddish brown, outwardly pale-edged, with white points on veins; subterminal fuscous spots on veins 3 and 5 and on submedian. Fore wings: an antemedial reddish-brown line, inwardly pale-edged, almost vertical; a small greyish spot in cell before end. Wings below greyish brown, thinly irrorated with fuscous brown; black points on

discocellulars; an outer whitish line, punctiform towards costa of fore wings.

Expanse 28 mm.

*Hab.* Poas.

*Pyrinia selecta*, sp. n.

♂. Frons brown. Vertex, collar, and thorax olive-buff; abdomen paler, with some brown irrorations. Fore wings whitish, with some olive-brown striæ; basal half tinged with brown and more thickly striated, the striæ fuscous on costa and irrorated with grey-white; a broad dark olive-brown medial line from costa to just above submedian, inbent, its inner edge irrorated with grey-white; a dark line on discocellular and postmedial streak from vein 3 to inner margin; an outer dark spot on costa, outbent, and small subterminal spot between veins 4 and 5; termen shaded with fuscous and greyish white except between veins 3 and 5; cilia dark brown. Hind wings buff-white, striated with pale olive-brown, suffusing and forming a postmedial line. Wings below yellow, striated with brown, chiefly at base. Fore wings: medial line forming three spots filled in with greyish white; the outer spots and terminal shading as above, but brown, the latter irrorated with grey-white. Hind wings: a macular postmedial brown line and shade at apex.

Expanse 25 mm.

*Hab.* Juan Vinas.

*Pyrinia punctilinea*, sp. n.

♀. Head dark brown. Body and wings yellow-brown, the latter with purplish striæ and irrorations; cilia reddish brown. Fore wings: a medial brown spot on costa and traces of a fine brown line, shaded with faintly iridescent scaling; an outer row of dark brown points on veins outwardly connected by a faint iridescent shade, followed by a dusky shade, on costa linear followed by a lilacine shade and an inbent brown spot; termen tinged with lilacine, slightly iridescent. Hind wings: a postmedial dark brown line outwardly shaded with iridescent scaling. Wings below deep yellow, irrorated and striated with bright reddish brown, the outer margins red; traces of a fine postmedial line. Fore wings: a broad subterminal dark purple shade, paler near its inner edge. Hind wings: an interrupted subterminal reddish-brown line.

Expanse 29 mm.

*Hab.* Juan Vinas.

Easily distinguished by the punctiform outer line

*Pyrinia rufinaria*, Schs., described in Ann. & Mag. Nat. Hist. 1912, x. p. 232, is *P. fridolinata*, Obt., the latter name having priority.

CATACRISMIA, gen. nov.

*Male*.—Palpi short, porrect, the third joint downbent. Antennæ simple, minutely serrate on terminal third. Legs smoothly scaled. Wings broad. Fore wings: apex acute, outer margin produced, rounded, crenulate; cell half the length of wing; vein 3 before lower angle; 4 from lower angle; 5 from middle of discocellular; 6 from upper angle; 7-10 stalked from just beyond middle of cell; 11 close to stalk. Hind wings: outer margin rounded, crenulate; vein 3 before lower angle; 4 from lower angle; 6 and 7 diverging before upper angle; upper side from base to beyond cell, and inner margin thickly covered with long hairy scales.

Type of genus, *Catacrismia hirsutaria*, Schs.

*Catacrismia hirsutaria*, sp. n.

♂. Palpi, head, and collar in front reddish brown mottled with creamy buff. Collar behind and thorax grey; abdomen light reddish brown, shaded with grey terminally; a dark red transverse line at base. Wings grey, with some fine brownish striæ marked with minute black points; traces of a fine dark terminal line; cilia roseate brown, with darker shadings. Fore wings: an antemedial brown line outangled in cell; an outer row of dark points on veins; extreme costa buff. Hind wings: a broad fuscous line at base, the space beyond to postmedial reddish brown except above vein 7; postmedial line thick, wavy, fuscous brown; anal angle shaded with reddish brown and fuscous grey. Wings below grey tinged with roseate and striated with fuscous; black discal points; lines faintly indicated, fine; outer fuscous spots on fore wings from vein 5 to costa.

♀. Darker, tinged with brown. Fore wings as in male. Hind wings uniformly coloured like fore wings; the postmedial line very fine, indistinct; black discal points.

Expanse, ♂ 25, ♀ 27 mm.

*Hab.* Guapiles, Esperanza.

*Anisoperas murcia*, sp. n.

♂. Antennæ bipectinate. Head and thorax dark brown. Abdomen greyish brown. Wings brown striated with darker brown; costa narrowly shaded with dark grey; a few scattered whitish scales; antemedial line dark grey, outwardly

shaded with dark brown, vertical, faintly curved across submedian, preceded by whitish points on median and submedian; a black spot on discocellular in front; a dark brown postmedial line, outcurved around and near cell, slightly outbent from vein 3; subterminal line dark grey, downcurved and outbent to near termen below vein 8, angled and slightly incurved to inner margin near tornus, outwardly edged with white on costa, marked by white points on veins, and irrorated with white towards costa, inwardly edged by a fine reddish-brown line. Hind wings: a black spot on discocellular; subterminal line as on fore wings, but straighter. Wings below buff-brown, with some dark irrorations and striæ; black discal spots; subterminal very fine, marked by brown points on veins.

Expanse 35 mm.

*Hab.* Poas.

*Paragonia lanuginosa*, sp. n.

♂. Head and front of collar grey-black; collar otherwise, body, and wings brown, the latter with some fine short black striæ. Fore wings: an antemedial darker brown line, twice outcurved, vertical, with white points on veins; a black point on discocellular; a postmedial darker brown line, outcurved close around cell, then slightly outbent to inner margin; a finer outer line, inbent from a large white costal spot before apex, curved below vein 3, and outangled on submedian; the costal spot mottled with brown; a fine fuscous subterminal line, punctiform on veins; cilia dark brown, partly tipped with white. Hind wings: a black discal point; a fine postmedial line; outer line lunular, with short white streaks on veins; subterminal as on fore wings. Wings below paler, more thickly striated with black, and darker shaded between outer and subterminal lines; black discal points; apex of fore wing shaded with white.

Expanse 50 mm.

*Hab.* Avangarez.

Near *P. edipodaria*, Obt.

*Ænoptila egeria*, sp. n.

♀. Body and wings reddish brown tinged with purple; collar grey tipped with reddish brown; front of thorax greyish white; a few black irrorations and striæ on wings. Fore wings: a broad whitish line on costa, not reaching edge, irrorated with fuscous grey and with a subterminal small black spot; lines darker, faint, not reaching costa; antemedial remote from base, vertical; a black point on

discocellular; postmedial vertical, close to end of cell; some outer yellow and reddish shading, forming an interrupted line, slightly outcurved between veins 4 and 2; subterminal small black spots above and below vein 3. Hind wings: a medial vertical line to postmedial on inner margin; postmedial indicated by fine yellow and reddish shadings; subterminal black points from below vein 4 to inner margin, above vein 4 to costa faint reddish shading. Wings below roseate, with some black striae and irrorations; the subterminal black spots as above; faint traces of fuscous lines.

Expanse 44 mm.

*Hab.* Juan Vinas.

*Alana fumida*, sp. n.

♂. Head dark grey. Body and wings roseate brown, abdomen irrorated with dark grey. Fore wings striated with dark grey, especially terminally; space below cell to inner margin shaded with smoky grey, with slightly darker antemedial and postmedial shades; a black point on discocellular; a smoky subterminal shade, broad at apex, constricted between veins 2 and 3. Hind wings with dark grey striae, except beyond cell; a black point on discocellular; a broad basal smoky shade also along costa and at anal angle; subterminal small smoky-grey spots containing white points, upcurved towards inner margin. Wings below whitish buff; dark grey discal points; a subterminal dark shade on fore wings from costa to vein 3; dark subterminal points on hind wings.

Expanse 29 mm.

*Hab.* Juan Vinas.

*Alcis mopsaria*, sp. n.

♂. Palpi brown, fringed with grey. Frons brown, edged below with whitish grey. Vertex and abdomen whitish grey, the latter irrorated with brown and crossed by dark brown lines, the basal segment clearer white. Wings white, with fine brownish-grey striae; terminal black spots on interspaces; cilia tinged with brown at base; subterminal line white, indicated outwardly by suffusing striae, inwardly by fuscous spots somewhat interrupted on fore wings; postmedial line fine, dark brown, lunular, with short darker streaks on veins. Fore wings: a fine antemedial inbent line, punctiform on veins, originating from a fuscous spot on costa; medial line faint, with well-marked points on median and submedian and a large spot on costa; a dark streak on discocellular. Hind wings: a fine antemedial brownish shade;

a small brown discal spot. Wings below whitish; black terminal spots; small discal spots. Fore wings tinged with grey except postmedially; a broad fuscous-grey shade along outer margin, not quite reaching termen.

Expanse 37 mm.

*Hab.* Juan Vinas, Avangarez.

Near *A. mollearia*, Wlk.

*Alcis lurida*, sp. n.

♂. Frons, collar, and thorax grey; vertex and abdomen whiter, the latter with transverse pale brown shades. Wings white tinged with grey; terminal black points on interspaces; cilia partly mottled with pale brown. Fore wings: a sub-basal grey-brown line, angled on costa, closely followed by the fine black antemedial line; a fine grey line edging some white scales on discocellular, wavyly inbent below it; some greyish striæ on costa and beyond cell; postmedial line fine, black, wavy, vertical from costa to vein 5, where it is bluntly outangled, inbent to near discocellular, incurved below vein 2, followed throughout by a pale brown shade, expanding to subterminal on costa; subterminal line lunular, dentate, white, defined by greyish shadings; termen shaded with grey, darkest between veins 4 and 7. Hind wings: a thick black basal line; a fine grey antemedial line, downcurved on inner margin; raised white scales on discocellular; postmedial line fine, black, upcurved from fold, touching discocellular, followed by a narrow pale brown shade; subterminal as on fore wings; the veins terminally shaded with yellow-brown. Wings below white. Fore wings: some black striæ on costa; discocellular broadly edged with fuscous; a broad terminal fuscous shade, with a small white shade at apex and terminally between veins 3 and 4. Hind wings: traces of terminal black points.

Expanse 34 mm.

*Hab.* Sixola.

*Melanolophia fugitaria*, sp. n.

♀. Head whitish grey. Body whitish brown, the collar and abdomen with slightly darker shadings. Wings bone-colour. Fore wings shaded with pale olive-brown; fuscous-brown striæ, more numerous on outer margin; lines fine, fuscous grey, mottled with brown; antemedial line inangled on subcostal, outangled close below it, and inbent to inner margin; medial line outangled on subcostal and on submedian; a black point on discocellular; postmedial line inbent, faintly curved, followed by a fuscous shade above and

below vein 4; subterminal fuscous spots from costa to vein 5; a marginal fuscous shade from above vein 4 to above vein 6. Hind wings shaded with pale olive-brown except before postmedial line, the shading striated with fuscous brown; antemedial line thicker; a black spot on discocellular; postmedial line fine, slightly wavy; subterminal fuscous spots; a dark terminal line. Wings below duller; a broad subterminal fuscous shade, reduced to spots on hind wings below vein 4; termen broadly whiter; the lines all present; black discal points.

Expanse 36 mm.

*Hab.* Juan Vinas.

*Gazena friaria*, sp. n.

♂. Head, collar, and thorax brownish grey; thorax behind and abdomen whiter, the latter shaded with grey-brown and with brownish irrorations; black transverse lines on segments, dorsally interrupted at base. Wings white, with a few brown irrorations; a terminal fuscous-brown line, expanding on interspaces; cilia white, crossed by a wavy grey-brown line, and with greyish shadings at veins. Fore wings: the base brownish grey; antemedial line black, slightly inangled on subcostal, inbent below median; a black medial line, outbent on costa, edging finely a grey discocellular space, incurved below cell, somewhat punctiform, closely followed by a narrow, parallel, greyish shade; postmedial similar, inbent, sinuous, followed by greyish shades, except between veins 7 and 6, 4 and 2, and inner margin, where the shading is pale reddish brown; subterminal line lunular dentate, white, indicated by greyish and pale brown shadings. Hind wings: a thick black basal line, downbent on inner margin; antemedial and medial dark brown lines also downbent on inner margin, very faint towards costa; a dark grey discal spot; postmedial line as on fore wings, followed by brown shading between veins 2 and 4, the subterminal as on fore wings. Fore wings below brownish grey, almost fuscous apically; the cilia and apex narrowly white; a terminal brown line. Hind wings whitish, the veins faintly brownish; a small grey discal spot.

Expanse 30 mm.

*Hab.* Poas, Turrialba.

A smaller whiter form expanding 27 mm. is found on Turrialba, but a large series of specimens would be necessary before separating it.

*Melanchroia tritonaria*, sp. n.

♂. Body and wings dark blue. Back of head, neck, and

front of collar orange-red. Fore wings: an oblique white fascia from vein 8 to vein 2 near termen, widest at costa; the apical space black. Wings below duller.

Expanse 29 mm.

*Hab.* Carillo.

Subfam. *GEOMETRINÆ*.

*Oospila camilla*, sp. n.

♀. Shaft of antennæ and line between them white. Frons, thorax, and abdomen above lilacine brown. Neck, collar, and front of patagia green. Body below white. Fore wings green; costa finely white; a faint antemedial brownish shade; a black point on discocellular; outer margin broadly purplish mauve, with some buff mottlings and dark striæ, its inner edge shortly excavated between veins 3 and 4, reaching vein 8 on outer space; the terminal space between 7 and 8 green; the costa terminally mottled with purple-mauve; a subterminal yellow-green spot above vein 3 and a smaller one below it; a terminal purple-red line. Hind wings green; a black point on discocellular; a purple-mauve spot on inner margin near base and a narrow similar streak along inner margin connecting it with the broad similarly coloured outer margin; the inner edge of marginal space uneven, broken along vein 4 by a green line to a subterminal yellow-green spot, which suffuses with a smaller spot below vein 3; the outer margin mottled as on fore wings, but with some darker subterminal shadings from vein 4 to costa. Wings below whitish green. Fore wings: a broad dull roseate outer shade and dark brown spots on cilia. Hind wings: a dull roseate marginal shade from apex to vein 4; a fuscous shade on cilia at veins 4 and 6.

Expanse 31 mm.

*Hab.* Sixola.

Very much like *Drucia latimargo*, Warr.

Subfam. *ACIDALIINÆ*.

*Hyria croceimarginata*, sp. n.

♀. Body and wings reddish purple, shading to black before the narrow yellow termen; cilia yellow; a fine outer darker lunular line. Fore wings: two white points on discocellular; the marginal fuscous shade reaching cilia at apex and at vein 3; the outer margin oblique from apex to vein 3, then slightly incurved. Hind wings: an interrupted white line on discocellular, shaded with red; traces of a dark postmedial line; the outer margin curved. Wings below greyish purple; cilia paler yellow; a white streak on discocellular of



hind wings; the termen very narrowly whitish on both wings.

Expanse 19 mm.

*Hab.* Juan Vinas.

Near *Hyria flavistigma*, Warr.

*Hyria helleria*, sp. n.

♀. Head, thorax behind, and abdomen dark purplish red; collar and thorax in front yellow. Fore wings acute, the outer margin oblique, yellow; cell and base tinged with grey, shading to dark reddish brown on inner margin; a still darker space medially on inner margin, crossed by a medial and a postmedial fuscous line; a black point on discocellular and some reddish-brown shading below it; a few postmedial dark irrorations and traces of terminal dark points. Hind wings rounded, reddish brown; a darker medial shade, edged by fuscous medial and postmedial lines; base of inner margin, apex, and some terminal yellow shadings; the postmedial followed by yellow spots from vein 3 to inner margin; above vein 3 the yellow spots are outset towards apex. Wings below duller.

Expanse 14 mm.

*Hab.* Juan Vinas.

*Hyria præcellens*, sp. n.

♀. Head fuscous. Collar and thorax yellow; patagia shaded with purple-brown. Abdomen above reddish purple; fine yellow segmental lines; body below yellowish. Fore wings dark reddish purple, redder on termen; a triangular medial yellow spot on costa, irrorated with red in cell; a wavy yellow outer line, outbent from costa to termen below vein 3, expanding at vein 5, and containing a red spot; inner margin from middle broadly yellow, crossed by a postmedial reddish line; an interrupted marginal yellow line on reddish portion; cilia yellow, partly mottled with red at base. Hind wings bright red; a yellow streak on discocellular; postmedial line sinuous, yellow; some subterminal and terminal yellow shading. Fore wings below similar, but duller. Hind wings below with the yellow markings more extended.

Expanse 15 mm.

*Hab.* Turrialba.

Near *H. radaria*, Schs.

*Hyria priscilla*, sp. n.

♂. Body and wings purplish red, cilia yellow. Fore wings: the termen narrowly yellow from apex to vein 4, also

from vein 3 to tornus, more broadly at vein 3, forming an angle. Hind wings: the termen yellow, more narrowly so at anal angle; the wing broad and produced at vein 4, but rounded. Underneath the same.

Expanse 14 mm.

*Hab.* Carillo, Guapiles.

Closely allied to *H. violescens*, Schs.; but much redder, the hind wings not angled as in that species.

*Hyriagona rosinaria*, sp. n.

♂. Body roseate; head, collar, and front of patagia whitish yellow. Fore wings whitish yellow; inner margin to cell, terminal third of cell, and the space beyond to post-medial roseate; a black point on discocellular; postmedial faintly indicated, greyish on costa, then as an edging to roseate space, somewhat dentate opposite cell, inbent along vein 3, angled and outbent to tornus; some subterminal roseate irrorations chiefly opposite cell; apex shaded with grey; terminal dark points at veins 3 and 4; a speck at submedian and fold. Hind wings roseate, cilia whitish; a postmedial yellow-white spot near inner margin; a fine yellowish line from termen at vein 7 to vein 3 subterminally. Hind wings long and narrow, the anal angle acute.

Expanse 15 mm.

*Hab.* Juan Vinas.

*Hæmalea macoaria*, sp. n.

♂. Palpi, frons, and collar orange-brown. Vertex white. Thorax white, irrorated with orange-brown. Abdomen white, with fine orange-brown segmental lines. Wings white, with scattered fuscous-brown irrorations; lines fine, orange-brown, partly mottled with fuscous brown; a terminal fuscous-brown line; cilia whitish mottled with brown. Fore wings: antemedial line outbent on costa, vertical in cell, wavy and slightly inbent below cell; postmedial line sinuous, touching a dark streak on discocellular; outer line outbent from costa to vein 6, wavy vertical to below 3, and incurved; subterminal triangular dark spots at vein 6, above and below vein 3, and at tornus. Hind wings: a wavy medial line followed by a point on discocellular; postmedial line downcurved, sinuous; subterminal orange-brown spots, shaded with fuscous. Wings below white; the costa of fore wings shaded with orange-brown.

Expanse 17 mm.

*Hab.* Avangarez.

Near *H. macouma*, Schs.

*Euacidalia proliva*, sp. n.

♂. Body and wings olive-grey; fuscous points on discocellular; an interrupted slightly darker terminal line. Fore wings: outer margin rounded; a dark outcurved postmedial line, followed by a parallel fainter line. Hind wings broad, produced and angled between veins 2 and 3; a fine darker postmedial line, almost vertical. Underneath similar, the hind wings thickly clothed with hair-like scales except on termen.

Expanse 22 mm.

Hab. Tuis, Guapiles, Juan Vinas.

*Euacidalia subcrinita*, sp. n.

♂. Body brown, the thorax tinged with purple. Fore wings with the inner margin deeply lobed, purplish brown; costal margin to postmedial and termen above vein 3 to apex yellowish; traces of a dark outcurved antemedial line; a dark spot on discocellular, followed by a yellowish-white quadrate patch, suffusing in front with pale costal margin; postmedial line fine, fuscous brown, vertical from costa to vein 3, then inbent; a faint, dark, downbent line from discal spot to postmedial; some purplish irroration on terminal yellow space. Hind wings reddish brown, the base irrorated with fuscous grey; a fine postmedial fuscous line; some faint yellowish shadings on outer margin, which is rounded; the abdominal fold filled below with long scales, covered by the fringe on inner margin; the base of wing below with long downturned hairs. Wings below paler, the hind wings yellow-brown, with reddish postmedial and subterminal lines.

♀. Wings normal, bone-colour, the outer margins broadly purplish brown, inwardly edged by a fuscous-brown wavy line; dark discal points; a fine postmedial line close to cell; an interrupted dark terminal line; paler subterminal shades. Fore wings: the base reddish brown, limited by a darker antemedial line. Hind wings: some dark irrorations on basal half. Wings below duller.

Expanse 13 mm.

Hab. Tuis, Esperanza, Banana River, Juan Vinas.

*Euacidalia adipata*, sp. n.

♂. Frons dark brown. Collar and thorax greyish brown. Abdomen light brown. Wings light brown, with darker purplish irrorations; an interrupted dark terminal line. Fore wings: a purplish line on discocellular, outbent, continuing to vein 2, but finer below cell, and joining the inbent sinuous outer line; traces of a dentate postmedial line from

costa to vein 6; the space from end of cell to costa and outer line clearer and paler; a subterminal pale shade. Hind wings: a few darker scales on discocellular. Wings below pale roseate brown, with traces of a fine outer line; dark lines on discocellulars. Wings shaped as in *E. subcrinita*, but the hind wings below are devoid of long hairs at base.

Expanse 13 mm.

*Hab.* Avangarez.

*Euacidalia posides*, sp. n.

♀. Frons and collar brown; vertex white; thorax and abdomen whitish grey, irrorated and shaded with purple. Wings whitish grey, thinly irrorated with dark grey; a terminal dark purple-brown line; cilia bright purple. Fore wings: a fine inbent antemedial line; a dark line on discocellular; postmedial very faint, outcurved; outer line inbent, terminating at tornus; traces of a fine subterminal line; the outer margin very oblique. Hind wings: a dark point at upper angle of cell; a very fine medial and postmedial line; outer margin rounded towards anal angle. Wings below roseate white, the lines indistinct except outer line.

Expanse 17 mm.

*Hab.* Juan Vinas.

*Euacidalia griseinitens*, sp. n.

♂. Pale olive-brown tinged with shining grey; black discal points; very faint darker medial and postmedial lines. Wings below dull dark grey; discal points and a subterminal darker shade. Fore wings with the inner margin straight, the outer margin obliquely curved. Hind wings rounded, with hairy scaling at base below.

Expanse 13 mm.

*Hab.* Limon.

*Euacidalia prusias*, sp. n.

♀. Body and wings grey irrorated with fuscous brown; the lines fine, fuscous brown; the postmedial line inbent, the space beyond to termen darker shaded; an interrupted terminal dark line. Fore wings: antemedial line outcurved on costa; an inbent medial line crossing a dark streak on discocellular. Hind wings: an antemedial line and dark point on discocellular. Wings below without irrorations, the lines broader, well marked; medial and postmedial lines on both wings.

Expanse 21 mm.

*Hab.* Juan Vinas.

The fore wings are narrow, acute, the outer margin oblique.

*Ptychopoda fractaria*, sp. n.

♂. Frons black. Vertex buff-brown. Body yellowish white. Wings white tinged with yellow, the lines consisting of dark brown irrorations. Fore wings: costal margin roseate; a yellow shade on discocellular and beyond it below costa to apex; antemedial irrorations very faint; postmedial barely traceable; an outer lunular dentate line, almost vertical; some subterminal irrorations. Hind wings: a fine postmedial line close to cell; outer line lunular dentate, incurved between veins 6 and 4; a fine subterminal line. Fore wings below white, shaded with grey-brown at base and along costa, the costa itself darker; traces of postmedial and outer darker shades. Hind wings below white; a faint fine outer line.

Expanse 19 mm.

Hab. Poas.

*Ania perlineata*, sp. n.

♂. Frons brown. Vertex, collar, and thorax dark grey. Abdomen grey, with brownish shadings and whitish segmental lines. Wings whitish, the lines mostly dark brown; the outer margin broadly brown. Fore wings: the base shaded with grey; the costa irrorated with grey; antemedial outcurved shading, very indistinct; a fine medial line, out-angled in cell near black point on discocellular; four parallel fine postmedial lines, deeply outbent, curved across vein 7 and very oblique to inner margin; a fifth line, more fuscous, from the fourth at vein 5; a subterminal light brown line; a terminal dark brown line, inwardly edged with light brown; cilia light brown, with dark points at veins and partly dark-tipped. Hind wings: the lines straight; an antemedial fuscous-brown line; a similar coarser double medial line; the outer line interrupted by a black point on discocellular; three postmedial dark brown lines and an outer fuscous line; a light brown subterminal line outwardly edged with fuscous; terminal line as on fore wings; cilia whitish brown, with black points at veins. Wings below brownish yellow, the postmedial space whitish; fuscous irrorations at base and on outer margins; black discal spots; first postmedial line heavily marked, fuscous, outangled, the three lines following faintly marked; outer line heavily marked, fuscous, out-angled on fore wings, slightly sinuous on hind wings; sub-terminal indicated by fuscous-grey edging; terminal line as above.

Expanse 22 mm.

Hab. Juan Vinas.

Near *Ania flexistrigata*, Warr.

*Zeuctoneura derosa*, sp. n.

♂. Frons fuscous; vertex, collar, and thorax grey. Abdomen whitish, with transverse grey-brown lines. Fore wings whitish, the base, costal and outer margins faintly greyish, with fuscous irrorations; an antemedial fuscous line outcurved across costa and cell, incurved below cell and below submedian; a faint pale brownish line across discocellular to middle of inner margin, coarser, fuscous on costa; outer line fine, pale brown, incurved, thick, fuscous opposite cell, followed by a short parallel fuscous streak from vein 2 to inner margin, broadly edged with fuscous; a subterminal white lunular line; a terminal dark brown line. Hind wings white; some black irrorations on inner margin; a brown point at upper angle of cell; subterminal line fine, brown, coarser, darker opposite cell and near inner margin, outcurved below vein 4, followed by some brown shading and fuscous irrorations; a dark terminal line; the outer margin deeply crenulate, incurved between veins 6 and 4. Wings below whitish; a broad subterminal fuscous shade on fore wings; some subterminal spots on hind wings, distinct on costa only.

Expanse 15 mm.

*Hab.* Juan Vinas, Cayillo; also from Chiriqui.

Near *Odontoptila mimica*, Dogn.

Subfam. *LAURENTINÆ*.*Amaurinia thetisaria*, sp. n.

♂. Head, collar, and thorax purplish brown. Abdomen and wings reddish brown. Basal half of shaft of antennæ and line between them white. Wings: lines dark purple; termen narrowly and cilia yellow. Fore wings: three basal lines partly suffusing, followed by a clear red-brown line and two antemedial lines, also suffusing; a black spot on discocellular at vein 5; two lines beyond cell; two outer lines, outcurved, lunular, and a similar subterminal line; the dark space close to termen between veins 3 and 4, its outer edge wavy from costa to vein 5, twice incurved between vein 3 and inner margin. Hind wings short on costa, long on inner margin, the termen not angled, glossed with purple; a basal and two antemedial lines; a medial, more distinct post-medial, and two outer lines; the outer edge of dark space somewhat lunular. Wings below dull lilacine, the lines darker; termen whitish; cilia pale yellow. Fore wings: no discal spot; the two outer and subterminal lines faint; a

dark spot on cilia at vein 3. Hind wings: a subbasal, medial, postmedial, and outer line.

Expanse 22 mm.

*Hab.* Juan Vinas.

Nearest *A. chrysocraspedata*, Warr., but differs in shape of hind wing.

*Amaurinia dorisaria*, sp. n.

♂. Body and wings purple-brown. Shaft of antennæ to beyond middle and a line between them white. Wings: the lines fine, darker; termen narrowly and cilia pale yellow. Fore wings: a basal and three antemedial lines, the latter outcurved to median, vertical below it; a dark point on discocellular shaded with reddish brown; two postmedial lines, outcurved; two similar outer lines, and a subterminal line, all very indistinct; the edge of dark space wavy, close to termen at vein 3, and there shaded with orange. Hind wings produced at vein 4; a fine medial and postmedial line, the latter outcurved across veins 4 and 3; the termen and cilia shaded with orange-brown at vein 4. Wings below dull lilacine grey, the termen and cilia paler. Fore wings: fine postmedial, geminate outer, and subterminal lines; cilia brown at apex and vein 3. Hind wings: a fine antemedial, postmedial, and subterminal line; cilia brownish at vein 4.

Expanse 22 mm.

*Hab.* Juan Vinas.

Near *A. chrysocraspedata*, Warr. Hind wings longer; without the reddish-brown shadings; the lines also different.

*Amaurinia goodmani*, sp. n.

♀. Body and wings bluish green; whitish segmental lines on abdomen. Wings: black discal points; a postmedial and an outer darker green line, with a finer lunular line between them; a terminal purple-brown line; cilia white, shaded with fuscous at veins 3 and 4, and on fore wings at apex also. Fore wings below purplish, the inner margin and hind wings whitish; the outer line slightly indented opposite cell, followed on fore wings by a narrow whitish shade; dark discal points; the postmedial line fine, barely traceable on hind wings.

Expanse 22 mm.

*Hab.* Juan Vinas.

[To be continued.]

XL.—*Descriptions of some new Lycænidæ from Tropical Africa.* By HAMILTON H. DRUCE, F.L.S. &c.

Fam. *Lycænidæ*.

Subfam. *LIPTENINÆ*.

*ASLAUGA*, Kirby.

*Aslauga cephren*, sp. n.

♂. Upperside: uniform dull purple; costal margin of hind wing rather broadly brown. An anteciliary dark brown line common to both wings. Cilia of both wings russet-brown. Underside creamy brown, without conspicuous markings and overlaid with coarse dark reddish-brown scales, which appear thickest towards the base and outer margins of both wings; cilia of both wings dark brown. Abdomen purple above, brown below. Palpi and legs pale brown. Antennæ brown, clubs reddish. The lower half of the abdominal margin of the hind wing is strongly concave and the anal angle is produced into a distinct lobe, which is directed inwards.

Expanse 42 mm.

Type Mus. Druce.

*Hab.* Bitje, Ja River, Cameroons, wet season, May 1912 (*G. L. Bates*).

This insect, which appears to agree in venation with *Aslauga vininga*, Hew., is distinguished by its larger size, different colour, and shape of the hind wing.

*Aslauga aura*, sp. n.

♀. Upperside: fore wing blackish brown; costal margin grey towards base. Discal area from the base to beyond the cell clear pale blue; an elongate, indistinctly defined, white spot lying over the end of the cell and crossed by a black linear spot which appears to close the cell. Hind wing dark grey, with the discal area pale blue and extending almost to the anal angle, which is much produced. In some lights the hind wing shows a pale purplish sheen. Abdominal fold grey. Cilia of fore wing brown, of hind wing white. Underside: both wings cream, with the whole surface except the dorsum of the fore wing, which is clear up to vein 2, thickly speckled with brown and black scales. The apical half of the termen of the fore wing is reddish brown, and close to the apex are two black and grey sagittate markings.



There is a small clear white spot at the end of the cell and a central indistinct band of shades reaching from the apex to the centre of vein 2. On the hind wing there is a narrow central brown line reaching from about the centre of the costa to the centre of the dorsum. Cilia concolorous with wings, excepting on the dorsum of hind wings, where it is brown. Head grey; thorax clothed with blue hairs; abdomen greyish brown above and below; legs brown, with white markings. Antennæ reddish brown. The palpi are cream, with the terminal joint brown.

Expanse 53 mm.

Type Mus. Druce.

*Hab.* Bitje, Ja River, Cameroons, 2000 feet, wet season, May 1912 (*G. L. Bates*).

May possibly prove to be the female of the previously described *Aslauga cephren*, with which it agrees in venation, but the underside is entirely different, and the dorsum of the hind wing, although distinctly concave, is not so to the same extent, and the anal angle is more a blunt point than a lobe.

*Aslauga (?) pandora*, sp. n.

♀. Upperside: both wings uniform dark brown without markings. The costa of the fore wing is very narrowly and the cilia of both wings are reddish brown. The underside is pale brown, thickly sprinkled with dark brown scales and with a central, rather narrow, brown band, with indistinctly defined borders common to both wings and extending from the apex of the fore wing to about the middle of the dorsum of the hind wing. The dorsum of the fore wing is narrowly clear of the dark brown scales. Cilia of both wings brown. Head, thorax, and abdomen brown above and below. Antennæ reddish brown. Legs brown, with white markings. Palpi cream, with brown scales and brown terminal joint. There is a white dot at the end of the cell in both wings. The apex of the fore wing is produced to a narrow point and the lower half of the dorsum of the hind wing is strongly concave, almost touching vein 1, after which it curves strongly outwards, so that the dorsum may be described as sickle-shaped.

Expanse 64 mm.

Type B. M.

*Hab.* Uganda Prot., Budongo Forest, Unyoro, 3400 feet, December 1911 (*S. A. Neave*).

I have placed this insect provisionally in the genus *Aslauga*, not knowing where to place it, and hoping that Mr. Neave will soon procure the male.

It differs from *Aslauga* by vein 6 not originating from the end of the cell, consequently the upper discocellular is present.

There is a specimen, also a female, in the Adams Collection in the British Museum from Bitje, Ja River, Cameroons, which differs only from the type by being slightly smaller.

Subfam. *LYCENINÆ*.

*PSEUDALETIS*, H. H. Druce.

*Pseudaletis arrhon*, sp. n.

♂. Upperside: fore wing black, with a clearly defined orange band placed obliquely beyond the cell, commencing as a point on the costa and gradually widening towards the termen, which it does not quite reach. In the cell, at the end, is a quadrate orange spot, and at the base another, triangular, which bears a small round black spot. The costa between the band and the quadrate spot is laved with orange, and there is a narrow orange streak on vein 1 from the base. Hind wing orange, with the costa, except at the base, termen, and dorsum unevenly black; the abdominal fold pale orange. At the anal angle close to the margin is a row of three pure white dots. On the costa about the middle there is a large curved, black, pointed, dentate marking which projects into the orange area. There are two black filamentary tails. Underside paler than above. Fore wing marked as on upper-side, but the dorsum is narrowly white from the base for about three-fourths of its length, and the orange streak on vein 1 is wanting. The hind wing is almost entirely orange; the black dentate marking bears a central white line; the apex is slightly fuscous, and there is a subterminal black line. Vein 1 bears an indistinct brown line for the whole of its length. At the anal angle are several white spots overlaid with silver. Cilia of both wings black. Head and anal tuft orange. Antennæ black ringed with white; thorax black; abdomen black, with white rings. Legs brown.

Expanse 41 mm.

Type Mus. Druce.

*Hab.* Bitje, Ja River, Cameroons, 2000 feet, wet season, May 1912 (*G. L. Bates*).

Appears to be quite distinct from any other described species in the genus.

I hope shortly to be able to publish coloured figures of the four insects herein described.

## THE ANNALS

AND

## MAGAZINE OF NATURAL HISTORY.

[EIGHTH SERIES.]

No. 64. APRIL 1913.

XLI.—*New Species of Heterocera from Costa Rica.*—XXI.

By W. SCHAUS, F.Z.S.

[Concluded from p. 357.]

· *Erateina delecta*, sp. n.

♀. Body black; longitudinal yellow-white lines on frons and thorax; transverse lines on collar and abdomen. Fore wings fuscous brown; basal third shaded with slate-grey; inner margin white; a red streak along costa, not reaching apex; a semihyaline white oval spot close beyond cell, suffusing with a similar outbent and downcurved spot from veins 4 to 2; cilia at apex tipped with white. Hind wings black, almost entirely filled with a semihyaline white spot, not touching margins, the veins crossing this spot more heavily scaled; a terminal small white spot above vein 6, and a larger spot including cilia between veins 6 and 5; whitish mottlings on cilia otherwise. Fore wings below dark red; inner margin greyish; a yellow-white streak on basal half of extreme costa, one below it and on median vein; a white streak in cell; a yellowish spot on costa to semihyaline spot. Hind wings: the margin dark red; whitish streaks at base; the costa narrowly yellow-white; the white space shaded in front with purple-red, reaching and angled at vein 6, behind edged with black; large terminal white spots edged with fuscous brown, the largest spot between veins 5 and 6, only inwardly so edged, the white extending through cilia.

Expanse 33 mm.

*Hab.* Poas.

*Cænocalpe dryasaria*, sp. n.

♂. Body grey irrorated with brown; basal segment of abdomen white, on following segments two fine interrupted fuscous-brown lines. Wings grey irrorated with brown; a fine terminal fuscous line; cilia fuscous. Fore wings: lines fuscous brown; basal line fine; subbasal geminate filled in with dark brown; antemedial similar, outangled on costa and inbent; medial space to outer line tinged with brown, except on costal margin; a black point on discocellular; postmedial line fine, geminate, barely traceable; outer line inbent from costa preceded by a fuscous-brown shade from veins 5 to 7, outwardly finely edged with white, and followed by a lunular dark brown line, punctiform on veins; a whitish shade from vein 5 to apex; traces of a whitish subterminal line. Hind wings: lines defined on inner half chiefly; geminate antemedial and medial lines; a postmedial line; an outer lunular line followed by dark points on veins; a whitish subterminal line. Wings below greyish white irrorated with brown forming faint lines; the postmedial line more distinct; black discal points.

Expanse 22 mm.

*Hab.* Juan Vinas.

*Hammaptera dominans*, sp. n.

♀. Frons dark green. Vertex, collar, and thorax brown mottled with fuscous. Abdomen yellow-brown irrorated with black. Fore wings: base dark greyish green, crossed by a subbasal geminate outcurved line, followed by a pale green narrow antemedial shade, outwardly crossed by a fine dark green line, then a dark brown space edged with fuscous, its outer edge inbent below subcostal, incurved from vein 2 to submedian; medial space lilacine brown to postmedial, then slightly darker to outer line; a dark streak on discocellular; postmedial fine, dark brown, geminate, outbent on costa, vertical opposite, wavily incurved below vein 3; the outer line fuscous brown, outcurved, lunular, partly interrupted, followed by a green shade, crossed by a dark green line, outwardly edged by a dark brown line which is partly geminate; termen mottled green and brown; subterminal white points on veins; an interrupted terminal dark brown line; cilia light brown spotted with fuscous. Hind wings yellow-buff; inner area broadly shaded with fuscous to a fine outer line, geminate on inner margin; some fuscous marginal spots and reddish irrorations; the terminal dark line interrupted and not reaching apex. Wings below

yellow-buff; fine fuscous lines on discocellulars. Fore wings: a fuscous shade in and below cell to near termen between veins 2 and 4; four fine postmedial lines, outbent, partly suffusing from costa to vein 4; a large apical fuscous space from costa to vein 4, crossed by yellow subterminal points; a subterminal fuscous line from vein 4 to near tornus. Hind wings with some reddish and dark grey irrorations; faint traces of a geminate postmedial line; the outer line better defined; subterminal shade narrow, interrupted.

Expanse 31 mm.

*Hab.* Poas.

Near *H. fulvifusa*, Warr.

*Hammaptera colonaria*, sp. n.

♀. Frons pale bistre. Vertex, collar, and patagia light brown, darker-shaded. Thorax and abdomen whitish grey, thickly irrorated with yellow-bistre; thorax edged behind with black; a transverse fuscous band on base of abdomen and similar segmental lines. Fore wings whitish irrorated with pale brown; subbasal, antemedial, and postmedial broad olive-brown lines, edged with fuscous brown, the outer edge of postmedial lunular below vein 4; a dark streak on discocellular; a subterminal lunular white line from costa to vein 4, preceded by two olive-brown lines, and followed by darker shading interrupted between veins 7 and 8; paired terminal fuscous markings at veins; cilia pale brown tipped with grey, with darker shadings at veins. Hind wings greyish white, broadly paler beyond postmedial; a fine grey medial and postmedial line, the latter closely followed by a slightly darker line; terminal fuscous markings. Wings below creamy white; marginal fuscous shadings, darkest from costa to vein 4; short black discal streaks. Fore wings: a postmedial fuscous shade, its outer edge outangled at vein 4. Hind wings: a faint postmedial line, followed by a coarser line outcurved below vein 4.

Expanse 27 mm.

*Hab.* Esperanza.

*Rhodomena cachiria*, sp. n.

♀. Palpi black, spotted with white at base. Head and thorax whitish grey, faintly shaded with light brown; a black and metallic bronze tuft behind. Abdomen whitish grey, dorsally shaded with fuscous at base, followed by reddish-brown shades. Fore wings white; the base narrowly black to below cell; a subbasal fine black line terminating in black

spots on margins; an antemedial fascia, fuscous brown-mottled with black, partly edged with pale brown shadings, chiefly in cell, where it is joined by an inbent line from a triangular fuscous spot on costa; medial space broadly clear white, narrow on costa; a small yellow-brown spot on discocellular with a few black scales; postmedial line fine, black, starting from costal spot, incurved opposite cell, out-angled below vein 4, incurved and spotted on veins; a parallel fainter line follows, the intermediate space tinged with green and roseate brown, both lines macular between veins 2 and 4; the outer line followed by a broad fuscous-brown shade, but narrow between veins 2 and 4, its outer edge somewhat lunular; terminal space pale green with faint roseate-brown shadings subterminally; a dark terminal line; a fuscous spot at apex; cilia spotted with fuscous. Hind wings whitish grey, with faint postmedial, subterminal, and terminal greyish shades. Wings below whitish grey, obscured by darker grey shadings. Fore wings: the antemedial fascia, postmedial line, subterminal shades, and apical spot well indicated. Hind wings thickly striated and mottled with grey; a darker postmedial shade; subterminal shading darker, not reaching costa.

Expanse 25 mm.

*Hab.* Cachi.

*Anapalta avolaria*, sp. n. .

♂. Body and base of fore wings grey irrorated with dark grey and fuscous brown. Fore wings: a subbasal black line; antemedial line fuscous, outcurved, closely followed by a sinuous medial line; space beyond broadly brownish white; geminate postmedial dark lines on costa; outer line fuscous, outcurved from costa to vein 2, then slightly inbent to inner margin; terminal space brown, darker-shaded on costa, opposite cell, and at tornus; traces of a whitish subterminal line. Hind wings whitish, the termen tinged with grey, shading to fuscous grey at anal angle; antemedial, medial, and outer lines faintly indicated. Fore wings below duller, the lines faintly marked towards inner margin; a broad fuscous subterminal shade from costa to vein 4. Hind wings brownish white; antemedial, medial, postmedial, and subterminal lines faint; a fuscous spot on discocellular at medial line; the outer line deeply outcurved, darker, and distinct.

Expanse 21 mm.

*Hab.* Poas.

*Eupithecia albibasalis*, sp. n.

♂. Body brownish buff. Abdomen: a fine black segmental line on second segment; anal hairs fuscous. Fore wings: costa mottled with light brown and white, the extreme edge black, interrupted by whitish shades; a white space at base in and below cell, crossed by a subbasal light brown line, and limited by an antemedial line outangled on subcostal, this line light brown on margins, otherwise fuscous, and is followed in and below cell by a dark greyish shade, outwardly edged by a darker line, outcurved in cell and below it; rest of medial space greyish brown crossed by a fine dark line, outbent on costa; postmedial somewhat punctiform, followed by two series of smaller points faintly connected by lines; outer space above vein 4 whitish grey; a fine greyish subterminal shade; the termen shaded on interspaces with light brown, the shade at apex larger, more conspicuous; a terminal dark line; a small white spot at tornus and one on cilia at tornus. Hind wings dark grey with traces of lines, fuscous on inner margin and shaded with light brown. Wings below dark grey, the lines darker. Fore wings: a yellowish shade on costa to postmedial; the postmedial shade broadest. Hind wings: two antemedial and a medial line; the postmedial more outcurved, coincident with medial on margins; a punctiform line following it, and a subterminal shade.

Expanse 22 mm.

*Hab.* Juan Vinas.

*Eupithecia albimixta*, sp. n.

♀. Head mottled white and fuscous. Collar brownish grey and black. Thorax and abdomen fuscous mottled with grey; some pale reddish-brown shading dorsally on abdomen beyond base. Fore wings white, the lines and shadings black; subbasal line broad, slightly curved; a broad greyish shade following it; antemedial fascia broad, its inner edge evenly curved, its outer edge outangled in cell and on fold; a dark streak on discocellular, and a fine medial line outcurved around it; postmedial broad, partly interrupted, divided by a white line opposite cell; large grey and fuscous subterminal patches from costa to vein 4, outwardly edged by a fine lunular white line, and with a light brown mark on vein 6; some similar shadings below vein 2 to tornus; a fine terminal black line; cilia spotted black and white. Hind wings greyish white; traces of transverse lines; a fine dark terminal line. Wings below greyish. Fore wings suffused with fuscous

on costa and apically, with whitish-buff spots on costa. Hind wings irrorated with fuscous grey, the lines well marked, rather thick; a basal, antemedial, two medial, a postmedial, and a subterminal line; a fine black terminal line. Very similar to *E. cyrnea*, Dr. Postmedial line more outcurved. Hind wings greyer; wings below much darker, the lines heavier.

Expanse 22 mm.

*Hab.* Poas.

*Eupithecia brevicula*, sp. n.

♂. Body buff; thorax and base of abdomen fuscous brown; tip of abdomen fuscous; anal hairs buff. Wings brownish buff. Fore wings: base below subcostal to inner margin, a streak below subcostal to end of cell, a broad shade along submedian, and costal half beyond postmedial fuscous grey with traces of black lines; on costa only a faint antemedial and medial line; a dark point on discocellular; postmedial fuscous, outangled at vein 6, inangled on vein 3, with darker spots on veins; a subterminal fuscous shade, interrupted by ground-colour between veins 3 and 5, outwardly faintly edged by a greyish dentate line; terminal fuscous streaks on interspaces above vein 5, and below vein 2. Hind wings: costa to postmedial greyish white; inner margin irrorated with black at base; a small dark spot on discocellular anteriorly; a postmedial shade; a subterminal shade on costa; terminal cuneiform black spots near apex. Wings below whitish buff; black discal points; a distinct postmedial line; fuscous apical shades. Fore wings: a subterminal shade, indistinct between veins 3 and 5.

Expanse 13 mm.

*Hab.* Juan Vinas.

*Eupithecia briseis*, sp. n.

♂. Body olive-brown; anal hairs white. Fore wings pale olive-brown shaded with reddish brown subterminally; a fine darker subbasal line; a fine darker antemedial line, outcurved on costa, and inbent; an almost medial dark brown fascia, inwardly edged with fuscous brown, and also inbent, its edges even; a curved line, open in front, around discocellular; two indistinct punctiform lines from it to inner margin; postmedial straight on costa, brown, outcurved from veins 6 to 2, fuscous, preceded by a dark shade opposite cell; termen shaded with grey. Hind wings white; inner margin narrowly fuscous brown towards base; a



similar postmedial line on inner margin; anal angle shaded with brown. Hind wings below whitish, very faint antemedial and medial lines; the postmedial consisting of short brown streaks on veins.

Expanse 19 mm.

*Hab.* Poas.

*Eupithecia broteas*, sp. n.

♀. Head and palpi whitish buff; frons shaded with yellow. Collar pale grey. Thorax yellow-brown; a transverse white fascia followed by fuscous spots on patagia, and grey shade behind. Abdomen yellowish with black dorsal points. Wings whitish grey crossed by numerous inbent olive-brown lines, partly suffusing, irrorated in cell and below it with fuscous; a black spot on discocellular; the medial line just beyond cell very fine yellowish; the two postmedial lines broader, irrorated with fuscous brown on veins, the outer followed by a clearer grey shade, then an olive-brown shade and the subterminal line, which is white and lunular towards costa; outer margin olive-brown; fine black streaks on interspaces from subterminal to termen; a terminal darker olive-brown line; cilia greyish spotted with smoky olive-brown. Hind wings: the costal margin broadly whitish with very faint traces of lines; the lines irrorated with fuscous before inner margin. Wings below greyish white. Fore wings: antemedial and medial line fine; a fuscous line on discocellular; postmedial broad with darker streaks on veins; a fine outer line; a dark line, broad on costa before pale subterminal; a dark marginal shade. Hind wings: a fine antemedial line; a black point at upper angle of cell; a well-marked postmedial line; a subterminal line; some marginal shadings, and a terminal line.

Expanse 23 mm.

*Hab.* Juan Vinas.

*Eupithecia cachina*, sp. n.

♀. Palpi pale brown. Head, collar, thorax, two basal and terminal segments of abdomen bone-colour; black points on patagia; abdomen otherwise grey-brown with fuscous segmental lines. Wings bone-colour, the markings dull fuscous brown. Fore wings: subbasal fine, interrupted by pale median; antemedial irregular, inbent, preceded by a shade on costa; a line before end of cell, inbent; a spot on discocellular; line following cell fine, deeply inbent to near previous line; a broad postmedial shade, followed by a

clear pale shade from costa to vein 4, and below it by pale and fuscous geminate spots on veins; outer space dark-shaded, with some pale spots on veins, followed by a dentate pale subterminal line; an interrupted terminal line, barely darker than terminal shadings; cilia fuscous with pale spots. Hind wings: the lines as on fore wings, the finer lines not reaching costa. Wings below slightly browner, the lines and shades dull brown. Fore wings: all the lines present. Hind wings: a basal and antemedial line; a broad medial and subterminal shade.

Expanse 18 mm.

*Hab.* Cachi.

*Eupithecia caliginosa*, sp. n.

♂. Antennæ pubescent. Fore wings long, broad at termen. Palpi, vertex, and collar brownish grey; frons darker. Thorax fuscous brown; abdomen slightly browner, with dorsal black and buff points. Wings brown. Fore wings: space below cell shaded with fuscous; a fine sub-basal black line; an outcurved fuscous line before end of cell; a black point on discocellular; postmedial broad, out-angled, marked with fuscous spots on interspaces, partly irrorated with whitish-grey scales; similar scales on submedian; two fine brown lines following postmedial, well apart, and with small darker spots on veins; fine black lines on interspaces to termen, interrupted by the faint whitish subterminal line; a terminal dark line interrupted by veins. Hind wings: base of costa highly arched, downcurved and produced at vein 6; subbasal, antemedial, medial, postmedial, and outer fuscous lines, the postmedial broadest; some subterminal greyish scaling. Wings below brownish white; the postmedial line outcurved, well marked; the subterminal dark line more distinct on fore wings; a black discal point on fore wings.

Expanse 17 mm.

*Hab.* Poas.

*Eupithecia cariosa*, sp. n.

♀. Palpi yellow-brown, the second joint irrorated above with black. Head and collar yellow-brown. Thorax dark brown crossed in front with white spots and with a medial spot behind. Abdomen brown; black dorsal tufts on segments. Wings dark brown, the veins irrorated with black and white; a subterminal lunular dentate white line partly interrupted and inwardly shaded with fuscous above

and below vein 5; the cell, the inner margin broadly, and a shade from cell to apex irrorated with fuscous; a fine medial white line outangled on discocellular; traces of a similar antemedial line. Hind wings: a geminate medial paler shade, and fuscous postmedial shade, all ill defined. Wings below brownish grey; the postmedial and subterminal fuscous shades well defined, the latter followed by a dentate whitish line on fore wings, and by a wavy shade on hind wings with branches towards postmedial; fine lines on discocellular, and traces of antemedial lines.

Expanse 22 mm.

*Hab.* Juan Vinas.

*Eupithecia contexta*, sp. n.

♀. Body fuscous mottled with grey. Fore wings fuscous brown crossed by whitish-grey lines, outcurved and sinuous; a subbasal line; the antemedial and medial fascia broad, divided by a fuscous line; the space following crossed by a whitish line and limited by the white postmedial which is also divided by a fuscous line; a subterminal lunular dentate white line; cilia whitish grey with dark spots; the subcostal vein to just beyond postmedial light brown; the end of median and veins 3 and 4 partly light brown; vein 6 light brown between postmedial and subterminal; a dark line on discocellular. Some specimens are greyer and the shade following antemedial is velvety black. Hind wings dark brownish grey; traces of two antemedial and a medial line; median, vein 2, and inner margin irrorated with fuscous brown, the inner margin with white lines also. Wings below brownish grey. Fore wings: four outcurved darker lines beyond middle and a subterminal shade broadest on costa. Hind wings: two antemedial, a medial, and postmedial line; outer margin darker-shaded, with small whitish subterminal spots on interspaces; dark points on veins on either side of postmedial line. This species has a distinguishing feature in the light brown subcostal, and similar shade on vein 6. The only species approaching it is *E. viperea*, Schs.

Expanse 22 mm.

*Hab.* Juan Vinas, Poas.

*Eupithecia derogata*, sp. n.

♂. Antennæ pectinated. Palpi and head buff. Thorax and abdomen dark grey, irrorated with fuscous; darker segmental lines; some light brown shading on patagia.

Fore wings: costal margin dark grey, with fuscous lines; a fuscous space between cell and submedian to vein 2; cell and inner margin brown; subbasal and antemedial fine black lines, barely traceable; a dark line on discocellular, preceded by two dark lines in cell; a fine dark postmedial line followed by a broad fuscous shade from costa to vein 4, and another fine fuscous line; below vein 4 there is a brownish shade followed by a lunular line; an outer fine brown line followed by similar shadings to termen, crossed by a very faint subterminal pale line, partly shaded with fuscous; a fine terminal fuscous line; cilia fuscous spotted with whitish. Hind wings: costal margin highly arched with large fovea containing long hairs, outwardly downbent and produced above vein 4; antemedial, medial, and postmedial broad fuscous lines, the last followed by a fine brown line; outer space brown, crossed by a white subterminal line inwardly shaded with fuscous; an interrupted terminal line. Wings below whitish grey. Fore wings: an oval dark space below cell, corresponding to fovea of hind wings; a dark line on discocellular, postmedial and subterminal lines dark, out-curved. Hind wings: fovea black; antemedial, postmedial, and subterminal darker lines.

Expanse 17 mm.

*Hab.* Juan Vinas, Avangarez.

*Eupithecia dissors*, sp. n.

♂. Palpi and collar buff. Head and thorax greyish brown. Abdomen brown shaded with fuscous dorsally. Fore wings buff, the lines broad fuscous grey; a fuscous basal shade; an antemedial line, the medial suffusing with postmedial below subcostal; a fuscous streak on discocellular; the outer edge of postmedial lunular dentate; the subterminal shade outwardly lunular dentate edged with greyish-buff scales; a fine terminal black line; cilia with faintly darker shades at veins. Hind wings: costal margin grey, broadly fuscous shaded beyond middle; inner half buff-brown; a medial and a subterminal fuscous line. Wings below buff-brown shaded with fuscous grey; dark discal spots. Fore wings: an antemedial and broader postmedial line; the outer margin broadly darker, crossed by a subterminal macular buff line. Hind wings: a subbasal line; a medial line touching discal spot; a subterminal shade suffusing with terminal shade at apex.

Expanse 17 mm.

*Hab.* Juan Vinas.

*Eupithecia fausta*, sp. n.

♂. Frons light brown. Vertex and body greyish white, the abdomen shaded with light yellow-brown. Fore wings: costal margin and a little more than terminal third pale yellow-brown; a white streak along cell in front to subterminal line, which is also white, and expands to termen between veins 3 and 4; cell behind, and below to inner margin, dark grey; a terminal interrupted fuscous line; cilia dark grey. Hind wings: the basal half dark grey, followed by a white shade, and then pale yellow-brown; the termen broadly white; the terminal line preceded by yellowish shades in places. Fore wings below brown, the inner margin silky grey. Hind wings below whitish.

Expanse 15 mm.

Hab. Poas.

*Eupithecia josefina*, sp. n.

♀. Head and collar greyish brown. Thorax and abdomen brown; a fuscous shade across thorax in front; a buff shade across base of abdomen. Wings light silky brown; a fine terminal dark line; cilia mottled with lighter brown. Fore wings: lines on costa and inner margin slightly darker brown, not traceable otherwise; a small black spot on discocellular; an outer faint paler line; subterminal whitish, interrupted, preceded on costa by a fuscous-brown spot. Hind wings: the inner margin mottled with dark brown and white; a brown streak on discocellular; subterminal white, only near anal angle. Wings below greyish brown. Fore wings: costa mottled with grey between the lines; antemedial vertical; black discal spots, postmedial and subterminal slightly outcurved. Hind wings; the lines slightly darker; two antemedial, a broader medial, a punctiform postmedial, and dentate subterminal line.

Expanse 17 mm.

Hab. San José.

*Eupithecia macreus*, sp. n.

♀. Body brownish grey, the abdomen mottled with fuscous. Fore wings dark brown, crossed by thick light brown lines, the dark portions edged with fuscous; basal, subbasal, and antemedial lines slightly inbent; medial line sinuous passing close beyond fuscous streak on discocellular, a broad postmedial space dark brown, light brown on costa with three fuscous spots, otherwise crossed by a single

fuscous line, outwardly edged with some whitish scaling and a light brown shade followed by a dentate black line; subterminal line white, lunular; termen with light brown shading on interspaces; an interrupted terminal dark line; cilia grey-brown with darker spots. Hind wings brownish white; a dark streak on discocellular; lines faintly indicated; the subterminal dentate, better defined; a black terminal line. Wings below pale brownish. Fore wings: medial, postmedial, and outer lines outcurved on costal half, then vertical; subterminal evenly curved. Hind wings: postmedial line the darkest, followed by a very fine line; the subterminal lunular.

Expanse 26 mm.

*Hab.* Poas.

*Eupithecia montana*, sp. n.

♀. Wings long and narrow. Body and wings greyish buff, faintly tinged with brown. Abdomen: a transverse dark brown shade near base; dorsal fuscous points. Fore wings: lines indicated by broad dark shades on costal margin, otherwise by irrorations slightly inbent and forming small spots on median and points on submedian; subbasal on costal only; antemedial fine; medial barely traceable below cell; postmedial inangled on subcostal, with dark streaks on costa and beyond cell; an outer row of points on veins; terminal space somewhat darker-shaded; the pale subterminal line faintly indicated; a dark interrupted terminal line. Hind wings slightly whiter: a black discal point, and fuscous line through it to inner margin; lines preceding it only on inner margin; a faint subterminal line not reaching costa; termen darker-shaded; a dark terminal line. Wings below duller; black discal points, dark terminal line. Fore wings: postmedial and outer lines faintly indicated. Hind wings: medial line reaching costa; outer line indicated by brown streaks on veins.

Expanse 21 mm.

*Hab.* Poas.

*Eupithecia nemoralis*, sp. n.

♀. Body greenish white, the abdomen irrorated with fuscous. Wings greenish white. Fore wings: the lines below cell and vein 4 very finely reddish brown; a fuscous shade at base of costa; antemedial line faintly indicated, geminate; medial line outangled at black discocellular point, followed by a broad dark shade to cell; postmedial macular

on costa, dark brown, slightly outcurved, parallel with medial line below vein 4, and followed from vein 4 to costa by a broad fuscous-brown shade; a fine greenish outer line, followed by a fine reddish-brown line partly punctiform; subterminal black spots, largest on costa and between veins 4 and 5, faintly connected by a dentate white line; an interrupted terminal black line. Hind wings: black irrorations forming fine antemedial and medial lines; a similar broad postmedial shade, dividing into three fine lines on costa; outer space tinged with pale green; the dentate subterminal white line preceded by small black spots; a black terminal line, interrupted at veins; cilia greenish with dark spots.

Expanse 18 mm.

*Hab.* Juan Vinas.

A male from the Volcano of Turrialba, which I think belongs to this species, has the costal shadings reddish brown, the cilia reddish brown, and there is a distinct white spot on discocellular of fore wings.

Expanse 13 mm.

*Eupithecia olivocostata*, sp. n.

♀. Palpi, head, collar, and thorax yellow-brown, probably olive-green when fresh. Abdomen dull greyish brown with paler segmental lines. Wings dull dark brown; a slightly darker terminal line; cilia buff, darker-shaded at veins. Fore wings: costal margin olive-green; a small fuscous spot on discocellular, and pale oblique shade above it; lines not traceable; a faint fuscous postmedial shade, a subterminal white spot below vein 2, a larger spot between 3 and 4, and a faint whitish line from vein 5 to costa. Hind wings: costa broadly shaded with whitish to near apex; a dark streak on discocellular; faint antemedial and medial lines; postmedial broader, heavier marked; subterminal white spots on interspaces, the largest between veins 3 and 4. Wings below whitish buff, a faint antemedial line; dark brown streaks on discocellulars; postmedial line outcurved; the subterminal whitish spots preceded by a dark shade; the termen faintly dark-shaded.

Expanse 27 mm.

*Hab.* Poas.

*Eupithecia placens*, sp. n.

♀. Palpi and frons brown. Vertex, collar, and thorax greyish. Abdomen brown, with some darker irrorations.

Wings whitish grey; darker shades on cilia at veins. Fore wings: costal margin shaded with buff; lines faint, pale brown; subbasal, antemedial, and medial lines not traceable below cell; some black scales near end of cell; a round black spot on discocellular; postmedial shade slightly darker-tinged, outcurved beyond cell, marked with fine fuscous streaks on veins; a dull reddish-brown subterminal shade outwardly crossed by a fine pale line. Hind wings greyer; inner margin buff, crossed by three dark brown spots. Wings below darker grey; faint discal spots; lines barely indicated.

Expanse 22 mm.

*Hab.* Juan Vinas, Poas.

*Eupithecia rectilinea*, sp. n.

♀. Palpi buff. Head whitish-buff. Thorax and abdomen buff with transverse brown lines, interrupted dorsally. Fore wings long, narrow; anal angle rounded. Wings brown, the lines whitish; terminal whitish points; a fine whitish line at base of cilia; subterminal line parallel with termen, inangled on submedian. Fore wings: costa shaded with buff to near postmedial; subbasal and antemedial lines, dark brown on costa, inbent below it; medial line inbent from subcostal; postmedial straight. Hind wings: antemedial and medial line straight; postmedial slightly upcurved towards inner margin. Fore wings below silky grey-brown; medial and postmedial buff, inwardly shaded with fuscous, well marked on costal half. Hind wings below; an antemedial and postmedial darker brown shade outwardly edged with buff-brown.

Expanse 16 mm.

*Hab.* Juan Vinas.

*Eupithecia rufa*, sp. n.

♀. Palpi and head greyish buff. Collar and thorax pale reddish. Abdomen dark brown, the terminal segment buff; lateral reddish spots. Wings dark brownish grey. Fore wings: base reddish limited by a fine subbasal black line; two faint antemedial darker lines, curved on costa and inbent, chiefly indicated by irrorations; medial space from below cell to costa pale red, darker on costa, outwardly edged by a postmedial curved dark line, faintly defined and not crossing costal margin, where the reddish shade extends somewhat; an outer row of pale points on veins; a subterminal whitish



line, partly obsolescent from below vein 5; terminal pale points. Hind wings: a faint antemedial and postmedial darker shade; terminal roseate points. Wings below silky brownish grey; darker discal spots, and a postmedial shade; subterminal paler spots.

Expanse 19 mm.

*Hab.* Juan Vinas.

*Eupithecia subtilis*, sp. n.

♀. Head and collar fuscous mottled with buff. Thorax and base of abdomen buff-brown; abdomen otherwise mottled and spotted with black. Fore wings buff-brown; base of costa and cell fuscous; a black discal spot containing a few grey scales; a fuscous shade on costa from before end of cell to postmedial, crossed by whitish lines; three postmedial fine indistinct lines, fuscous-shaded on inner margin; a very faint subterminal pale shade; cilia tipped with grey. Hind wings: the apical area buff-brown, the inner margin irrorated with fuscous; black and whitish spots and lines on median, veins 2 and 3, and submedian. Wings below dark greyish brown, with fuscous discal spots. Fore wings: traces of darker lines chiefly on costa. Hind wings: traces of dark lines; some whitish lines on inner margin from middle to termen; some terminal whitish shades.

Expanse 17 mm.

*Hab.* Juan Vinas.

*Eupithecia summissa*, sp. n.

♀. Body and fore wings dull grey. Fore wings thinly irrorated with fuscous brown; a fine wavy subbasal fuscous line; a nearly medial fuscous line suffusing with an oblique black line across costa and discocellular; two fine outcurved lines beyond followed by the more heavily shaded postmedial fuscous line; postmedial followed by three fine brownish lines, the two outer lines more heavily marked, the last edging the subterminal shade which is dull grey; the termen darker grey; a terminal fuscous line. Hind wings brownish grey, more darkly irrorated on outer and inner margins; traces of a line on inner margin. Wings below paler, the lines darker, very faint. Hind wings: two antemedial, a medial, postmedial, and subterminal lines equally apart.

Expanse 19 mm.

*Hab.* Poas.

Vein 5 on fore wing from lower angle of cell.

*Eupithecia superans*, sp. n.

♂. Frons fuscous; vertex whitish grey. Collar brown, thorax whitish grey; the patagia shaded with fuscous. Abdomen brown dorsally shaded with grey at middle. Wings pale slate-grey; cilia light brown with darker shadings. Fore wings: base of costa brown limited by a wavily inbent black line, followed by a clear grey shade; an antemedial faint brownish shade originating from a black costal spot, followed by a finer clear grey line and then an oblique black spot on costa; costa medially brown; a fuscous streak on discocellular, followed by a clear grey line edged with dark brown, outcurved, lunular to middle of inner margin; postmedial clear grey inwardly preceded by a broad fuscous shade on costa, a smaller shade at vein 4, and short streaks on veins 5, 2, fold, and submedian, outwardly finely edged with brown, this line is inbent on costa, slightly outbent, and somewhat wavy; subterminal line lunular dentate, whitish grey, crossing a fuscous shade between veins 5 and 4, which are terminally brown, and preceded by a brown shade from vein 3 to inner margin; termen partly shaded with fuscous, the tips of veins 2 and 6 also brown. Hind wings crenulate, with lines corresponding to fore wings; the postmedial preceded by a fuscous shade between veins 3 and 5; the subterminal preceded by brownish shades; terminal brown shades, except space between veins 3 and 4 which is whitish grey. Wings below dull grey. Fore wings: a dark line from costa across black discocellular streak; a fuscous postmedial shade, broad on costa where it is preceded by a short line, interrupted from vein 6 to near 4, with only a spot on vein 5. Hind wings: a faint antemedial and medial line; the postmedial broad, fuscous, angled between veins 4 and 3.

Expanse 24 mm.

*Hab.* Juan Vinas.

*Eupithecia tenebricosa*, sp. n.

♂. Palpi, head, and collar whitish buff. Thorax and abdomen dark purplish brown. Fore wings brown, basal half tinged with purple, the lines and shades fuscous brown; basal and subbasal lines fine, outcurved, followed by a spot on costa, and smaller shade in cell; antemedial fine, out-angled in cell, and wavily inbent, followed by a broader parallel shade; a round black spot at end of cell crossed by an outcurved line; postmedial shade broad, followed by a fine line punctiform on veins; subterminal greyish, fine,

preceded by a broad dark shade and followed by fuscous streaks on veins ; no terminal line ; cilia brown mottled with fuscous brown. Hind wings brown, paler on costa ; basal, antemedial, and medial lines on inner margin ; postmedial reaching costa ; outer margin broadly darker ; the subterminal whitish brown. Wings below paler. Fore wings : a fuscous streak on discocellular ; postmedial fine, followed by a broad fuscous shade, not reaching inner margin ; subterminal broad, paler. Hind wings ; basal and medial lines, the latter crossing a dark spot on discocellular ; postmedial broad, fuscous on costa ; a broad subterminal brown shade ; terminal brown shadings.

Expanse 19 mm.

*Hab.* Poas.

*Eupithecia tenera*, sp. n.

♂. Body and wings white faintly tinged with olive-grey. Fore wings : basal fourth of costa narrowly fuscous grey ; a similar triangular spot medially on costa, darker-edged, its apex formed by a fuscous-brown spot on discocellular ; a subterminal clearer white dentate line, preceded by faint dark shades on costa and on interspaces between veins 3 and 5 ; a better-marked fuscous point above tornus. Hind wings : a dark discal point ; clearer white antemedial, postmedial, and subterminal shades, the last preceded by some fine dark shadings. Wings below suffused with dark grey, and with black discal spots. Hind wings : the suffusions forming an angled postmedial white shade.

Expanse 15 mm.

*Hab.* Juan Vinas.

*Eupithecia tremula*, sp. n.

♀. Head, collar, and thorax white ; a transverse black line on patagia ; thorax shaded behind with light brown. Abdomen white shaded with grey from beyond base ; black dorsal points. Fore wings whitish, the lines consisting of fuscous irrorations forming spots on costa ; costa shaded with pale brown ; subcostal and veins terminally brownish buff ; subbasal line fine, outangled below cell ; three antemedial lines, coarser ; an oblique black streak on discocellular ; a fine medial line beyond cell ; postmedial outbent to vein 6, then wavily inbent, fuscous, preceded by a broad fuscous grey shade, followed by a fine brown line ; subterminal wavy, white, preceded and followed by fuscous and brown shadings from vein 8 to vein 4, and near inner margin ;

a fine terminal black line; cilia whitish with dark grey spots. Hind wings whitish; some fuscous irrorations at base of inner margin; a spot on discocellular anteriorly; postmedial fuscous streaks on veins, followed by a very fine and faint line; subterminal dentate, well marked, and punctiform on veins; terminal dark shadings and line. Wings below whitish grey, the lines fuscous grey. Fore wings: line across costa and cell thick, followed by a fine line, and broader outcurved postmedial; a subterminal line. Hind wings: basal irrorations; faint antemedial and medial lines; a dark line on discocellular; postmedial with dark streaks on veins; subterminal more heavily shaded on veins.

Expanse 20 mm.

*Hab.* Juan Vinas, Poas.

*Eupithecia turpicula*, sp. n.

♂. Palpi and collar brown. Head and thorax fuscous; white spots at base of antennæ; abdomen grey; black dorsal points; base and terminal segment buff. Fore wings grey; irrorations, lines, and shadings brownish, darkest on costa; subbasal and geminate antemedial lines fine, slightly curved; a medial shade, darker-edged, followed by a broad white shade from costa to vein  $\pm$ , outwardly crossed by a fine dark line, and an oblique line on discocellular; postmedial shade broad; outcurved, followed by a fine line; a subterminal dark shade, partly edged outwardly with whitish scales; terminal dark shades on interspaces; cilia dark brown, with a fine white line at base and whitish spots. Hind wings white; a dark discal point; lines well marked on inner margin; postmedial faint towards costa, partly punctiform; subterminal punctiform; termen shaded with brown; cilia white, with dark spots. Wings below whitish tinged with brownish grey; fuscous lines on discocellular. Fore wings: postmedial shade broad. Hind wings: basal shade broad; medial line curved just beyond cell; postmedial very fine, followed by dark streaks on veins; subterminal and terminal shades almost suffusing.

Expanse 20 mm.

*Hab.* Turrialba.

*Eupithecia valeria*, sp. n.

♂. Antennæ pubescent. Wings broad. Body and wings buff-brown; some black irrorations on thorax behind; dorsal black points on abdomen not reaching base. Fore wings:

an interrupted fuscous streak on subcostal; a fine black sub-basal line; antemedial fine, curved on costa, inbent, preceded by some fuscous irrorations and followed by a faint medial line; an outbent line to black discal point; some yellow-brown shading above median at end of cell; black irrorations beyond cell; postmedial fuscous, slightly outcurved to vein 6, then inbent, outwardly edged with whitish, and a fine black lunular line; outer space broadly clearer brown, divided by the subterminal white line, which interrupts some fuscous shadings on interspaces; traces of an interrupted terminal black line; cilia darker grey, with brownish spots. Hind wings: some black irrorations at base of inner margin; a black discal point; postmedial line distinct; marginal shadings crossed by a faint subterminal whitish line. Wings below bone-colour; black discal points; a postmedial fuscous line close to cell, distinct; a subterminal line and terminal fuscous shade; traces of an antemedial line.

Expanse 16 mm.

*Hab.* Juan Vinas.

Near *E. orsetilla*, Dr.

*Eupithecia venusta*, sp. n.

♀. Head, thorax, base, and two terminal segments of abdomen white. Collar and abdomen medially orange-brown, dorsal black points on abdomen. Wings white. Fore wings: basal third of costa orange-brown; a subbasal cluster of black scales below subcostal, some scattered black scales below it, and a few beyond on subcostal; a broad orange-brown medial incurved fascia, interrupted in and below cell by fuscous irrorations and edged on extreme costa with fuscous; a broad similar shade extends from the fascia along veins 3 and 4 to termen, bifurcating to tornus and vein 5, enclosing a terminal white spot; these branches partly edged with fuscous scales; veins 4 and 5 terminally black, with subterminal white points; a fine irregular black line encloses a white spot beyond cell; an orange-brown sub-terminal spot on costa; a terminal black line. Hind wings: a broad orange-brown medial shade not reaching costa, irrorated with fuscous on inner margin, forming three lines; a small cluster of black scales above anal angle; an oblique orange shade from above vein 3 to termen at angle; a terminal black line; the outer margin produced at vein 3. Wings below shaded with grey, especially the fore wing, which has a black discocellular line, and fine postmedial, outer, and subterminal darker lines. Hind wings: an ante-

medial, medial, and subterminal line; a dark discal point; the terminal line black.

Expanse 19 mm.

Hab. Juan Vinas.

*Eupithecia vilis*, sp. n.

♀. Body dark grey; segmental black lines on abdomen. Fore wings greyish brown, irrorated with fuscous brown; lines mostly very indistinct and not traceable; antemedial apparently outcurved; a dark spot medially on costa and dark shade on discocellular; the median shaded with buff between veins 3 and 4; postmedial wavyly outcurved, punctiform on veins, followed by a fine whitish-grey line, and another series of dark points; subterminal distinct, whitish, lunular dentate; terminal dark grey triangular shadings, but no line; cilia mottled with whitish. Hind wings similar; veins 2 and 3 more darkly irrorated; the lines somewhat punctiform. Wings below paler, without irrorations, the lines faintly marked; a terminal darker shade on hind wings.

Expanse 19 mm.

Hab. Pcas.

Nearest *E. summissa*, Schaus, but with a brown tinge; the discocellular more vertical.

*Eupithecia viperea*, sp. n.

♀. Body greyish, with darker irrorations; a transverse black line on second segment of abdomen. Fore wings greyish, more darkly irrorated, base of costa fuscous; traces of fine darker lines; a broad, outcurved, wavy black fascia just before middle edged with whitish grey; a dark streak on discocellular; postmedial line whitish, inwardly shaded with dark brown, outwardly edged by a fine dark line and then with light brown and another fine dark line; the subcostal and all the veins terminally light brown; subterminal white, interrupted by veins and partly shaded with dark brown; a terminal dark line. Hind wings: a dark streak on discocellular; traces of lines, well marked on inner margin; the subterminal better defined, fuscous grey, dentate; a terminal dark shade interrupted by line. Wings below brownish white; dark streaks on discocellular. Fore wings: the postmedial and subterminal outcurved, brownish. Hind wings: an antemedial, medial, and two postmedial lines; a subterminal lunular line. Easily distinguished from *E. contexta*, Schs., by the veins on fore wings being all light brown

terminally and by the whiter hind wings and different markings below.

Expanse 23 mm.

*Hab.* Poas.

*Eupithecia vitans*, sp. n.

♂. Body and fore wings pale bistre; abdomen dorsally shaded with brown. Fore wings: some fuscous-brown irrorations below cell, at end, just beyond cell, and at base of inner margin; a black spot on discocellular; the lines not traceable except on costa; some shining whitish irrorations at end of cell and postmedially; the subterminal consisting of similar scales forming a dentate line, preceded by small fuscous shades; the outer margin somewhat darker; an interrupted dark terminal line. Hind wings whitish; a black discal spot; black irrorations forming lines on inner margin; a grey postmedial shade and slightly darker subterminal and terminal shades. Wings below white; a terminal dark brown line with whitish points at veins. Fore wings: black basal and antemedial shades on costa; a brown costal spot above the black discocellular spot; a fine brown postmedial line originating from a black costal spot; subterminal shade brown, on costa black. Hind wings: brown irrorations at base; a black discal spot; postmedial line punctiform; a narrow subterminal shade.

The female is rather darker.

Expanse, ♂ 16 mm., ♀ 20 mm.

*Hab.* Juan Vinas, Tuis, Cachi.

*Dochephora discordans*, sp. n.

♂. Antennæ simple. Palpi light reddish brown. Body brown shaded with fuscous. Fore wings very broad terminally; costal margin slightly sinuous; underneath with a vesicle between veins 2 and 3, filled with short hairs; a larger smooth vesicle below vein 2; vesicles above black, wing otherwise greyish brown; an oblique fuscous streak on discocellular; a postmedial darker brown vertical line and subterminal similar broader line, slightly curved. Hind wings small; costal margin arched; outer margin rounded; a long vesicle on upper side below costa containing a tuft of long whitish hairs; wings mostly dark grey, the inner margin brown, with darker subterminal and terminal lines. Wings below brownish grey; faint traces of lines on fore wings.

♀. Thorax grey; body otherwise pale yellow-brown, with

dark brown shadings, forming segmental lines on abdomen. Wings pale greyish brown, irrorated with brown, and short, shining, curly scales; antemedial and medial lines fine, darker brown; postmedial line broader, fuscous brown; subterminal similar, outwardly edged with greyish white; a terminal line interrupted by veins. Fore wings: the subcostal and base of costa yellowish brown; a small black spot on discocellular; the veins terminally lighter brown. Wings below smoky grey, the lines darker, the postmedial most distinct; black lines on discocellular, very fine on hind wings.

Expanse, ♂ 14, ♀ 18 mm.

Hab. Guapiles, Juan Vinas.

*Tithraustes longipennis*, sp. n.

♀. Abdomen fuscous. Head mottled with white; an orange spot on shoulders; a whitish dorsal line on abdomen; abdomen ventrally white. Fore wings fuscous brown; a broad white line below cell from base, not reaching vein 2; a semihyaline white fascia beyond cell from stalk of veins 3 and 4 to stalk of veins 7-10; a large white spot below vein 3 to submedian near termen; a small terminal white spot on vein 5. Hind wings black; a semihyaline white fascia below cell, crossed by vein 2; a white spot beyond cell.

Expanse 46 mm.

Hab. Juan Vinas, Limon.

*Hyrmina cærulescens*, sp. n.

♂. Palpi black. Frons white, black medially. Body blue-black; abdomen ventrally white. Fore wings black shot with blue, brighter on inner margin; a whitish streak above submedian, not reaching termen; a hyaline streak in cell and a very slight streak at base below cell; a broad hyaline fascia beyond cell from subcostal to submedian; subapical hyaline spots between veins 5 and 8. Hind wings shot with bright blue; a hyaline streak in and below cell, not reaching termen; all the wings black across hyaline spaces. Wings below black, the hind wings with a broad white streak on costa to middle, and the inner margin broadly whitish streaked with fuscous.

Expanse, ♂ 28, ♀ 33 mm.

Hab. Carillo.



## Uraniidæ.

*Psamathia sordidata*, sp. n.

♂. Body and wings grey, the latter finely and thinly striated with brown. Fore wings: the extreme costa striated with fuscous; inner line fine, dark brown, outbent from costa; outer line broader, outwardly narrowly shaded with lighter brown, slightly angled below vein 6; a small subterminal black spot between veins 6 and 7; cilia brown, darkest at base. Hind wings: outer line deeply angled on vein 4, geminate, divided by a lighter brown line; outer margin paler-shaded; a terminal brown shade, outwardly finely edged with whitish grey, the shade interrupted between veins 4 and 3; terminal fuscous-brown spots below vein 4 and vein 3. Underneath dull grey without markings.

Expanse 29 mm.

*Hab.* Guapiles, La Florida, Tuis.

Very close to *P. paralleluria*, Warr., which has the outer line vertical; also larger.

*Epiplema æolis*, sp. n.

♂. Body and wings white. Fore wings: the base faintly tinged with pale brown; costal margin irrorated with grey; some dark brown irrorations forming an outer row of small spots; a few subterminal dark brown scales. Hind wings: some antemedial irrorations; the postmedial line better defined, macular; a cluster of dark scales above anal angle; a few subterminal and terminal brown scales.

♀. Body and wings white; more numerous irrorations forming a fine antemedial line; some medial irrorations; the postmedial line geminate, with a small spot above vein 4 on fore wings; brown striæ at tornus of fore wings and subterminally on hind wing.

Expanse 21 mm.

*Hab.* Guapiles.

Near *E. adjectaria*, Wlk.

*Epiplema cononaria*, sp. n.

♀. Body and wings grey faintly tinged with brown. Fore wings: a few darker irrorations; extreme costa with small fuscous-brown spots; a fine antemedial reddish-brown line, outcurved, touching a small brown spot on subcostal; a large fuscous spot close beyond cell; postmedial line reddish brown, fine, but broader on costa, slightly tubent; a terminal

reddish-brown shade from vein 4 to apex, with marginal black points; cilia light brown, spotted with fuscous. Hind wings darker-shaded; antemedial and postmedial lines dark brown, coarser, macular, shaded with buff; the medial space with fuscous striæ; outer and subterminal fuscous striæ; termen narrowly shaded with brown; cilia whitish buff, divided by a brown line. Wings below grey, with a few dark striæ.

Expanse, ♂ 14-20, ♀ 17-21 mm.

*Hab.* Juan Vinas, Cachi, San José, Poas.

The largest specimens are from Poas.

*Epiplema proclivaria*, sp. n.

♀. Body and wings brown; palpi grey; frons black. Fore wings: a few dark striæ on basal third; a dark brown medial line, heavier-shaded on margins, outcurved, almost angled at vein 4; an outer inbent fuscous shade, outwardly shaded with dark brown, and followed by a small white spot between veins 4 and 5, below vein 2 outcurved, filled in with fuscous brown, and outwardly edged by a short white line; a small marginal fuscous spot between veins 5 and 6. Hind wings: inner margin paler-shaded; antemedial line outcurved, dark brown; postmedial line dark brown, outwardly edged by a fine whitish line; outer margin produced between veins 6 and 7. Wings below brown, with a few fuscous irrorations; a very fine darker postmedial line.

Expanse 32 mm.

*Hab.* Poas.

Near *E. lacerataria*, Wlk.

*Epiplema lustrata*, sp. n.

♂. Frons black. Vertex yellow. Body and wings light grey. Fore wings: some scattered black irrorations; medial line outcurved, fine, light reddish brown; an outer fascia, reddish brown on costa to vein 5, then darker grey, outwardly defined by a fine reddish line and irrorated with black, below vein 2 reddish, broadly edged with fuscous brown, and suffusing with medial line; a subterminal fuscous shade from vein 3 to tornus; a terminal reddish-brown shade at excision below apex, inwardly edged by a black line; cilia black on excision. Hind wings: base and inner margin whitish grey, otherwise reddish brown; a few fuscous irrorations; a medial dark brown line from vein 3 to inner margin; outer line angled between veins 4 and 3, white on brown space, dark

brown on inner margin; a marginal black point below vein 4, a dark brown line from vein 4 to apex. Fore wings below fuscous grey, the margins buff; subterminal black striæ. Hind wings below whitish yellow; some black striæ, chiefly near apex.

Expanse 20 mm.

*Hab.* Juan Vinas.

*Epiplema chremesaria.*

♀. Frons black, vertex and body fuscous brown, the collar and patagia tinged with steel-blue. Fore wings fuscous to outer line, tinged with steel-blue and mottled with dark brown striæ; lines brown; medial line angled at vein 4, inwardly edged from cell to inner margin with whitish scales; outer line outwardly edged with whitish scales; terminal space light brown, with fuscous striæ; a fuscous shade above tornus and terminally from veins 3-7, with marginal dark brown spots above and below vein 5. Hind wings similar, the terminal space dark brown; inner line downbent to below middle of inner margin, inwardly edged by a whitish line; postmedial outangled between veins 3 and 4, outwardly white-edged; a greyish shade crossed by brown striæ at anal angle. Fore wings below fuscous grey to outer line, the terminal space brown, with dark striæ. Hind wings below pale brown, shaded with fuscous at base, crossed by dark striæ.

Expanse 24 mm.

*Hab.* Laguna.

Vein 5 on fore wings is from a little below upper angle.

*Epiplema? similaria*, sp. n.

♂. Frons fuscous. Vertex, collar, and thorax grey-brown. Abdomen fuscous grey. Fore wings very broad terminally, margin excavated between veins 6 and 4; apex blunt, light brown, thinly irrorated with fuscous brown; inner margin shaded with fuscous grey; an angled coarse fuscous-brown line from costa before middle to below vein 4 at its base, then upbent to costa. Hind wings small, fuscous grey, the outer half covered with coarse ochreous scales. Wings below paler; the fore wings with irrorations only.

Expanse 24 mm.

*Hab.* Juan Vinas.

Veins 3 and 4 on hind wings are stalked.

Near *E. carilla*, Druce.

*Antiplema clipearia*, sp. n.

♂. Head fuscous brown. Collar and thorax in front dark grey-brown; thorax behind paler-shaded. Abdomen dark grey-brown. Wings light brown, with some darker irrorations. Fore wings: costal margin to postmedial broadly dark grey; a dark brown line from just before middle of costa, outbent to below vein 3, then upbent to costa, on which it is slightly incurved, outwardly edged where upturned with whitish-grey striæ; a similar curved line on inner margin beyond middle, the space within it darker-shaded; costa subterminally fuscous grey and some darker shadings below it; a marginal wavy black line, not reaching tornus, inwardly edged with whitish-grey striæ; a terminal whitish line. Hind wings: medial space broadly fuscous grey, limited by the postmedial brown line, outwardly edged with whitish striæ and inwardly by a dark brown antemedial line, preceded by a paler brown shade on inner margin; some dark grey and whitish terminal striæ and faint terminal fuscous points. Fore wings below grey-brown, with short darker striæ, the hind wings paler.

Expanse 15 mm.

*Hab.* Juan Vinas, San José.

Fore wings: veins 6 and 7 from upper angle; 8 and 9 on long stalk from middle of cell; 10 close to it; 11 approximating costal vein.

*Gathynia latonaria*, sp. n.

♀. Frons and collar dark purplish brown. Vertex white. Thorax and base of abdomen light greyish brown, abdomen otherwise greyish, thickly irrorated with fuscous brown. Wings rust-brown; cilia darker, with a pale line at base. Fore wings: the costal margin broadly shaded with dark grey and fuscous striæ; fuscous striæ near base; inner line fine, brown, outangled at vein 4, bifurcating at vein 2, and widely diverging, enclosing a darker space on inner margin; outer line dark brown, outcurved, suffusing with branch of medial line below vein 2; subterminal and terminal black irrorations; a small black spot at apex and one below it, inset; a fine terminal fuscous line. Hind wings: a very few black irrorations; lines dark brown; inner line twice outcurved; outer line downbent and curved, outwardly finely edged with white scales; termen narrowly darker; a black spot edged with grey below vein 4. Fore wings below fuscous grey, shaded with buff on costa and light brown at

tornus. Hind wings below buff, terminally shaded with brown; some scattered black irrorations. On fore wings vein 5 is from middle of discocellular, 6 and 7 from upper angle, 8 and 9 on long stalk from cell close to 10 and 11, which are free and not stalked as in typical *Gathynia*. The hind wings are toothed at veins 4, 6, and 7.

Expanse 21 mm.

*Hab.* Juan Vinas.

XLII.—*Descriptions and Records of Bees.*—LI.  
By T. D. A. COCKERELL, University of Colorado.

*Hylaeoides waterhousei*, sp. n.

♀.—Length about 13½ mm.

A species with deep red markings, close to *H. concinnula*, Ckll., but pale area on clypeus entirely red, covering the whole of upper part of clypeus (but not extending beyond), and ending below as a broad lobe of colour in middle of clypeus, not reaching lower margin; scutellum and post-scutellum red except the narrow anterior border, which in the case of the scutellum is notched in the middle by the red; first abdominal segment with at least the basal half black; tegulae very dark rufo-piceous. The broad red band on the third abdominal segment is greatly narrowed in the middle; ventral white band very well developed; prothorax above entirely and broadly red, but tubercles black.

Although this has a very strong superficial resemblance to the common *H. concinna* (Fab.), it is very distinct structurally by the very coarse deep punctures of the thorax and the more finely and shallowly but still very well punctured abdomen.

*Hab.* S. Australia (*Waterhouse*) (Nat. Mus. Victoria, 116).

Other specimens of *Hylaeoides* from the Victoria Museum are all *H. concinna*, as follows:—(1) males, Raymond Isl., 247, 246; (2) females, Melbourne (*F. R. Spry*, 117); no loc., 248; Point Lonsdale, January (*I. Akershan*, 249).

*Euryglossa furcifera*, sp. n.

♀.—Length a little over 4 mm.

Bright chrome-yellow, marked with black; face broad, quite without dark markings; apical half of mandibles

ferruginous; flagellum with greyish cross-bands (one to each joint) above; a narrow black band across vertex, connecting ocelli, from which comes a narrow median black line, going less than halfway down front, while at the sides the band connects with the linear facial foveæ, which are also black, the whole making the form of a very broad three-pronged fork; base of occiput black; mesothorax largely orange, with no markings except a pair of very narrow dark lines leaving the anterior border and failing to reach the middle; pleura entirely yellow; upper side (area) of metathorax black, with a transverse yellow mark. Wings clear, stigma and nervures very pale yellowish; lower side of first s.m. practically straight; second s.m. fairly large, about as broad as high; first r. n. entering second s.m. near base or joining first t.-c.; upper side of second s.m. very little oblique. Legs yellow, the tibiæ with a more or less evident brown line behind, hind tarsi brown behind. Abdomen with about equally broad transverse bands of yellow and black; venter yellow, without markings.

♂.—Length a little over 3 mm.

Six dark bands (instead of five) on abdomen, these dark brown, evanescent at margins; lateral prongs of fork-like mark on head very short.

*Hab.* Purnong, near Murray River, S. Australia (*S. IV. Fulton*). Nine specimens (Nat. Mus. Vict. 140, 234, 218, 139).

The type is a female. Apparently allied to *Euryglossina sulphurella*, but differing in the markings and venation. The facial foveæ bend and extend toward the ocelli above as in *sulphurella*. The b. n. does not seem to go to the t.-m., but joins the discoidal nervure so as to make an angle on the basad side.

Some species of *Euryglossa* having the same type of coloration as *E. furcifera* are much larger. *E. flavopicta*, Smith, has the yellow head, with black line enclosing the ocelli, but there is more dark colour on the thorax and abdomen, the general effect being very different. *E. euxantha*, Perk., also has the peculiar cephalic colour and markings, but the prevailing colour of the mesothorax is black.

*Euryglossa ridens*, sp. n.

♀.—Length slightly over  $4\frac{1}{2}$  mm.

Broad, the head very broad; head dullish black, minutely tessellate, the broad front with a delicate median groove and a very few scattered punctures; antennæ inserted below

middle of face, the rather thick flagellum pale reddish beneath except basally; clypeus brilliant chrome-yellow, broadly truncate (a little concave) above, with large rectangular lateral notches; eyes dark purplish; mandibles yellow; cheeks entirely dark; thorax pure black, brilliantly shining, almost without hair; tubercles bright yellow, with a black spot; under the microscope the thorax above has an extremely delicate tessellation, while the mesothorax and scutellum have a very few scattered punctures; tegulae ferruginous. Wings slightly reddish; the large stigma and the nervures dull ferruginous; lower side of first s.m. distinctly curved; second s.m. rather large, receiving first r.n. very near its base; no approach to *Pachyprosopis* venation. Legs very dark brown, anterior knees and anterior tibiae in front bright yellow. Abdomen broad and flat, shining dark reddish brown, the hind corners of segments 1 to 3 yellow; venter brown.

*Hab.* Blue Mts., N. S. Wales (*Taylor*; Froggatt coll. 156).

A quite unique species by its small size and the bright yellow clypeus. *E. sinapipes*, Ckll., has a yellow clypeus, but is otherwise quite a different bee. The specific name is suggested by the very broad mouth.

*Euryglossina sulphurella*, sp. n.

♀.—Length slightly over 4 mm.

Very pale sulphur-yellow, the head bright yellow, except the lower parts, the clypeus and adjacent parts, and the mandibles except the dark apices, being white; dark brown linear facial foveae, beginning near the level of the middle of the face, run very close to the orbital margin until they reach the top of the eye, when they curve across the vertex toward the outer ocelli, which they fail to reach by a space about equal to the diameter of an ocellus; eyes very pale reddish; antennae yellow, flagellum quite thick. Wings clear, with very pale nervures, not reaching to end of abdomen; b.n. robust, falling considerably short of t.-m., but the b.n. seems to end at the t.-m. and to be joined before its end by the slender discoidal nervure; stigma large; first r.n. joining first s.m. some distance from its end, the distance equal to about three-fifths the length of the first t.-c.; lower side of the long first s.m. straight; second s.m. small, joined by the second r.n. at its lower apical corner; lower side of second s.m. strongly developed; hind basitarsus long and slender, with a strong apical spur; very little pubescence, the abdomen above subapically with quite long finely

plumose hairs; legs creamy white; no black markings on thorax, legs, or abdomen.

♂.—Length less than 4 mm.

Like the female, but without the dark facial foveæ; hind tibiæ very long and slender.

*Hab.* Purnong, near Murray River, S. Australia (*S. W. Fulton*). Nine specimens from the National Museum of Victoria (143, 211, 144).

Entirely unique by the pale yellow colour, without dark markings. The type is a female. This appears to correspond, in the Australian fauna, to the yellow species of *Perdita* in the American, and probably, like those, it frequents yellow flowers.

*Euryglossina fultoni*, sp. n.

♀.—Length 3–4 mm.

Broad, black, with the usual broad face; moderately shining, with hardly any pubescence; labrum ferruginous, mandibles paler, with darkened tips; flagellum short and thick, rather dilute reddish brown above, very pale yellowish below; tubercles pellucid whitish; tegulæ hyaline, with a cream-coloured patch. Wings clear, brilliantly iridescent, the large stigma and nervures rufo-fuscous; b. n. very strongly arched; lower side of the long first s. m. nearly straight; first r. n. joining first s. m. some distance before end; second s. m. small, narrow, its upper side strongly oblique (the venation approaches that of *Pachyprosopis*). Legs black basally, but the knees and all the tibiæ and tarsi cream-colour, the hind tibiæ with a large black patch behind. Abdomen shining, without bands or markings. Under the microscope the mesothorax is minutely tessellated, with scattered punctures. The linear facial foveæ run parallel with the inner orbit, without any bent portion above. The tibiæ and tarsi in some specimens are bright yellow. Claws simple.

♂.—Length about  $2\frac{3}{4}$  mm.

Like the female, but face up to level of top of scape, labrum, mandibles, and a broad band on lower half of cheeks bright chrome-yellow; antennæ chrome-yellow; sides of prothorax broadly, as well as tubercles, creamy white; anterior part of pleura pale; legs yellow, the femora with dark markings; extreme apex of abdomen pale yellowish.

*Hab.* Purnong, near Murray R., S. Australia (*S. W. Fulton*). Sixteen females and one male (Nat. Mus. Vict., 210, 228, 231, 141, 142, 229, 212). The type is a female.



This insect is intermediate between *Euryglossina* and *Pachyprosopis*, differing in no radical way from *P. flavicauda*, Ckll., although much smaller and with different details of coloration. The abdomen has nothing of the purplish lustre of *E. semipurpurea* (Ckll.) and *E. cockerelli*, Perk.

*Euryglossina xanthodonta*, sp. n.

♂.—Length about  $3\frac{1}{2}$  mm.

Bright yellow (altered to red by cyanide in type) and black, the black distributed as follows: vertex broadly (but with a square-cornered lobe of yellow in front of middle ocellus), mesothorax except in front broadly and more narrowly at sides (in front the yellow sends two large triangular tooth-like lobes into the black), metathorax above, and dorsal surface of abdomen except sides narrowly, declivity of first segment, and two transverse yellow bands, at the bases of the second and third segments; the face, legs, scutellum, and underside of thorax and abdomen are entirely yellow; flagellum short and thick, the joints broader than long; tegulae hyaline. Wings clear, stigma and nervures red-brown; b. n. strongly arched, not appearing to reach t.-m.; lower side of first s.m. nearly straight; first r. n. entering apical corner of first s.m., and practically in a straight line with first t.-c.; second s.m. small and narrow, receiving second r. n. a little before its end; upper side of second s.m. oblique (approach to *Pachyprosopis* venation); facial foveae long and linear, black, not much curved above, but ending about halfway between eye and lateral ocellus. Claws bidentate:

*Hab.* Purnong, near Murray River, S. Australia (*S. W. Fulton*). Nat. Mus. Vict. 223.

Quite unique by the minute size and peculiar coloration.

*Euryglossina chalcosoma*, sp. n.

♀.—Length a little over  $3\frac{1}{2}$  mm.

Head and thorax dark æneous, very minutely tessellate, the mesothorax with a system of evenly and closely placed microscopical punctures, joined by fine lines (a fine network with punctures where the lines intersect); front with slightly crimson tints; clypeus, supra-clypeal area, mandibles (except tips), labrum, tubercles, and legs bright yellow (turned red by cyanide in the specimens described); head ordinary, face broad; flagellum short and thick, light reddish beneath; tegulae pellucid. Wings clear, nervures and the large stigma dilute reddish sepia; lower side of first s.m. straight; first

r. n. joining first s.m. quite a long distance before end; second s.m. small and nearly square; marginal cell bulging below. Abdomen shining piceous, with the apex rather broadly yellow, the extreme lateral margins also yellow, broadening to cover the hind corners of the second and third segments.

♂.—Length about 3 mm.

Like the female, but face up to above middle of front and the antennæ entirely yellow; a very fine yellow line following orbits up to top of eyes; cheeks behind eyes very broadly yellow; sides and under surface of thorax, with sides and very broad anterior corners of mesothorax, all yellow; abdominal venter all yellow.

*Hab.* Croydon, Australia (Nat. Mus. Vict. 194). 3 ♀, 1 ♂ (the type is a ♀), collected by S. W. Fulton.

Quite unique by the æneous head and thorax and small size, the colour and markings closely resembling those of some species of *Perdita*.

*Euryglossina proctotrypoides*, sp. n.

♀.—Length about 4 mm.

Rather narrow and parallel-sided, with a peculiar thick oblong head, irregularly oval in lateral profile, the whole appearance suggesting a Proctotrypid; head and thorax black, without light markings, abdomen very dark obscure purplish; lower margin of clypeus reddish; mandibles lively castaneous subapically; antennæ dark, flagellum obscure reddish beneath; vertex and thoracic dorsum microscopically tessellate, with widely scattered extremely feeble punctures; femora and tibiæ dark brown or piceous, the anterior tibiæ dull yellow in front and behind; tarsi reddish brown, the anterior ones palest; claws simple. Wings clear, the nervures and very large stigma dilute reddish sepia; b. n. not appearing to reach t.-m.; lower side of first s.m. straight; first r. n. joining first s.m. some distance before end; second s.m. very broad, broader than high; no approach to *Pachyprosopis* venation.

*Hab.* Croydon, Australia (S. W. Fulton; Nat. Mus. Vict. 163).

A singular little species, allied to *Euryglossina purpusilla* (*Euryglossa perpusilla*, Ckil.), but differing in the shape of the head, colour of the legs, &c.

*Pachyprosopis saturnina*, sp. n.

♀.—Length 4–4½ mm.

Like *P. humeralis*, Ckll., but differing thus:—Scutellum with a large yellow cruciform mark, rather suggestive of the planet Saturn; face, legs, and underside of abdomen orange, though the patches at sides of mesothorax are clear yellow; lateral face-marks gradually tapering from clypeus to a very fine line which runs to top of eyes; scape slender (doubtless a sex-character); mesothorax with two fine, short, yellow antero-discal lines; abdomen with only one light band, that at apex of first segment. The mesothorax is microscopically tessellated, with rather numerous minute punctures; in *P. humeralis* it is quite the same.

Another specimen is not well coloured, but I think the scutellum would have been all yellow.

*Hab.* Purnong, near Murray River, S. Australia (*S. W. Fulton*; Nat. Mus. Vict. 225, 233).

This is probably not the undescribed female of *P. humeralis*, as it seems unlikely that that sex would have the large yellow scutellar mark wanting in the male.

*Halictus purnongensis*, sp. n.

♂.—Length 5 mm.

Head and thorax shining olive-green; abdomen piceous, with the first segment dark greenish, hind margins of segments broadly reddish subhyaline; head enormous, about as large as and much broader than thorax; face (especially the brassy-tinted supra-clypeal area) shining, but front granular and dull; hair of head and thorax throughout thin and white; apical part of clypeus broadly cream-colour, with a crescentic depression; mandibles very large and long, scimitar-shaped, cream-colour except the sharply pointed ends and the reddened inner edge; cheeks broad, with a large prominent tooth below; antennæ rather long, the thick flagellum very strongly crenulated beneath; scape dark green; flagellum black above, broadly pale reddish fulvous below; middle flagellar joints about as long as wide; mesothorax and scutellum brilliantly shining, the punctures very fine and scattered; area of metathorax large, with fine radiating wrinkles, connected near the base by transverse wrinkles; tegulæ hyaline, tinged with testaceous. Wings clear hyaline, nervures and stigma rather pale reddish; b. n. very strongly arched; second s. m. receiving first r. n. very

near its end; third s.m. short and high; second r.n. and third t.-c. evanescent. Legs dark green basally, but broad apices of femora and all the tibiae and tarsi ferruginous, the hind tibiae pallid at base. Apical plate of abdomen transverse, broad, and short.

*Hab.* Purnong, near Murray River, S. Australia (*S. W. Fulton*).

Perfectly unique among the Australian species by the very large head, with toothed cheeks. It belongs to the subgenus *Chloralictus*.

XLIII.—*Description of a new Cyprinid Fish from Singapore.*

By C. TATE REGAN, M.A.

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*Rasborichthys altior*, sp. n.

Depth of body 3 in the length, length of head 4. Diameter of eye 3 to  $3\frac{1}{2}$  in length of head, interorbital width  $2\frac{1}{2}$  to  $2\frac{2}{3}$ . Mouth very oblique; lower jaw included; maxillary ending below nostrils. Pharyngeal teeth hooked, compressed, triserial, 1.3.5-5.3.1. 36 to 38 scales in lateral line, 8 from origin of dorsal fin to lateral line, 4 from lateral line to base of pelvic fin. Dorsal 9-10, with 7 branched rays; origin equidistant from eye and base of caudal; first branched ray longest, shorter than head; free edge straight or slightly convex. Anal 18-20; origin behind end of dorsal; free edge straight or slightly emarginate. Pectoral  $\frac{3}{4}$  or  $\frac{4}{5}$  length of head, nearly or quite reaching the 8-rayed pelvics. Caudal forked. Caudal peduncle as long as deep. Olivaceous above, silvery on sides, with or without dark stripes along the series of scales.

Singapore.

Three specimens, 60 to 85 mm. in total length, the smallest received from Herr J. Paul Arnold, the two larger ones from Herr Hans Gaukel.

*R. helfrichii*, Bleek., from Borneo, the only other species of the genus, is more slender (depth  $4\frac{1}{2}$  in the length) and has smaller scales (55 in the lateral line).

XLIV.—A Revision of the *Myxinoids* of the Genus *Myxine*.  
By C. TATE REGAN, M.A.

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IN 1912 ('Annals,' (8) ix. p. 534) I published a synopsis of the genus *Heptatretus*, comprising the *Myxinoids* with 6 to 14 branchial apertures on each side and with the external branchial ducts subequal in length. A related genus, *Paramyxine*, Dean, with 6 branchial apertures on each side, approaches *Myxine* in that the apertures are approximated and the anterior external ducts are longer than the posterior ones; there is a single species from the Sagami Sea, Japan, viz. *P. atami*, Dean (Journ. Coll. Tokyo, xix. 1906, Art. 2, p. 11, fig. D, pp. 14 & 22, pl. i. figs. 3-5). *Myxine* is the only other genus of the family.

#### MYXINE.

*Myxine*, Linn. Syst. Nat. ed. 10, i. p. 650 (1758).

*Gastrobranchus*, Bloch, Ausl. Fisch. xii. p. 66 (1795).

*Myxinoids* with 5 to 7 branchial sacs, and with a single external branchial aperture on each side.

Atlantic coasts of Europe and N. America; Pacific coast of Colombia; Chile and Patagonia; South Africa; Japan.

The species are all extremely similar, and the characters of most importance in distinguishing them appear to be the number of the teeth and of the pores on each side of the body; the teeth increase in number as the fish grows, so that the size of the specimen has to be taken into account. The length of the head, measured to the branchial aperture, and the number of branchial pouches are the only other characters that seem of any value.

Of three new species described, two, *M. atlantica* and *M. capensis*, are each based on a single unsatisfactory specimen. But, taking into consideration the locality and that in one or more characters they appear to be outside the limits of variation of the other known species, it seems better to describe them than to postpone this revision indefinitely in the hope of more material.

#### 1. *Myxine garmani*.

*Myxine garmani*, Jord. & Snyder. Proc. U.S. Nat. Mus. xxiii. 1901, p. 731.

6 branchial pouches. 11 or 12 teeth in the first series, the

3 most anterior ones united; 10 or 11 teeth in the second series, the 2 most anterior ones united. Pores 26-27+57-61+12-13. Length of head  $3\frac{2}{3}$  in the total length.

Japan.

1-3. 310-520 mm. *Hyalonema* Ground, 345 fath. 'Challenger.'

### 2. *Myxine tridentiger*.

*Myxine australis* (part.), Günth. Cat. Fish. viii. p. 511 (1870); 'Challenger' Deep-sea Fish. p. 267 (1887).

*Myxine tridentiger*, Garman, Mem. Mus. Comp. Zool. xxvi. 1899, p. 345.

6 branchial pouches. 10 teeth in each series, the 3 most anterior in the first series and the 2 most anterior in the second series united. Pores 22+62+9. Length of head  $3\frac{2}{3}$  in the total length. Left branchial aperture widely separated from that of the oesophageal duct.

Straits of Magellan.

1. 460 mm. (type of the species). Sandy Point. Dr. Cunningham.

### 3. *Myxine circifrons*.

*Myxine circifrons*, Garman, Mem. Mus. Comp. Zool. xxvi. 1899, p. 344, pl. lxxviii. figs. 1-4.

5 branchial pouches. 13 teeth in the first series, the 3 most anterior united; 11 teeth in the second series, the 2 most anterior united. Pores 21-23+59+11. Length of head a little less than  $\frac{1}{3}$  of the total length.

Total length 470 mm.

7° 30' 36" N., 78° 39' W., 730 fathoms.

### 4. *Myxine paucidens*, sp. n.

6 branchial pouches. 6 teeth in the first series and 7 in the second; the 2 most anterior teeth of each series united. Pores 26+53-57+10. Length of head  $3\frac{2}{3}$  in the total length.

Japan.

1-2. 240 & 305 mm. *Hyalonema* Ground, 345 fath. 'Challenger.' (types).

5. *Myxine australis*.

*Myxine australis*, Jenyns, Zool. 'Beagle,' Fish. p. 159 (1842); Garm. Mem. Mus. Comp. Zool. xxiv. 1899, p. 345.

*Myxine affinis*, Günth. Cat. Fish. viii. p. 511 (1870).

*Myxine australis* (part.), Günth. l. c.

*Myxine acutifrons*, Garm. t. c. p. 347.

6 branchial pouches. 8 to 11 teeth in each series, the 2 most anterior united. Pores 27-36 + 56-68 + 8-13. Length of head  $3\frac{1}{4}$  to  $3\frac{3}{4}$  in the total length.

Chile and Patagonia.

1. 490 mm. (teeth $\frac{11}{11}$ ).	Orange Bay.	Paris Mus.
2. 430 mm. (teeth $\frac{11}{11}$ ).	Cape Gregory.	Dr. Coppinger.
3. 375 mm. (teeth $\frac{10}{11}$ ).	Messier Channel.	'Challenger.'
4-6. 325-370 mm. (teeth $\frac{10-11}{10-11}$ ).	Sandy Point.	Dr. Cunningham.
7-10. 165-400 mm. (teeth $\frac{8-10}{9-10}$ ).	Puerto Bueno.	Dr. Coppinger.
11. 330 mm., type of <i>M. affinis</i> (teeth $\frac{11}{11}$ ).	—	Dr. Günther.
12. 320 mm. (teeth $\frac{9}{9}$ ).	Cockle Cove.	Dr. Coppinger.
13-14. 250-285 mm. (teeth $\frac{8}{8-9}$ ).	Tyssar Islands.	Dr. Cunningham.
15. 275 mm. (teeth $\frac{8}{9}$ ).	Magellan.	Mus. Comp. Zool.

6. *Myxine glutinosa*.

*Myxine glutinosa*, Linn. Syst. Nat. ed. 10, i. p. 650 (1755); Günth. Cat. Fish. viii. p. 510 (1870); Garman, Mem. Mus. Comp. Zool. xxiv. 1899, p. 348.

*Gastrobranchus cæus*, Bloch, Ausland. Fisch. xii. p. 66, pl. ccccxiii. (1795).

6 (exceptionally 7) branchial pouches. 7 to 9 teeth in the first series and 8 to 10 in the second, the 2 most anterior teeth in each series united. Pores 24-34 + 54-64 + 10-14. Length of head  $3\frac{2}{3}$  to 4 in the total length.

Northern and western coasts of Europe.

1-2. 370-400 mm. (teeth $\frac{9}{9-10}$ ).	Firth of Forth.	Granton Mar. Stat.
3-6, 7-8. 300-370 mm. (teeth $\frac{8}{9}$ ).	"	"
9-12. 330-350 mm. (teeth $\frac{8}{9}$ ).	Scotland.	Sir John Murray.
13. 300 mm. (teeth $\frac{7}{8}$ ).	"	"
14-15. 310-330 mm. (teeth $\frac{8}{9}$ ).	Christiansund, Norway.	Lord Ducie.

16. 320 mm. (teeth $\frac{8}{9}$ ).	—	V. Fritsch.
17. 310 mm. (teeth $\frac{8}{9}$ ).	Newcastle-on-Tyne.	Dr W. G. Ride-wood.
18-20. 240-270 mm. (teeth $\frac{7-8}{8-9}$ ).	Between Shetland and Faroe Is., 545-780 metres.	Prof. D'Arcy Thompson.
21. 265 mm. (teeth $\frac{8}{9}$ ).	Firth of Forth.	Mr. Adamson.
22. 220 mm. (teeth $\frac{9}{9}$ ).	Christiansund.	F. Sandeman, Esq.
23. 200 mm. (teeth $\frac{8}{9}$ ).	Newcastle-on-Tyne.	Mr. Woodfall.

### 7. *Myxine limosa*.

*Myxine limosa*, Girard, Proc. Ac. Philad. 1858, p. 223; Garman, Mem. Mus. Comp. Zool. xxiv. 1899, p. 348.

*Myxine glutinosa*, Jord. & Everm. Bull. U.S. Nat. Mus. xlvii. 1896, p. 7.

6 branchial pouches. 9 teeth in the first series and 10 in the second, the 2 most anterior teeth in each series united. Pores 26 + 70 + 10. Length of head  $3\frac{3}{4}$  in the total length.

Atlantic coasts of North America.

1. 340 mm. Bay of Fundy, 30 fath. F. Day, Esq.

### 8. *Myxine atlantica*, sp. n.

6 branchial pouches. 9 teeth in the first series and 8 in the second, the two most anterior teeth in each series united. Pores 28 + 64 + 12. Length of head  $3\frac{1}{2}$  in the total length.

Western North Atlantic.

1. 310 mm. (type of the species).  $44^{\circ} 17' N.$ ,  $58^{\circ} 10' W.$ , 120 fath. Smithsonian Inst.

### 9. *Myxine capensis*, sp. n.

7 branchial pouches. Pores 30 + 58 + 11. Length of head  $3\frac{1}{2}$  in the total length.

South Africa.

1. 310 mm. (type of the species). Cape of Good Hope, 110 fath. Dr. J. D. F. Gilchrist.

Unfortunately the teeth are imperfect; there may have been 8 or 9 in each series.



## XLV.—Two Cases of Abnormal Appendages in Crabs.

By W. T. CALMAN, D.Sc.

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AMONG the specimens of Crustacean abnormalities that have been added to the British Museum collection in recent years are two that seem especially deserving of record. The first is a case of incomplete homœosis, between limbs that are not adjacent, in *Cancer pagurus*; the second is an example of duplicity, of a type hitherto unknown, in a cheliped of *Portunus puber*.

1. *Homœosis in Walking-leg of Cancer pagurus, Linn.*

(Fig. 1, p. 400.)

The specimen is a male, measuring 238 mm. in width of carapace, and comes from Dartmouth (B. M. Crust. reg. no. 1913. 2. 12. 1). It is perfectly normal except as regards the second walking-leg (sixth thoracic appendage) of the left side, which carries a chela resembling, but smaller than, that of the normal cheliped.

The *coxa* of the abnormal limb does not differ from that of the corresponding limb on the other side of the body. The *basi-ischium* is somewhat loosely articulated with the *coxa*, so that the posterior condyle can be raised a little way out of the articular notch. Distally the *basi-ischium* is a good deal wider than that of the normal limb and somewhat inflated on the ventral surface. The *merus* is shorter and wider than the normal, its length being about 58 mm. and its greatest width 32 mm., while the corresponding measurements in the limb of the opposite side are 70 and 24 mm. respectively. The distance between the distal articular processes is greatly increased for the reception of the *carpus*. The *carpus* is shaped much as in the normal cheliped, except that its outer (dorsal or extensor) face is flattened; its greatest length is 42 mm. and its depth distally 30 mm. The *propodus*, compared with that of the normal cheliped, appears somewhat shrunken and malformed. It measures about 48 mm. in length to the articulation of the *dactylus* by about 30 mm. in depth and 17 mm. in thickness in the middle; the greatest depth is at the articulation with the *carpus* and the greatest thickness at the articulation with the *dactylus*. The *immovable finger* is bent downwards at

right angles to the long axis of the propodus; it is about 40 mm. long and is slightly curved to the inner or anterior side like the immovable finger of the normal cheliped, which it otherwise closely resembles in form and colour. On the dorsal edge of the propodus, somewhat to the posterior or outer side, is an irregular band of short tufted setæ, and there are some scattered and less conspicuous setæ along the

Fig. 1.



Abnormal walking-leg of *Cancer pagurus*. About half natural size.

ventral edge, running on to the base of the immovable finger. The *dactylus* is nearly straight and cannot be bent towards the immovable finger to a greater extent than is shown in the figure. In general characters it resembles the dactylus of the cheliped, but it has on the dorsal surface a thick brush of short setæ arranged in tufts and extending

from near the base to about the middle of its length. On the ventral side the dark colour of the distal portion of the dactylus shades off gradually near the base as in the normal cheliped, but on the dorsal side it ends more or less abruptly along an irregular line slightly raised above the surface, much as it does in the walking-legs. The low rounded tubercles on the opposed edges of the fingers agree in form, and apparently also in number, with those of the normal cheliped of the same side.

The chief points of interest in connection with this specimen appear to be two. While it is a clear case of homœosis, to use Bateson's term, it is an imperfect one. The modified limb, in assuming the characters of a cheliped, has not parted altogether with those proper to a walking-leg. The brushes of hair on the dorsal or outer edge of propodus and dactylus are closely similar to, although less developed than, those of the other walking-legs, and they are quite unrepresented on the cheliped. The sharp restriction of the coloured area of the dactylus on the dorsal side is also a character of the walking-leg. It is to be noted that both these characters are on the dorsal or extensor aspect of the limb, the only feature pointing in the same direction which can be discovered on the ventral or flexor aspect being the scattered hairs on the margin of the propodus. Briot (C. R. Soc. Biol. Paris, lxiv. 1908, p. 1182), describing a case of homœotic resemblance to a thoracic leg in the first abdominal appendage of a male crayfish, has called attention to a similar coexistence of incongruous characters on the outer and inner sides of the appendage.

The second point which seems worthy of notice in this specimen is that the abnormal limb is not adjacent to the limb which it "mimics," the first walking-leg, which is normal in every respect, coming between them. The only analogous case recorded among Crustacea is that of the *Asellus* described by Bateson (Proc. Zool. Soc. London, 1900, p. 268), which had an antennule replaced by a mandible. Bateson notes that the cases most nearly approaching this are those of insects which have the antenna replaced by a foot. The very remarkable case of a shore-crab having a walking-leg on the abdomen, described by Bethe (Journ. Mar. Biol. Assoc. iv. p. 144, 1896, and Arch. Entwmech. iii. p. 301, 1896), appears to belong to a different category altogether.

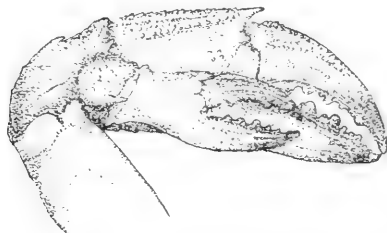
It is an obvious suggestion that reversion or atavism may be concerned in this abnormality, since the limb in question

was presumably chelate in the lobster-like ancestors of the crabs. Some of the objections to this view, however, are no less obvious—*e. g.*, (1) the resemblance is not to a generalized type of chela, but to the specific type of *Cancer pagurus*; (2) in this very species a chelate form may be assumed by the third maxilliped, a limb which is not normally chelate in any decapod (Bateson, 'Materials for the Study of Variation,' 1894, p. 149).

2. *Duplicity of Chela in Portunus puber* (Linn.).  
(Figs. 2 and 3.)

The specimen is a male, measuring 68 mm. across the carapace; it was found at Lyme Regis, and presented by Mr. J. Curtis (B. M. Crust. reg. no. 1905. 9. 13. 1). The

Fig. 2.



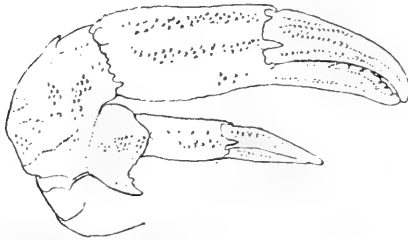
Abnormal cheliped of *Portunus puber*, inner aspect. Natural size.

left chela is much larger than the right, measuring 49 mm. as against 35 mm. along the lower edge. On the inner side of the left carpus, in the position occupied in a normal cheliped by the carpal spine, is attached a second, smaller, carpus, marked off from the first by a groove, which, however, does not form a movable articulation. It would, perhaps, be more correct to speak of this as the distal portion of a carpus, since it is improbable that it repeats the region proximal to its junction with the normal limb; but this cannot be determined with certainty. In form it resembles closely a normal carpus, except that the granulated ridges and furrows of the upper surface are indistinctly marked. It bears a large carpal spine of normal form, with three small secondary teeth on its concave distal edge. As nearly as can be judged, the long axis of the secondary carpus forms

an angle of rather less than  $60^{\circ}$  with that of the normal carpus.

Articulating with the secondary carpus is a chela measuring 26 mm. in length along the lower edge. It approaches the normal chela of the species in form and colour, except that the palmar portion is narrowed just beyond the base, with its upper and lower edges concave, the lower edge becoming strongly convex at the base of the immovable finger. The granulated ridges on the palm are feebly developed, but all those present in the normal chela can be recognized; especially noteworthy is the inner ridge of the upper margin, which ends in a strong spine overhanging the base of the dactylus, as in the normal chela, and, together with the carpal spine, shows at once that we have to do with a *left*, not with a *right*, chela. The fingers have a slight curvature inwards,

Fig. 3.



Abnormal cheliped of *Portunus puber*, from above. Natural size.

the dactylus, in addition, being angularly bent at a short distance above the base; except for this and for some other small irregularities they resemble in form, sculpture, and colour those of the normal chela.

In other respects the crab appears to be quite normal, except that three of the walking-legs are just beginning to regenerate after autotomy and that the penultimate antero-lateral tooth on the left side of the carapace is broken or worn away at the tip. On folding the left cheliped against the carapace it is seen that the inner spine of the secondary carpus abuts against this tooth.

This case seems to be excluded from all those categories into which, as Bateson showed, the vast majority of cases of extra appendages in Arthropods naturally fall. The extra chela shows no trace of duplicity, as if it represented a pair

of appendages in secondary symmetry. On the other hand, the few cases of "double limbs" recorded by Bateson in Arthropods (as well as those recorded since, *e. g.* by Zeleny, Biol. Bull. ix. 1905, p. 152) have the two parts in *symmetry* with each other. Bateson discusses the possibility of "such a phenomenon as the representation of one of the appendages by two identical appendages standing in succession," and concludes that it is "probably unknown and perhaps against Nature" ('Materials for the Study of Variation,' 1894, p. 539). It would seem, nevertheless, that the specimen now described presents an instance of this very phenomenon, for the extra segments springing from what is morphologically the antero-ventral surface of the left cheliped are themselves unmistakably parts of a left cheliped.

XLVI.—*New Forms of Akodon and Phyllotis, and a new Genus for "Akodon" teguina.* By OLDFIELD THOMAS.

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*Akodon mollis altorum*, subsp. n.

The common olive-coloured Akodon of the Ecuadorean Andes.

Essential characters as in true *mollis*, but the fur longer and the colour much darker. Upper surface approximating to Ridgway's "olive," while in true *mollis* it is between wood-brown and broccoli-brown. Under surface greyish, washed with dull buffy. Hands and feet greyish, darker than in *mollis*. Tail averaging a little shorter than in *mollis*, blackish above, dull greyish white below.

Skull and teeth as in true *mollis*.

Dimensions of the type (measured in flesh):—

Head and body 110 mm.; tail 70; hind foot 22; ear 16.

Skull: greatest length 28; condylo-incisive length 26; interorbital breadth 4.7; palatal foramina 6.7; upper molar series 4.3.

*Hab.* Ecuadorean Andes from Quito southwards into Peru. Type from Cañar. Alt. 2600 m.

*Type.* Adult male. B.M. no. 99.9.9.99. Original number 252. Collected 8th April, 1899, by P. O. Simons. Presented by Oldfield Thomas.

An examination of the fine series of Akodons obtained in

Ecuador by Mr. Perry Simons shows that the form inhabiting the Andes is, as might be expected, readily distinguishable by its longer fur and deeper colour from that which inhabits the low and more or less desert coast strip at the north-western corner of Peru. The type of *A. mollis* came from Tumbes, at the northern end of this coast strip, and there is a good series in the Museum from Eten and other localities further southwards which agree fairly closely with it and are evidently referable to the same form. All Mr. Simons's other specimens, from the highlands, are of the darker character now described.

*Akodon arviculoides montensis*, subsp. n.

Like the ordinary large *Akodon* of East and Southern Brazil, but markedly paler and more buffy.

Size averaging slightly smaller than in true *arviculoides*. General colour above grizzled olive-grey, paler and more buffy than in *arviculoides*. Rump and sides prominently buffy or clay-colour. Under surface pale buffy, the bases of the hairs slaty. Hands and feet dull whitish, not so brown as in *arviculoides*.

Skull rather lighter in build than in true *arviculoides*, the brain-case slightly narrower. Supraorbital edges generally with a slight postorbital angle, which does not appear to occur in *arviculoides*.

Dimensions of the type (measured in flesh) :—

Head and body 128 mm.; tail 97; hind foot 24; ear 19.

Skull: greatest length 31; condylo-incisive length 27·7; zygomatic breadth 15; nasals 12·5; interorbital breadth 5; breadth of brain-case 12·4; palatal foramina 7; upper molar series 4·1.

*Hab.* Paraguay. Type from Sapucay.

*Type.* Adult male. B.M. no. 4. 1. 5. 35. Original number 1022. Collected 31st July, 1903, by W. Foster. Fifteen specimens examined.

“Trapped in monte.”—*W. F.*

This is evidently the Paraguayan representative of the common large *Akodon* of Brazil, for which, in its typical form, from Bahia, I believe the name *arviculoides* \*, Wagn., should be used, *orobinus*, Wagn., being a synonym of it;

\* I regret to be able to find no excuse for using the correct form of this word, *arviculoides*. Pictet wrote *arviculoides*, but Wagner used the incorrect form *arviculoides* four times over, in different publications, so that it cannot be treated as a misprint.

while *cursor*, Winge, appears to represent a darker subspecies occurring in the southern provinces. The new form is distinguishable from both by its much paler and more buffy colour and its slightly narrower skull.

*Akodon arosus*, sp. n.

*A. caliginosus*, Tomes, of Allen\* and Thomas †, nec *Hesperomys caliginosus*, Tomes, which is an *Oryzomys*.

A large dark-coloured species practically indistinguishable externally from *Hesperomys* (*Melanomys*) *caliginosus*. General colour above dark bistre-brown, little paler below. Ears, hands, feet, and tail blackish brown.

Skull that of a true *Akodon*; with broad interorbital region, smooth, unbeaded supraorbital edges, and evenly convex upper profile. Anterior edge of zygomatic plate slightly concave. Palatal foramina long, widely open, with smoothly rounded edges. Teeth typically *Akodont*.

Dimensions of the type (measured in flesh):—

Head and body 108 mm.; tail 75; hind foot 24; ear 16.

Skull: greatest length 29.3; condylo-incisive length 26.8; zygomatic breadth 15; nasals 11; interorbital breadth 6; breadth of brain-case 13; palatilar length 12.1; palatal foramina 6.6; upper molar series 4.9.

*Hab.* Andes of Ecuador, Peru, and Bolivia. Type from Mirador, Baños, Ecuador. Alt. 1500 m.

*Type.* Adult male. B.M. no. 99. 9. 9. 105. Original number 234. Collected 6th February, 1899, by P. O. Simons. Presented by Oldfield Thomas. About thirty specimens examined.

The two dark Andean species, one of *Akodon* and the other of *Oryzomys*, subgenus *Melanomys*, being practically indistinguishable externally, and Mr. Tomes's description of his "*Hesperomys caliginosus*" agreeing equally well with either of them ‡, both Dr. Allen and I took the description as applying to the *Akodon*, though admitting that the question could only be settled by an examination of Tomes's type.

That type being now in the Museum (B.M. no. 7. 1. 1. 128), I find that, unfortunately for our powers of divination, it is unquestionably an *Oryzomys*, and presumably identical with my *O. phæopus*, the type of the subgenus *Melanomys*. As a consequence, the *Akodon* needs a new name.

\* Bull. Am. Mus. N. H. iii. p. 210 (1891).

† Ann. & Mag. Nat. Hist. (6) xiv. p. 356 (1894).

‡ P. Z. S. 1860, p. 263.



*Phyllotis melanius*, sp. n.

A *Phyllotis* with the proportions and blackish colour of *Oryzomys caliginosus* and *Akodon arosus*.

Size about as in *Akodon arosus*. Fur fine, rather crisp, hairs of back about 6·0–6·5 mm. in length. General colour dark sepia or bistre, slightly greyer and less warm than in the two species above mentioned; median dorsal area rather blacker than the rest. Punctulation of the fur fine, about as in the *Akodon*, not so distinctly lined as in the *Oryzomys*. Under surface soiled buffy greyish, more different from the upper surface than in the species in question. Ears short, as in the similar species, not as in ordinary *Phyllotis*; greyish brown, the proectote blackish. Hands and feet greyish brown, a patch in the middle of each metapodial blackish brown. Tail shorter than head and body, markedly more hairy than in the *Oryzomys* or *Akodon*, brown above, dull greyish white below.

Skull similar in shape to that of *Phyllotis andium*, but rather larger. Supraorbital edges sharply square. Teeth proportionally small.

Dimensions of the type (measured in flesh):—

Head and body 105 mm.; tail 78; hind foot 22; ear 16.

Skull: greatest length 28·5; condylo-incisive length 25; zygomatic breadth 15; nasals 10·8; interorbital breadth 4; breadth of brain-case 13·1; palatilar length 13; palatal foramina 7; upper molar series 4·3.

*Hab.* Porvenir, Bolivar, Ecuador. Alt. 1800 m.

*Type.* Adult male. B.M. no. 99. 9. 9. 107. Original number 258. Collected 12th March, 1899, by P. O. Simons. Presented by Oldfield Thomas.

This animal carries on one of the most remarkable cases of geographical isomorphism known to me. The practical identity in external appearance of *Oryzomys (Melanomys) caliginosus* and *Akodon arosus* was already known (though, as shown above, under erroneous names). And now, mixed up with Mr. Simons's *Akodons*, I find a third similar blackish species a member of the genus *Phyllotis*, as shown by its skull and teeth. By its slightly lighter underside, its more hairy and faintly bicolor tail, and its not wholly dark feet it is just distinguishable externally from the other two; but the resemblance is still so great as to excuse anyone for confusing it with them. The three, therefore—*Oryzomys*, *Akodon*, and *Phyllotis*,—all inhabiting the same region, are so similar to

each other that they would be supposed to belong to a single species were the skulls and teeth not examined.

Of the genus *Phyllotis* the new species is perhaps most allied to *Ph. andium*, but has much shorter ears and tail, apart from its darker coloration.

A new Genus for "Hesperomys" or "Akodon" teguina,  
Alst., and its Allies.

On going through the vole-like vesper-mice of the Neotropical region to see which should be assigned to *Akodon* and which to *Zygodontomys* (no easy task, for the two are unexpectedly close to each other), I have found that, with the uncertain exception of *A. urichi* and *venezuelensis*, no species rightly assignable to *Akodon* are yet known to occur north of a line drawn from the S.W. corner of Colombia to the eastern angle of Brazil north of Pernambuco. "*Akodon*" *bogotensis* was some time ago separated as a *Microtus*, and I now find that "*A.*" *meridensis*, Allen, and "*A.*" *fuscinus*, Thos., of Marajo, are both members of *Zygodontomys*, which may be distinguished from *Akodon* by its rather less hypsodont and less complicated molars and its more distinctly angular or beaded supraorbital edges; the front margin of  $m^1$ , in young specimens, is distinctly notched in *Akodon*, entire in *Zygodontomys*, but unfortunately adult specimens do not show this diagnostic mark.

One small group of species, however, from far north of the above-defined line is clearly not referable either to *Zygodontomys* or *Akodon*, differing very definitely from both by the structure of the teeth. This consists of the "*Hesperomys*" *teguina* of Alston, more recently known as "*Akodon*" *teguina*, and the species or subspecies closely related to it described by Bangs and Allen. I would propose to form for it the following:—

SCOTINOMYS, gen. nov.

Most nearly related to *Akodon*, but the teeth of different structure and the zygomatic plate almost without any projection forwards.

Molars exceedingly narrow, laterally compressed, the notches and re-entrant angles, both on upper and lateral surfaces, much reduced in depth, so that the upper profile in little-worn teeth is almost straight, without deep angles between the laminae, and similarly the outlines of the teeth

when viewed vertically are more smoothly continuous. This result seems to be attained by a crushing together of the elements of the teeth, and consequent obliteration of the normal structure.

In old specimens with worn teeth these characters are not readily perceptible, but another and still more striking one becomes then available, namely the number of the molar roots, which in a hypsodont animal only become visible in old age.

The molars of old specimens of both *Akodon* and *Zygodontomys* show on their inner aspect the following roots:— $m^1$ , one root under the anterior lamina and one broad one supporting both the second and third laminae;  $m^2$ , one broad root under the two laminae;  $m^3$ , one root. In *Scotinomys*, on the other hand, every lamina of each tooth has its separate supporting root, so that on the inner side there are three in  $m^1$ , two in  $m^2$ , and two (less distinctly separated) in  $m^3$ . This number of roots I fail to find in any of the allied genera.

*Type.* *Scotinomys teguina* (*Hesperomys teguina*, Alst.). Other described forms: *S. teguina apricus*\*, Bangs, *S. xeramelinus*, Bangs, and *S. irazu*, Allen.

## XLVII.—A Revision of the Asilidæ of Australasia.

By GERTRUDE RICARDO.

[Continued from p. 166.]

### BLEPHAROTES, Westwood in Duncan.

The Natural Libr. xxviii. p. 329 (1840).

*Blepharis*, Macq., Dipt. Exot. i. (2) pl. viii. fig. 1 (1838) [præocc. Cuv. Pisc. 1817; Serv. Orth. 1831].

*Craspedia*, Macq., Dipt. Exot. i. (2) p. 198 (1838) [præocc. Hübner. Lepid. 1816].

*Psecas*, Jænn., Abhandl. Senckenb. naturf. Ges. vi. p. 359 (1867).

The following species have been described and one new species is added;—

*Blepharotes coriarius*, Wied., Auss. zweifl. Ins. ii. p. 644 [*Asilus*] (1830); Macq., Dipt. Exot. i. (2) p. 198 [*Craspedia*] pl. viii. fig. 1 [*Blepharotes*] (1838); Erichson, Archiv f. Naturgesch. vii. 2 (1841); Schiner,

\* Possibly an *Oryzomys* of the *Melanomys* section, in spite of its strong resemblance to *S. teguina*.

- Verh. zool.-bot. Ges. Wien, xvi. p. 690 [*Craspedia*] (1866); Loew, Zeitschr. f. d. ges. Naturwiss. N. F. x. (xliv.) 75 (1874); Froggatt, Australian Insects, p. 300 [*Craspedia*] (1907).
- Blepharotes splendidi-simus*, Wied., Auss. zweifl. Ins. ii. p. 645 [*Laphria*] (1830); Guérin, Icon. d. Règne Anim. vii. Ins. p. 536 nota [*Laphria*] (1835); Schiner, Verh. zool.-bot. Ges. Wien, xvi. p. 694 [*Craspedia*], et xvii. p. 383 [*Craspedia*] (1867); Loew, Zeitschr. f. d. Ges. Naturwiss. N. F. x. (xliv.) p. 75 (1874).—*Blepharotes abdominalis*, Westw. apud Duncan, The Nat. Libr. xxviii. p. 329, pl. xxxv. fig. 1 (1840).—*Craspedia audouinii*, Macq., Dipt. Exot. i. (2) p. 100 (1838).—*Psecas fasciatus*, Jænn., Abhandl. Senckenb. naturf. Ges. vi. p. 360, pl. xlv. fig. 2 (1867).
- Blepharotes vivax*, Hermann, Zeit. Hymen. et Dipt. vii. i. p. 76 [*Craspedia*] (1907).
- Blepharotes aterrima*, Hermann, l. c. [*Craspedia*] (1907).
- Blepharotes flavus*, sp. n.

The genus was established by Macquart for *Asilus coriarius*, Wied., and is peculiar to Australia and New Guinea. It is at once distinguished by the very broad abdomen adorned at the sides by bushy tufts of hairs and by the short terminal style of antennæ. The species described by Loew as *B. macrostylus* I have placed in a new genus, *Pararatus*, as, owing to the form of the female ovipositor, it could not possibly be included in this genus.

In neuration of the wing *Blepharotes* is allied to *Pararatus*, *Neoaratus*, and *Asilus in sensu stricto*; its place among the other genera appears doubtful. For the present I have followed Schiner, and placed it at the head of genera with antennal bristle bare.

#### *Blepharotes coriarius*, Wiedemann.

Specimens of this species, male and female, are in the Brit. Mus. Coll. from W. Australia (*Fyson*), Melbourne, and Moreton Bay, and in Mr. French's Coll. from Dandenong Ranges, Victoria. Mr. Froggatt states that the species is widely distributed all over the interior of the continent, and can often be seen flying about with its beak buried in the back of a large cockchafer beetle, its long legs clasping its victim and sucking its blood.

The species is distinguished by the red colour of the abdomen, sides fringed with black tufts of hairs, white hairs appearing on the second, fifth, and sixth segments; underside black, with white pubescence. *Palpi* often have white hairs intermixed with the black ones. Fore femora armed with spines as well as the posterior ones.

Length, ♂, 27 mm.

*Blepharotes splendidissimus*, Wiedemann.*Blepharotes abdominalis*, Westwood.*Craspedia audouini*, Macq.*Psecus fasciatus*, Jænn.

Type of *C. audouini* seen in Paris Museum, 12. 4. 11, from Moreton Bay. Its identity with the Wiedemann species is correct.

Specimens of this species, males and females, are in the Brit. Mus. Coll. from Victoria, Moreton Bay, and Burpengary, S. Queensland (*Bancroft*), and in Mr. French's Coll. from Dandenong Ranges, Victoria. Mr. Froggatt remarks he has frequently captured this species flying about the Botanic Gardens, Sydney, in early summer.

The species is distinguished by the dark brown *wings* and black *abdomen*, the segmentations narrowly rufous; sides with black tufts of hairs.

Length from 25 mm.

*Blepharotes viva.v.*, ♀, Hermann.

From New South Wales.

Is described as allied to *B. coriarius*, but is smaller, and distinguished by brighter markings of the *thorax* and by the black *wings* with violet reflections.

Length 25 mm.

*Blepharotes aterrima*, ♀, Hermann.

From Dutch New Guinea.

Is described as black, sides of *thorax* with long yellow hairs. *Wings* very dark-coloured, with violet reflections.

Length 35 mm.

*Blepharotes flavus*, sp. n.

Type (♂) from Mackay, Queensland (*Turner*), and another from Townsville, Queensland (*F. P. Dodd*).

Type (♀) and another female from Burpengary, Queensland (*Dr. T. L. Bancroft*), and a male in Mr. French's Coll. from Victoria.

This species is nearly related to *B. coriarius*, Wied., but is distinguished by the lighter-coloured *abdomen*, which is yellowish, not deep fulvous red; the *wings* are usually rather paler, and the size of insect is smaller, the *abdomen* not so broad; the white hairs on the sides of this latter are present on each segment except the last two, not only on the third

and sixth as in the Wiedemann species. A tuft of white hairs is present on the *forehead*, which is usually absent in *B. coriarius*, and the white hairs on the coxæ are chiefly limited to the anterior pair. It is distinguished from *B. vivax*, Hermann, by the absence of any bright colouring on the *thorax*, and the *wings* are lighter, not black with violet reflections; the *abdomen* also paler.

*Male*.—*Abdomen* pale yellow, rather narrow compared with those of other species of this genus, bordered by black tufts of hair, with which white hairs are intermixed below.

Length 30 mm.

*Face* black, covered with yellowish tomentum, and with long pale yellow bristles forming the moustache, chiefly confined to the oral opening. *Palpi* with black hairs. Beard white. *Antennæ* black, the third joint long, with a short bristle. *Forehead* with black pubescence, and a tuft of white hairs anteriorly on each side. Hind part of head with long white hairs and some shorter black hairs at vertex. *Thorax* black, with some grey tomentum on dorsum; sides with black bristles and grey tomentum; breast black, with grey tomentose stripes. *Scutellum* dark brown, with black bristles. *Abdomen* with the first segment black, with black hairs, the remaining ones pale yellow, the posterior borders paler; the white hairs at sides are below the black ones and most apparent on the fourth, fifth, and sixth segments; underside dark brown, with chiefly black pubescence. *Legs* black, femora armed with black bristles, the pubescence on the fore coxæ long, yellowish white; a few are visible on the other coxæ, otherwise their pubescence is black. *Wings* dark grey, with reddish-yellow veins, the posterior branch of fork strongly curved, the second posterior cell wide, almost touching the former vein at one place; the third posterior very wide, twice the width of the second at its widest part; the fourth posterior closed, the anal closed near the border; the small transverse vein about the middle of the discal cell, which is long and narrow.

*Female*.—*Abdomen* is darker yellow and broader, not so glabrous as is that of *B. coriarius*; the white hairs at sides are more apparent than in the male. Ovipositor blackish, short, not compressed at sides.

Length 35 mm.

#### PROMACHUS, Loew.

Lin. Ent. iii. p. 390 (1848).

*Bactria*, Meg., in litt. apud Meig.

*Telejoneura*, Rond., Archivio per la Zool. iii. p. 48 (1863).

*Trupanea*, Macq., Dipt. Exot. i. (2) p. 207 (1838) [præocc. Schrank, Dipt. 1803].

The following species have been described as from Australia and Tasmania:—

*Promachus grandis*, Macq., Dipt. Exot. i. (2) p. 217 [*Trupanea*] (1838).

*Promachus clausus*, Macq., l. c. Suppl. i. p. 208 [*Trupanea*] (1846).

*Promachus tasmanensis*, Macq., l. c. Suppl. ii. p. 55 [*Trupanea*] (1847).

*Promachus rufipes*, Macq., l. c. Suppl. iii. p. 186 [*Trupanea*] (1847).

To these species is now added:—

*Promachus interponens*, Walker, Proc. Linn. Soc. London, v. p. 280 [*Trupanea*] (1861), described from I. Batjan, but now found in N.E. Queensland.

*Promachus doddi*, sp. n.

*Promachus floccosus*, Kirby, Trans. Ent. Soc. London, 1884, p. 273 (1884); Hutton, Trans. New Zealand Instit. xxxiii. p. 21 nota (1901), was omitted by Hudson from his list of New Zealand Diptera, as he believed there was a mistake in the locality and that the type came from Opobo, W. Africa, there being no such place in New Zealand. The type, a male, is labelled "Opabo, New Zealand, H. W. Marsden, 1880," and is apparently a specimen of *Promachus fasciatus*, Fabr.

*Promachus grandis*, Macquart.

Type, seen by me in Paris Museum, 12. 4. 11, in a very bad state; abdomen almost wholly destroyed.

Macquart describes it thus:—

Black; face and moustache yellow; beard white. Tibiæ chestnut-coloured. Wings brown.

Length 12 lines.

Epistome bordered with black bristles. Forehead with brownish tomentum. Thorax (denuded), sides with brownish tomentum. Abdomen with indistinct blue reflections; sex indistinguishable, owing to its state. Tibiæ and tarsi with yellow tomentum below. Wings with violet reflections.

From New South Wales.

But the type I saw has the wings greyish, veins yellow, with a pale streak on the fore border, the fourth posterior cell closed, the small transverse vein situated at the middle of discal cell. Face broad, covered with golden-yellow tomentum and some yellow hairs at sides. Moustache of yellow bristly hairs reaching halfway up the face, below at the sides there are stout black bristles. Palpi with black

bristly pubescence. *Antennæ* blackish, the third joint wanting. *Legs* very stout, black; femora incrassate, with black spines; tibiæ reddish, with black spines and some short, appressed, yellowish pubescence; underside of posterior tibiæ with thick bright fulvous pubescence, and some on the posterior femora.

*Promachus clausus*, ♂, Macq.

Dipt. Exot. Suppl. i. p. 208 [*Trupanea*] (1846).

Is described as a black species, the *abdomen* with white segmentations. *Wings* with the first posterior cell closed.

Length 9 lines.

*Promachus rufipes*, ♂, Macq.

Is described as an ashy-grey species. *Abdomen* with dorsal black spots. Moustache white. *Palpi* with black hairs. *Legs* red.

Length 10 lines.

The name is preoccupied.

*Promachus tasmanensis*, ♂, Macq.

Is described as ashy grey. *Abdomen* with dorsal black spots. Moustache yellow. *Antennæ* and *legs* black; tibiæ testaceous.

Length 10 lines.

*Promachus interponens*, Walker.

Co-types two females from Batjan.

Male and female from N.E. Queensland (*C. M. Kelsall*), 1910.

A robust blackish species, with reddish *legs*; the *abdomen* in the female with the first four segments broad, the remaining ones gradually tapering to a point, sides and segmentations ashy grey. *Wings* with a grey streak in the first submarginal cell.

Length of co-types 27–28, ♂ 26 mm.

*Female*.—*Face* blackish, with grey tomentum; a few yellow and black hairs below antennæ; the tubercle well developed, carrying the moustache, which consists of stout black bristles continued round the oral opening, with a few long white hairs intermixed. *Palpi* blackish, with long bristly hairs. Beard white. *Antennæ* black, the first two joints with bristly black hairs, third wanting. *Forehead*



with a row of black bristly hairs each side and some yellow hairs. Hind part of head armed with very stout black bristles. *Thorax* black, with grey tomentum; two black bristles above base of wings, four or more below, and others on posterior border of thorax, intermixed with black hairs; sides with grey tomentum and white pubescence. *Scutellum* as thorax, armed with a double row of bristles. *Abdomen* black, with narrow ashy-grey segmentations on the first four segments, uniting with the ashy grey sides, the pubescence pale yellow or white; the last three segments narrow, wholly black; the ovipositor black, as long as the last segment; underside ashy grey, with long white pubescence. *Legs* red, the femora largely black, only red below, the apices of the tibiæ and the tarsi wholly black; all the numerous bristles are black, pubescence on femora and tibiæ whitish, on coxæ white and long. *Wings* hyaline tinged with pale brown, the streak in first submarginal cell large and distinct; veins fulvous, the small transverse vein on basal third of discal cell.

*Male*.—Hairs intermixed in moustache are more numerous and pale golden yellow. *Antennæ* with some fulvous thick pubescence on lower side of first joint; the third joint with long terminal bristle. Beard and hairs on legs same colour as hairs of moustache. *Abdomen* narrower, the ashy-grey colour being replaced by the same golden-yellow colour present on all the posterior borders and sides of segments; genital organs black, prominent; red colour of *legs* more inclining to yellow.

*Promachus doddi*, ♀, sp. n.

Type (♀) from Townsville, Queensland (*F. P. Dodd*), and type (♂) and another and a female from Endeavour River, Queensland, in Mr. French's Coll., and other females from Burpengary, Queensland (*Bancroft*).

A large species with black oblong spots on the greyish *abdomen* reaching the anterior border of segments, but not attaining the side borders; *legs* reddish, with white pubescence, and moustache yellowish white.

Length, ♂ 25, ♀ 27 mm. (without ovipositor).

*Face* black, covered with whitish tomentum; the moustache above oral opening consists of strong yellowish bristles and some fine hairs intermixed, which latter are continued up middle of face to base of antennæ. *Palpi* in ♂ with a few long black bristles at the apex and whitish-yellow bristle-like hairs below, in the ♀ wholly whitish yellow. Beard

whitish. *Antennæ* brown, with black hairs on the first two joints, the third with a long bristle at end. *Forehead* black, covered with greyish tomentum, a row of black hairs next the eyes, and beyond these white hairs reaching to antennæ; back of head armed with black bristles and whitish hairs. *Thorax* covered with greyish tomentum, ground-colour brownish, with two distinct brown (♀), black (♂) median stripes; some very short, inconspicuous, black pubescence on dorsum; sides with black bristles and covered with grey tomentum below and white pubescence; thorax posteriorly and *scutellum* on its posterior border with black bristles, the latter black, with grey tomentum and some white hairs. *Abdomen* in ♂ stout, robust, appearing black on each segment, with the posterior borders and the sides grey, pubescence on dorsum chiefly black, at sides with thicker whitish pubescence; venter black, but covered with grey tomentum and with fine white hairs; genital organs black, with black hairs above and some white ones below; in the ♀ the black spots are smaller and more distinctly marked, the pubescence even on the black spot chiefly yellowish but shorter; ovipositor black, shining, with white pubescence below. *Legs* red, the coxæ, knees, and apices of tibiæ, and all tarsi black; posterior tibiæ more largely black, especially in the ♀; coxæ with long white pubescence; femora with white short pubescence, thickest on the posterior pair; bristles black, on the middle and posterior pairs with some yellowish ones on their lower borders; tibiæ with white pubescence and black bristles; tarsi with black pubescence and bristles, anterior pairs with some white pubescence. *Wings* hyaline, veins yellowish, small transverse vein below the middle of the discal cell.

This species differs from *P. rufipes* in having white-haired *palpi*, the black spots on *abdomen* not triangular, and in the femora and tibiæ being the same colour, with some white bristles, and the size of *P. rufipes* is only 20 mm.

A male from Endeavour River, Queensland, and a female, both in Mr. French's collection, differ from the above by having the moustache and the *palpi* of black and white hairs, and the femora have no white bristles; for the present they may be considered as only a variety of *P. doddi*.

The following species have been described from New Guinea and other parts of the Australasian Region:—

*Promachus bifasciatus*, Macq.; *P. addens*, *complens*, *contradicens*, *gilolonus*, *transactus*, Wlk.; *P. inornatus*, Wulp;

*P. albicauda*, Wulp, *calorificus*, *concolor*, Wlk., from Celebes.

The type of *Promachus bifasciatus*, a female from Java, seen by me in Paris Museum, 12. 4. 11; the supposition that *P. strenua*, Wlk., is the same is correct.

#### PHILODICUS, Loew.

Linn. Ent. iii. p. 391 (1848).

The only species recorded from the Australasian Region is

*Philodicus canescens*, Walker.

List Dipt. vii. Suppl. 3, p. 608 [*Trupanea*] (1855); Kertész, Cat. Dipt. p. 218 [*Promachus*] (1909).

Type (♀) from New Holland.

A blackish species, with grey posterior borders on abdominal segments. *Wings* clear.

Length 21 mm.

*Face* covered with silvery-grey tomentum. Moustache of long yellow hairs. *Palpi* brown, with whitish hairs. Beard yellowish white. *Antennæ* black, the third joint wanting. *Forehead* with yellowish hairs at sides. Hind part of head with stout yellowish bristles and with white hairs. *Thorax* brownish, with grey tomentum on shoulders and sides, two narrow dark stripes on centre of dorsum, pubescence black; sides and breast with silvery-white tomentum; two stout black bristles above base of wings and numerous ones on posterior part of thorax. *Scutellum* covered with grey tomentum and with long white hairs. *Abdomen* long and slender, brownish black, with short greyish pubescence, the posterior borders of all segments grey tomentose. *Legs* black, with short grey pubescence, tibiae yellowish, all bristles black. *Wings* hyaline, greyish at apex; veins fulvous, small transverse vein below the middle of discal cell, fourth posterior cell closed.

#### PROCTACANTHUS, Macquart.

Dipt. Exot. i. (2) p. 236 (1838).

The following species are recorded from Australia:—

*Proctacanthus durvillei*, Macq., *l. c.* p. 237.

*Proctacanthus spilogaster*, Thoms., Eugen. Resa, Dipt. p. 469 (1860).

The type of *Proctacanthus posticus*, Walker, is a *Bathypogon* sp. (see 'Annals,' ser. 8, vol. x. 1912, p. 152).

*Proctacanthus durvillei*, Macquart.

Seen in Paris, 12. 4. 11.

Type a female from Tasmania in bad preservation.

Blackish. *Face* very narrow above, below wider and wholly taken up by a tubercle, covered with yellowish tomentum and very short pubescence. Moustache seems destroyed. *Palpi* with black bristly hairs. *Antennæ* destroyed. Head excised behind. Beard yellow. *Scutellum* with remains of golden tomentum. *Abdomen* apparently blue-black, shining. *Legs* fairly stout, black; femora with white hairs below; tibiæ and tarsi with many reddish bristles; tibiæ reddish.

Macquart described it thus, and states it came from Bay of Jervis, New South Wales (New Holland):—

Black. *Thorax* with yellow pubescence and three black stripes. *Tibiæ* testaceous.

Length 9 lines. ♀.

*Face*, moustache, and beard yellow. *Forehead* black, with slight grey tomentum and black hairs. *Abdomen* shining black with blue reflections. *Coxæ* and femora with whitish hairs; tibiæ and tarsi with yellow bristles. (*Wings* mutilated.)

*Proctacanthus spilogaster*, Thomson.

From Sydney.

Described as allied to *P. durvillei*, Macq.

Black, the *face*, spots on *thorax* and sides of *abdomen* yellow-haired; femora brown; tibiæ pale yellow, their base and apex and the tarsi black, these latter with the metatarsus yellow at base. *Wings* hyaline; veins brown, the transverse vein below the middle of discal cell.

Length, ♀, 17 mm.

ERAX, Scop.

Entomol. Carniol. p. 359 (1763).

*Efferia*, Coquill. Canada Ent. xxv. p. 175 (1893).

The following species are recorded from the Australasian Region, most of them from Australia:—

*Erax albiventris*, Macq., Dipt. Exot. Suppl. iv. p. 386 (1849).

*Erax asiloides*, Macq., l. c. p. 386, pl. viii. fig. 8.

- Erax caudatus*, Fabr., Syst. Antl. 171. 33 [*Dasyppogon*] (1805). See Kertész, Cat. Dipt. p. 234 (1909), for further references.  
*Erax fuscipennis*, Macq., Dipt. Exot. i. (2) p. 225.  
*Erax plantaris*, Thoms., Eugen. Resa, Dipt. p. 468 (1869).  
*Erax salomon*, Macq., l. c. p. 226.  
*Erax varymystaceus*, Macq., Dipt. Exot. Suppl. ii. p. 56.

No specimens of this genus are present in the Brit. Mus. Coll. or Mr. French's Coll.

*Erax albiventris*, Macquart.

Type (a male) seen in Paris Museum, 12. 4. 11.

A large species, distinguished by the tomentose ashy-grey coloured sixth segment of *abdomen*, which is black, with yellowish-grey tomentose lateral spots.

*Face* broad, with a large tubercle. *Moustache* white, with black bristles intermixed. *Antennæ* black, the arista long, almost the length of antenna, the first two joints with white hairs. *Legs* stout, black; the tibiæ red, the hind pair broader on the apical half, with dense fulvous pubescence; the anterior femora with white hairs and no bristles, the others with black bristles. *Wings* dilated, with an appendix.

Macquart described it thus:—

Black. Thorax with ashy-grey pubescence and black stripes. Abdomen with broken silvery segmentations and the last segment but one silvery; underside white. *Moustache* above black, below yellow. *Tibiæ* testaceous. *Wings* dilated. ♂. Pl. viii. fig. 4.

Length 10 lines. ♂.

*Palpi* with black hairs. *Beard* white. *Face* with greyish-white tomentum; *moustache* yellowish, with black bristles above and at sides. *Forehead* and *antennæ* black. *Thorax* with the intermediate stripe bordered by a white line; sides with ashy-grey tomentum, changing to brownish. *Abdomen* with white hairs at sides; the second, third, and fourth segments bordered posteriorly with a silvery-white colour, widely interrupted in the middle, and comprising the whole width of the segments near the junction of the arches; fifth on posterior border almost wholly white; sixth entirely dull silvery white; seventh short, black, with a white spot on each side of the anterior border; underside white, with white hairs; genital organs large, brown. *Legs* black, with white hairs and black bristles; tibiæ testaceous, the anterior and intermediate ones black at apex; posterior pair a little swollen towards the middle behind. *Wings* dilated on external border, reddish grey.

From the east coast of New South Wales. Paris Museum.

*Erax asiloides*, Macquart.

Type probably destroyed.

Described as black. *Abdomen* with yellow segmentations. *Legs* black, posterior femora at base and tibiæ red. *Wings* with no appendix.

Length, ♀, 6 lines without ovipositor.

From the figure of wing this species hardly appears to belong to this genus.

*Erax caudatus*, Fabricius.

Placed by Schiner in this genus, but not known to him.

Described as a female, 11 lines.

Yellow, with brown stripes; *abdomen* black, with golden bands and light honey-yellow legs. Beard white. Moustache of seven yellowish bristles. *Wings* yellowish.

From Australia.

*Erax fuscipennis*, Macquart.

Described as black. *Thorax* golden-coloured, with black stripes. *Legs* black; tibiæ testaceous, black at apices. *Wings* brown.

Length  $9\frac{1}{2}$  lines. ♂.

*Erax plantaris*, Thoms.

Described as brown. Allied to *Neoaratus hercules*, Wied., but *wings* not dilated in the middle and colour of *abdomen* different. *Antennæ* yellow. *Abdomen* yellow, at base olive. *Legs* chestnut; knees and tarsi black, posterior tibiæ yellow.

Length 23 mm. ♂.

From Australia.

*Erax salomon*, Macquart.

Seen in Paris Museum, 12. 4. 11.

Type a male. *Abdomen* half gone and in a bad state.

*Face* with a large protuberant tubercle, bearing the moustache. *Antennæ* black, the first two joints with black hairs, the third reddish, small and conical, with a long terminal arista almost the length of the entire antenna. *Legs* black, tibiæ testaceous; the bristles mostly black, some yellow ones on the femora. *Wings* dilated, neuration very similar to that of *Erax completus*, Macq. (see Dipt. Exot. i. (2) pl. ix. fig. 9), but the posterior branch of fork of third

vein does not curve towards the anterior border anything like so much, it ends just at the apex of wing; no appendix, but the rudiment of one is present.

Macquart describes it thus:—

Black. Abdomen ( $\sigma$ ) black, the three apical segments silvery. Legs red; femora and posterior tarsi black.

Length  $9\frac{1}{2}$  lines.  $\sigma$ .

Forehead and face with whitish tomentum; moustache black, mixed with white. Beard white. Antennæ black. Thorax anteriorly reddish grey, posteriorly slate-coloured, with black stripes and a black triangular spot on the posterior border. Abdomen whitish at the sides. Legs with black bristles, femora and the anterior and intermediate tibiæ with white hairs; posterior tibiæ black at apex. Wings a little brownish, dilated; the second submarginal cell with a very short appendix.

From the Solomon Islands, Port Praslin. M. Durville. Paris Museum.

Macquart also described, in Suppl. i. p. 210, a female from Sydney Island, Oceania, which he suggested might be the female of this species.

#### *Erax varymystacæus*, Macquart.

Described as having *abdomen* black, with sides and segmentations ashy grey. *Thorax* ashy grey, with black stripes. *Legs* black, tibiæ testaceous. *Wings* with an appendix.

Length 7 lines.  $\text{♀}$ .

From New South Wales.

#### Subgenera of *Asilus*.

Williston in his 1908 edition of 'Manual of N. American Diptera' considered many of the subdivisions of the old genus *Asilus* very vague and often not based on true generic characters, and placed them in his table of genera as subgenera. Prof. Hine in "Robberflies of the Genus *Asilus*," Ann. Ent. Soc. America, ii. no. 2, pp. 136-172, follows Williston.

#### GLAPHYROPYGA, Schiner.

Verh. zool.-bot. Ges. Wien, xvi. p. 674 (1866).

There are only two species recorded in this genus—*G. himantocerus*, Wied., from Brazil, for which Schiner formed the genus, and *G. australasia*, Schiner, 'Novara' Reise, Dipt. p. 187 (1866), from Australia.

Length 7 lines.

The description of this reads suspiciously like that of *Heligmoneura lascus*, Walker; but this genus is distinguished by the broad third joint of *antennæ*, almost the same width throughout; this last particular is true of *H. lascus*, but the width is not very great. Schiner gives no idea of the proportion of the width to the length.

#### DYSMACHUS, Loew.

Dipt. Südafrik. p. 143 (1860).

*Lophonotus*, Macq., Dipt. Exot. i. (2) (1838), præocc. Steph. Lepid. 1829.

The genus distinguished by the mane-like bristles on dorsum of thorax is only represented in the Australasian Region as yet by one species from Melbourne, viz. :—

*Dysmachus rudis*, Walker.

List Dipt. pt. vii. Suppl. iii. p. 737 (*Asilus*) (1855).

Type (♂) from Melbourne (Baly Coll.).

A small dull-coloured species with hyaline wings. *Legs* black, tibiæ reddish.

Length 12 mm.

*Face* blackish, covered with dull yellowish tomentum; tubercle occupies centre of face, not very large; the moustache, consisting of strong black bristles, reaches to the antennæ; the oral aperture surrounded at sides by dull yellowish hairs, a few of these are intermixed with the moustache below. *Antennæ* blackish, the first two joints together not so long as the third joint, both with thick black hairs; the third joint long, cylindrical, with a short style-like arista. *Forehead* with some long black hairs, longest on the ocelligerous tubercle. Hind part of head with yellowish hairs and black incurved bristles at vertex. *Thorax* brownish, with stripes of yellowish tomentum, the black hairs long, bristly, disposed like a mane, reaching the whole length of the thorax. *Scutellum* paler coloured, with two long black bristles. *Abdomen* brownish, with some yellowish tomentum, black bristles on posterior borders of segments not reaching the centre, dorsum with short black pubescence, sides of basal segments with larger yellowish hairs. Genital organs black, fairly large and prominent. *Legs* black, the coxæ and underside of femora with long yellowish hairs, the tibiæ dull reddish on basal two-thirds, first joint of tarsi same colour: pubescence yellowish on the



tibiæ, elsewhere chiefly black. *Wings* hyaline, veins reddish, the small cross-vein beyond the middle of discal cell, the first posterior cell almost the same width throughout, the fourth closed.

### MACHIMUS, Loew.

Linn. Ent. iv. p. 1 (1849).

This genus has not been recorded before from the Australasian Region; but two species are known from the Oriental Region, one being *Asilus atratulus*, Wlk., the type of which is in the Brit. Mus. Coll., from Java, a species with the legs black. I believe *Asilus antilco*, Walker, belongs to this genus, but it is in bad preservation. There is a female from Queensland which also appears to belong to this genus, but is a different species.

#### *Machimus antilco*, Walker.

List Dipt. ii. p. 458 (1849), et vii. Suppl. 3, p. 737 (1855).

Type (♀) from Port Stephen.

Length 15 mm.

A blackish species. *Face* black, with yellowish tomentum at sides, the tubercle distinct, the moustache consisting of numerous black bristles and hairs. *Antennæ* black, the first two joints with black hairs. The *thorax* black with grey stripes. *Legs* black; the tibiæ yellow, black at apex; the fore femora armed below with at least four stout short bristles and incrassate, on the hind femora these bristles are present but not so strong, and they are not so incrassate. *Wings* hyaline, the small transverse vein beyond the middle of discal cell. Abdomen very dirty and ovipositor not quite complete.

### HELIGMONEURA, Bigot.

Thoms., Archiv. Entom. ii. p. 356 (1858).

*Mochtherus*, Loew, Linn. Ent. iv. p. 58 (1849) [præoc. Schmidt, Goebel Coll., 1846].

*Neomochtherus*, Ost.-Sack., Cat. Dipt. N. Amer. ed. 2, pp. 82 & 235 (1878).

The only species recorded from the Australasian Region are:—

- H. *lascus*, Wlk., List Dipt. ii. p. 466 [*Asilus*] (1849), et vii. Suppl. 3, p. 743 [*Asilus*] (1853); Hutton, Cat. New Zealand Dipt. &c. p. 30 [*Asilus*], et Trans. New Zealand Inst. xxxiii. p. 22 [*Stenoprosopis*] (1901).
- H. *lauta*, v. d. Wulp, Tijd. v. Ent. (2) vii. (xv.) p. 242 [*Mochtherus*] (1872), et Cat. Dipt. S. Asia, p. 96 [*Mochtherus*] (1896).

II. *gnava*, v. d. Wulp, *l. c.* p. 243, pl. xii. fig. 3 (1872), et xix. p. 174 (1876); Ost.-Sack. Ann. Mus. Civ. Genova, xvi. p. 423 [*Mochtherus*] (1882).

H. *patruelis*, v. d. Wulp, is recorded from Celebes.

*Heligmoneura lascus*, Walker.

Types (♂ ♀) from Colenso, New Zealand, also recorded by Hutton from Auckland and Wellington, New Zealand.

The types presented by Dr. Hooker are not identifiable, but there are male and female specimens from New Zealand (Col. Sinclair, 1845) and others (Col. Botton, 1854), which agree with the description given by Walker. This species and another new species from New Zealand, *S. meridionalis*, were placed by Hutton in the genus *Stenoprosopis*, containing species from America, with the exception of one from Bengal; this species, however, belongs to *Heligmoneura*, having the face very narrow, raised round the mouth, forming a very slight tubercle (in *Stenoprosopis* the face has no tubercle and the moustache is composed of only a few long hairs), and appears nearly allied to *H. gnava*, v. d. Wulp, from Java, Obi, Halmahera, and Waigiou. *Stenoprosopis meridionalis*, Hutton, Trans. New Zealand Inst. xxxiii. p. 23, will probably prove to be a species of *Heligmoneura*.

*H. lascus* is described as a small species with reddish-yellow legs, the abdomen black, with rather broad greyish or dull yellowish segmentations. Wings clear, grey at apex and round posterior border.

Length 12–13 mm.

Description from fresh specimens from New Zealand (*Cockayne*).

*Male*.—Face very narrow, blackish, covered with dense yellowish pubescence; tubercle small, extending the whole width of face above the oral opening; the moustache consists of glistening long white hairs which surround the oral opening, three or four yellow bristly hairs are visible above. Beard of sparse white hairs. Palpi reddish yellow with white hairs. Antennæ blackish, the second joint and base of third pale reddish yellow; the first joint long, narrow, the second joint broader and about a third shorter, both with yellowish hairs at sides; the third joint long, conical, with terminal arista two-thirds its length. Hind part of head with white hairs, reddish yellow and stouter at vertex. Thorax and abdomen with the ground-colour dull yellowish marked with brown stripes and spots, the thorax with black bristles at side. Scutellum dull yellowish, with two reddish-yellow bristles. Abdomen with

irregularly oval-shaped, blackish-brown, large spots on centre of each segment, reaching the anterior but not the posterior border, the last segment almost wholly black; the genital organs large, shining black; dorsum with sparse, yellow, short pubescence and longer hairs at sides, thickest on the first segment; underside almost wholly blackish, shining. *Legs* yellowish, shining, upperside of femora blackish, apices of tibiae and tarsal joints brown; bristles on legs chiefly yellowish or white. *Wings* hyaline, apex and posterior border grey; veins brown, the small transverse vein just beyond middle of discal cell; first posterior cell long and narrow, the fourth closed.

*Female* identical; the ovipositor long, black, including the seventh and eighth segments, compressed at sides.

[To be continued.]

XLVIII.—On Aporemodon, a remarkable new Pulmonate Genus. By G. C. ROBSON, B.A., British Museum (Natural History).

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IT is a familiar fact that certain genera of Mollusca, otherwise distinct anatomically, agree in possessing a simple patelliform shell. Such agreement in conchological character is found in genera as different in anatomy as *Acmæa*, *Siphonaria*, *Cocculina*, and *Ancylus*. The new genus, for which a name is here proposed, seems to constitute not only a fresh but also a novel example of this phenomenon; for it possesses, along with shell-characters that would approximate it to *Cocculina* or *Propilidium*, a radula which is not only of Pulmonate form, but also resembles very closely that of a definite genus of Helicoid Pulmonata.

The material on which this genus is founded consisted of six complete specimens and an additional shell, a selection from which has been presented by J. R. le B. Tomlin, Esq., to the British Museum. They were bequeathed to Mr. Tomlin by Surgeon-General Archer, who obtained them "on the beach" near Singapore some thirty years ago. No further information is forthcoming, in which any reliance can be placed, for determining the animal's habitat or station, though there can be no doubt that it is a marine form. The soft parts were so shrivelled after thirty years' dessication that all attempts to render them fit for sectioning were fruitless. It is a matter for considerable regret that the rest of the anatomy

of this interesting form must remain unknown for the present, and that, in consequence, our attempts to allocate a systematic position to it are dependent on the form of a single structure—the radula.

A full description of the shell is given below; it is sufficient here to remark that it is, in general, a small patelliform shell with a spiral apex like that of *Cocculina* or *Propilidium*. It lacks the internal septum characteristic of the latter and the clear-cut sculpture of the former, while its horny texture distinguishes it from both.

The radula, however, as Dr. H. M. Gwatkin pointed out to me, and as I have subsequently verified for myself, resembles that of the Helicid genus *Vallonia*. In general arrangement the two are in singularly close agreement. The following differences of detail may be noted and commented upon. In *Aporemodon* the small central tooth bears a single cusp, though on its expanded base are often seen traces of two lateral cusps. In *Vallonia* the central tooth, likewise small, is clearly tricuspid, though the lateral cusps are diminutive. In both genera the lateral teeth are in agreement, save for the fact that there are five bicuspid teeth in *Aporemodon*, whereas in *Vallonia* the last lateral\* is usually three-cusped (though not always so), and thus marks a transition-stage between laterals and marginals. In addition, the interior lower angle of the basal plate in *Aporemodon* is rounded off, reminding us of the condition seen in *Succinea*. The marginal series of *Vallonia* seems to consist typically of eight teeth; in *Aporemodon* there are seven. In general they agree pretty closely, exhibiting each a narrow basal plate, with the outer end tending to exceed the inner in depth, and bearing a number of small cusps and one large one. But whereas in *Aporemodon* the cusps are four in number and the second is the largest, in *Vallonia* the cusps are more numerous (five or six) and the first cusp (obviously the same as the big cusp of the laterals) is the largest.

In attempting to assign a systematic position to *Aporemodon* we may at once exclude the shell from consideration, on account of the plasticity of that structure, especially in a case where the simple patelliform shell is in question, and are thus left *faute de mieux* with the radula.

It is clear that, for the time being, this genus must be placed near *Vallonia*. We might be tempted to regard the latter as a representative of a primitive Helicid stock, from

\* Other authors may prefer to regard this tooth as a marginal, but I am inclined to rank it with the lateral series on account of its shape and because it occasionally, even in species where it is normally three-cusped, exhibits two cusps only. In *V. cyclophorella* (Sterki, Proc. Acad. N. Sci. Phil. 1893) it is normally bicuspid.

which *Aporemodon* was given off as a modified form with uncoiled shell, both forms retaining similar dental characters. But I see no reason on anatomical grounds for regarding *Vallonia* as primitive. It is true that it lacks the mucus-glands characteristic of the *Belogona Siphonadenia* in which it is placed by Pilsbry\*. But that does not necessarily imply that it never had any. I am of Pilsbry's opinion that it has lost them through degeneration or retrogression. This being so, we are left, in default of further anatomical knowledge, with no other course open to us but to regard *Aporemodon* as a modified form of *Vallonia* regarded as a normal Helicid. It may be noted that *Vallonia* is a fairly old genus palæontologically, going back to the Lower Eocene, and that its geographical distribution does not in any way invalidate the genetic relationship here suggested.

The possibility is not excluded that this may be an extreme case of convergence. I am reminded of this possibility by the fact that the Helicoid character of transition between the lateral and marginal teeth of the radula is wanting in *Aporemodon*, the only noticeable transition being in size.

My best thanks are due to Dr. H. M. Gwatkin, who has made some admirable preparations of the radula and also drew my attention to the similarity between it and that of *Vallonia*.

#### APOREMODON, gen. nov.

Radula with formula 6-7 : 5 : 1 : 5 : 6-7, resembling that of *Vallonia*. Shell minute, patelliform, with coiled apex.

#### *Aporemodon tomlini*, sp. n.

Radula with median tooth unicuspid, laterals with one large and one small cusp, internal inferior angle of basal plate rounded, marginals quadricuspid, the second cusp larger than the rest.

Shell minute (2.9 × 2.0 mm., alt. 1.1 mm.), horny, subdiaphanous, ovate-oblong, brownish-yellow, with radial reddish stripes, occasionally bifurcate and seen more clearly anteriorly, sculptured with concentric lines of growth usually hair-like, occasionally larger, crossed by numerous almost imperceptible radial striæ, evanescent in many places; apex anterior, nearly overhanging the margin, coiled towards the left side.

\* Pilsbry ('Manual of Conchology,' ser. ii. vol. ix. pp. xxxvi and 237) thus places *Vallonia*:—

[Fam. *Helicidæ*.]

Tribe V. *Belogona*.

aa. *B. siphonadenia*.

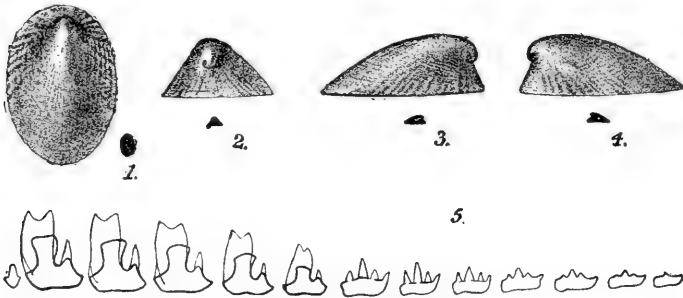
1. *Helix*, *Leptaxis*, &c.

2. *Helicodonta*, *Vallonia*, *Helicella*, &c.

Interiorly plain, lacking a distinct border, the external red stripes showing clearly through the transparent shell.

*Locality.* Singapore (beach).

Type in the British Museum.



Figs. 1-4.—*A. tomlini*; shell. (The small dark figures indicate the natural size.)

Fig. 5.—*A. tomlini*; radula, central tooth, and lateral and marginal teeth of one side. ( $\frac{1}{12}$  homog. immersion.)

#### POSTSCRIPT.

The marine habitat of this genus is distinctly interesting, though we must await further knowledge of its anatomy before concluding that it has not been adopted secondarily, as is the case of *Onchidium*, the only other marine (or, more strictly, amphibious) Pulmonate.

#### MISCELLANEOUS.

*Helix rufescens*, Pennant.

By A. S. KENNARD and B. B. WOODWARD.

MR. E. A. SMITH'S note on the identity of Pennant's species with *Helicigona (Arianta) arbustorum* is, of course, one of great interest to all conchologists. When, however, it comes to the question of what name should take the place of Pennant's for this well-known species there is likely to be some difference of opinion.

Mr. Smith gives preference to *montana*, on the ground that it had been previously adopted by Studer; but there is nothing to show that C. Pfeiffer was acquainted with Studer's shell in any way or that the application of the name to the shell he figures (pl. vi. fig. 9) was anything more than guesswork. Moreover, the figure in question rather suggests a large *Hygr. hispida*, Linn. (= *concinna*, Jeff.), than the shell we have hitherto known as *rufescens*. On the other hand, *striolata* (fig. 8) is our old friend and is the name by which it is currently known on the continent; so we think this name should be preferred.

# THE ANNALS

AND

## MAGAZINE OF NATURAL HISTORY.

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XLIX.—*A Revision of the Asilidæ of Australasia.*  
By GERTRUDE RICARDO.

[Concluded from p. 425.]

### PARARATUS, gen. nov.

Allied to *Aratus*, v. d. Wulp (now *Neoaratus*), in having no bristles on the abdomen, and in the neururation of the *wing*, but is distinguished from it by the non-dilation of the *wing* on its fore border in both sexes, and by the genital organs, which in the male are very large and club-shaped; the ovipositor of the female is compressed at the sides, bringing it thus near *Neoitamus* in this respect, from which, however, the neururation of *wing* and large size of the species distinguish it. It is also allied to *Blepharotes* in the large genital organs of male. From *Asilus in sensu stricto* it is distinguished by the character of these organs.

Type and only species of genus from Victoria, New S. Wales.

### *Pararatus macrostylus*, Loew.

Zeitschr. f. d. ges. Naturwiss. N. F. x. (xlv.) p. 75 (*Blepharotes*) (1874).

One male and one female in Brit. Mus. Coll. from Champion Bay, W. Australia (*Du Boulay*). Four males from Mallee District, Victoria, in Mr. French's coll.

Loew divided this species off from *Blepharotes coriarius*, stating he had often seen specimens of both species in *Ann. & Mag. N. Hist.* Ser. 8. Vol. xi. 30

collections under *B. coriarius*. After carefully studying his description of his new species I am convinced the above specimens are identical with his species *macrostylus* and that they do not belong to the genus *Blepharotes*, though it is very unlike Loew to have overlooked the following characters which preclude it from belonging to *Blepharotes*, viz.: ovipositor of female, which is long and compressed at sides; short style of *antennæ* and short third joint, the absence of thick tuft-like hairs at sides of *abdomen*, and the very much slighter build of *legs*; these last three characters were noticed by Loew in his description, but of the ovipositor he makes no mention. The neuration of *wings* is very similar. Small males of *Blepharotes flava* have a slight general resemblance to this species, but the thick tuft-like hairs at sides of *abdomen* will at once distinguish them.

This is a large species: *abdomen* fulvous with reddish-yellow pubescence and black apex; *thorax* blackish; *wings* large, hyaline. *Legs* wholly black.

Length 27–35 mm.

*Male*.—*Face* blackish, covered with yellowish tomentum; the tubercle large, occupying the lower part of face, bearing the moustache composed of long white hairs. *Palpi* black, with black hairs. *Antennæ* black, the third joint with a long terminal bristle; the first two joints short, the first the longest, both with black hairs; the third conical, with a rather long tapering point, the joint a little longer than the first two joints together, the bristle nearly as long as the joint. *Forehead* brownish black, with white pubescence, white hairs on hind part of head, a few black hairs at vertex. *Thorax* brownish black, with black pubescence and two long bristles before the suture, two beyond, and several on posterior part of thorax; sides and breast with white pubescence. *Scutellum* same colour, with three stout bristles on posterior border. *Abdomen* flat, rather broad compared with *Asilus* species, at its widest about 5 mm., becoming narrower at apex; the first segment black with black pubescence, the others bright reddish yellow with fulvous pubescence; sides with fairly long, fine, yellowish-white hairs, thickest on the second segment, not disposed as tufts; posterior border of last segment and the genital organs black, the latter large and prominent with black pubescence; underside black, bare, with black hairs at sides. *Legs* blackish, all the femora armed with black bristles; coxæ with long white hairs, pubescence elsewhere and all bristles black. *Wings* hyaline, the posterior branch of fork strongly curved; the second posterior cell broad at base, bulging into the first, the third



wide, the fourth closed, the anal cell closed some way from the border; the small transverse vein is situated about the middle of the discal cell; veins black at base and on fore border, then reddish. Halteres black.

*Female* identical. Ovipositor blackish, long, including the sixth and seventh segments, compressed at sides.

#### NEOITAMUS, Osten-Sacken.

Cat. Dipt. N. Amer. ed. 2, pp. 82 & 235 (1878)

*Itamus*, Loew, Linn. Ent. iv. p. 84 (1849), præocc. Schmidt, Goeb. Coll., 1846.

The following species are recorded from Australia, Tasmania, and New Zealand:—

*Neoitamus varius*, Walker, List Dipt. ii. p. 457 (1849), et pt. vii. Suppl. 3, p. 742 [*Asilus*] (1835); Hutton, Trans. New Z. Inst. xxxiii. p. 22 [*Itamus*] (1901).—*Asilus fraternus* (? females only), Macq., Dipt. Exot. Suppl. i. p. 219 (1844); v. d. Wulp, Sumatra Exp. Dipt. p. 25 [*Itamus*] (1881). *Asilus bulbus*, Walker, var. B, List Dipt. pt. ii. p. 466 (1849). *Itamus melanopogon*, Schiner, 'Novara' Reise, Dipt. p. 190 (1868).

*Neoitamus mistipes*, Macq., Dipt. Exot. Suppl. iv. p. 308, pl. ix. fig. 3 [*Asilus*] (1849).

*Neoitamus bulbus*, Walker, List Dipt. ii. p. 465 [*Asilus*] (1849), et vii. Suppl. 3, p. 743 [*Asilus*] (1855).—*Itamus inquisitor*, Nowicki, Mem. d. Krakauer k.-k. Akad. d. Wiss. ii. p. 21 [*Itamus*] (1875), et Beitr. z. Kenntniss d. Dipt. Fauna Neu Seelands, 21 [*Itamus*] (1875).

*Neoitamus planiceps*, Schiner, 'Novara' Reise, Dipt. p. 189 [*Itamus*] (1868).

*Neoitamus hyalipennis*, sp. n.

The synonymy of these species here given differs considerably from that given by Kertész in his Cat. Dipt., but I believe, from the examination of Walker's types, this will prove correct.

*Asilus sydneyensis* does not belong to this genus.

*Neoitamus varius*, Walker.

*Asilus fraternus*, Macq. (females only).

*Asilus bulbus*, Walker, var. B.

*Itamus melanopogon*, Schiner.

Macquart's type (male) and his original series of specimens of females seen in Paris Museum, 12. 4. 11, from Tasmania. The females were identical in all respects with a specimen of Walker's *Asilus varius* which I took for comparison; the male and another male specimen were identical, with the exception of the genitalia, which were not so swollen and large, but more long oval, and the white hairs on abdomen were not

so numerous or long as in the male specimen of *varius*. It appears probable that Macquart's male belongs to another species of *Neoitamus*, but the question must be left in abeyance till further material is available, and for this reason priority is given to Walker's name.

In Brit. Mus. Coll.

Types of *Asilus varius* consist of two males, co-types, one presented by Col. Sinclair, one from Mr. Earl's collection; and three females, co-types, added in the 7th volume 'List Dipt. Brit. Mus.,' from Auckland, presented by Col. Bolton; a long series of specimens are in the collection from New Zealand.

A small blackish species, the *legs* bluish black; *tibiæ* reddish yellow. *Wings* hyaline, greyish round the posterior border and at apex.

Length, ♂ 17–18 mm., ♀ 18 mm.

*Face* black, with white or yellowish tomentum at sides; tubercle large, black, shining; the moustache composed of many black bristles and a few long white hairs below. *Antennæ* with black hairs on the first two joints. Beard white and the hairs round head white. Head excised a little behind, with black incurved hairs at occiput. *Thorax* black, with two ashy-grey or yellowish tomentose stripes, grey at sides, the pubescence on dorsum black and some short black bristles present, with longer ones at the sides. *Scutellum* the same, with four large black bristles on posterior border, often yellow in the female. *Abdomen* black, with grey or whitish segmentations and short black pubescence, some white hairs at base on segmentations and yellow bristles at sides; genitalia in male club-shaped, large, swollen at tips, black and shining with black hairs and a few white ones intermixed; ovipositor in female long, including the sixth and seventh segments of abdomen. *Legs* black; femora with long white hairs below, the middle and posterior pair with bristles on underside; *tibiæ* testaceous; bristles on legs black. *Wings* with the small transverse vein at or beyond middle of discal cell.

Walker's var. B of *bulbus*, a female, is identical with the types of *varius*.

*Itamus melanopogon* is identical, judging from the description given by Schiner; the type came from Auckland.

The original description of *N. fraternus*, by Macquart, of male and female is very short. V. d. Wulp described more fully a female specimen from Rawas, Sumatra, he considered to be identical with it; the only difference in the description appears to be that the outsides of *tibiæ* have a black stripe

and the first joint of fore tarsi is brown-yellow. The ovipositor he mentioned as including the last three segments of abdomen, and being shining black.

*Neoitamus mistipes*, Macquart.

Type, a female, seen in Paris Museum, 12. 4. 11. A male specimen I took for comparison is identical with this type; the bristles on the legs are more largely white in the male than in the female type, which has only a few white ones on the middle and posterior femora.

In Brit. Mus. Coll.

Male and female from Mt. Gambier, S. Australia (*W. Wesche*), 1905, and another male and female from same locality.

A blackish species; the *abdomen*, especially in the male, covered with yellowish tomentum; tibiæ yellowish, femora yellow below; bristles on the *legs* chiefly yellow. *Wings* hyaline.

Length 14 mm.

*Male*.—*Face* covered with pale yellow tomentum, the tubercle distinct; moustache composed of weak yellowish-white bristles and two black longer ones above. Beard white. *Antennæ* blackish, the first two joints with black hairs, the third joint conical with a long terminal arista. *Forehead* brown, with black hairs at the sides. Hind part of head with dull yellow hairs. *Thorax* blackish brown, covered with yellowish tomentum, two median and a lateral interrupted stripe on each side black; shoulders covered with ashy-grey tomentum; between the median and lateral stripes long blackish hairs, shorter ones on anterior part of thorax; sides and posterior part of thorax with stout black bristles. *Scutellum* covered with ashy-grey tomentum; two weak, yellow, long bristles on its posterior border. *Abdomen* blackish brown, besides the yellowish tomentum, which is most apparent on the sides, the dorsum is covered with very short yellow hairs; first segment with a fringe posteriorly of yellow hairs; sides of segmentations with yellow bristles, often continued along posterior border of segment, sides with short yellow hairs. Genital organs black, shining, large, club-shaped. *Legs* black, the underside of all femora and the tibiæ for two-thirds of their length yellow; the coxæ covered with grey tomentum and with long white hairs; femora with long white hairs below; tibiæ with some long weak yellow bristles on their outer borders, the bristles on tarsi yellow. *Wings* clear; veins brown, the small transverse

vein just beyond the middle of discal cell; the vein closing fourth posterior cell convex, the second posterior cell wide at its base.

*Female* identical. The black bristles on upper part of moustache more numerous. The tomentum of *thorax* more grey than yellow. Ovipositor long, the last two segments included in it, black, shining, with some pale yellow hairs at sides.

This species and *N. hyalipennis* are both distinguished from *N. fraternus* by the quite clear wings.

*Neoitamus bulbus*, Walker.

*Itamus inquisitor*, Nowicki.

Types, two female co-types (not a male and female as Walker states); one measures 22 mm. in length, the other 14 mm., which roughly corresponds to Walker's length  $6\frac{1}{2}$ –10 lines, so that it appears probable he mistook one of these females for a male. Both are in a very dirty dilapidated condition, but they correspond fairly to the long careful description given by Nowicki and appear to be the species he was describing. It may be distinguished from *N. fraternus* at once by the presence of spines on the fore femora below and by the colour of the *legs*, which are chestnut-coloured, the femora with a black stripe below; apices of tibiae and all the tarsi black, the moustache is entirely black. Nowicki mentions some yellowish-white hairs; his type also came from New Zealand.

The var. B of Walker does not belong to this species, but is identical with *N. varius*, Wlk.

*Neoitamus planiceps*, ♂, Schiner.

From Australia, described from one male specimen only.

Schiner remarks it cannot be the same as *Asilus setifemoratus* or *rufotarsus*, Macquart, and describes the fore femora as armed with four black bristles below, which precludes it from being identical with *N. fraternus*, Macq. *Legs* are black, the tibiae yellow, so that it can hardly be the same as *N. bulbus*, Wlk., or *N. mistipes*, Macq.

*Neoitamus hyalipennis*, sp. n.

Co-types, one male and two females from Mr. French's coll., Mallee District, Victoria.

This species is at once distinguished from *N. mistipes* by the wholly black femora. A black species with a very thick

black moustache. *Legs* stout, armed with many bristles. *Tibiæ* only yellow at their base.

Length, ♂ 16, ♀ 20 mm.

*Male*.—*Face* covered with grey tomentum; the tubercle large, black; the moustache composed of many black bristly hairs, with white ones below and in the middle. Beard white. *Antennæ* black, the black hairs on the first two joints thick and long. Hind part of head at vertex with black hairs, curled upwards, elsewhere white. *Thorax* black, with grey tomentum and black stripes, the dorsum with black pubescence, rather approaching in their arrangement species of *Dysmachus*; black bristles at sides strong and numerous, posteriorly the black hairs are long and bristly. *Scutellum* with short whitish pubescence and four weak, long, yellow bristles on its posterior border. *Abdomen* blackish, with grey tomentum at sides; dorsum with short white hairs; segmentations with grey tomentum, sides with longer white hairs. *Genitalia* black, shining, long, club-shaped, with black pubescence. *Legs* black; *coxæ* with grey tomentum and long white hairs; fore femora with long blackish hairs below, shorter ones above intermixed with white ones, the middle pair with short black pubescence and strong black bristles below and at apex, the hind pair with shorter black bristles below; *tibiæ* yellow at base, the fore *tibiæ* with long black hairs below and shorter ones above and with stout black bristles, the others the same, but with no long black hairs; *tarsi* with black bristles, fore *tibiæ* at apex and *meta-tarsi* with short yellowish pubescence below. *Wings* clear, veins black; second posterior cell wide at its base, the vein closing fourth posterior convex; the small transverse vein situated on two-thirds of discal cell.

*Female* identical. Ovipositor as in *N. mistipes*.

The species of *Neoitamus* from other parts of the Australasian Region (not Australia) are *Neoitamus griseus*, Wied, *involutus*, and *longistylus*, Wlk., from New Guinea and elsewhere. *Neoitamus melanopygus* and *spinicauda*, v. d. Wulp, from Celebes.

*Neoitamus involutus*, Walker.

Proc. Linn. Soc. v. p. 281 [*Asilus*] (1861), et vi. p. 7 [*Asilus*] (1862);

Ost.-Sack., Ann. Mus. Civ. Genova, xvi. p. 423 [*Itamus*] (1882).

*Asilus normalis*, Walker, Proc. Linn. Soc. London, vi. p. 18 (1862).

These two types appear identical.

The types of *normalis*, male and female, come from Ternate; the specimens, females, of *involutus* from Ternate and Gilolo.

## CERDISTUS, LOEW.

Linn. Ent. iv. p. 74 (1849).

Schiner recorded the one species of this genus from Australia, and another species of Walker is added here, so that two species are recorded from this region as follows:—

*Cerdistus maricus*, Walker. Dipt. Saund. i. p. 141 [*Asilus*] (1851), et

List Dipt. vii. Suppl. 3. p. 737 [*Asilus*] (1855).

*Cerdistus sydneyensis*, Schiner, 'Novara' Reise, Dipt. p. 187 (1868).

*Cerdistus maricus*, Walker.

This small species appears to belong to the above genus, but does not answer to the description of Schiner's species.

Type (♂) from Port Philip (*Hunter*) and another female from Queensland (*Dr. T. L. Bancroft*).

Black. *Abdomen* with grey segmentations. *Legs* black, the tibiae and first joint of tarsi obscurely reddish yellow, the hind legs more distinctly so. Moustache black above, white below. *Wings* hyaline.

Length 12 and 14 mm.

*Face* blackish, with white tomentum at sides; in the fresh female the *face* is more brownish, the tubercle small, the moustache not reaching beyond it, composed of stout black bristles above and long, soft, white hairs below, in the type the black bristles are not so apparent. Beard white. *Antennae* black; the first two joints with black pubescence, the style of the third long. Head deeply excised behind. *Thorax* black, with white tomentose stripes and sides; two black bristles situated on side at suture, one above the other, and weak yellowish ones behind; on dorsum short black hairs and white ones posteriorly. *Scutellum* black, with whitish tomentum and two weak yellow long bristles. *Abdomen* black, with whitish-grey segmentations, and with white hairs at the sides; short black hairs on anterior border of segmentations, and at sides of segmentations a few black hairs. Ovipositor about as long as the last two segments, brown and shining. *Legs* with black bristles; on the hind tibiae a few white ones intermixed; femora with short white hairs below. *Wings* hyaline, the small transverse vein beyond the middle of the discal cell; the fourth posterior and anal cells closed, the former with a short stalk; veins black.

*Cerdistus sydneyensis*, Schiner.

Described as black. *Abdomen* with grey segmentations.

*Legs* black, the base of all femora and tibiæ rusty yellow. *Face* with white tomentum; the moustache black, with some white hairs below. *Wings* hyaline, but broadly and distinctly tinged with grey round the whole border. 5 lines.

Schiner records four pair from Sydney.

#### NEOARATUS, Ricardo.

*Aratus*, v. d. Wulp, Termés. Füzetek, xxi. p. 236 (1898) (præocc. Howard, Hym. 1896).

This genus was formed for *Asilus hercules*, Wied., by v. d. Wulp, who satisfied himself as to the probability of the correctness of the three synonyms (see below); he also suggested that *Rhadiurgus macquarti*, Bigot, and *Asilus tasmaniae*, Macq., might belong to this genus, which he characterized as follows:—

*Face* moderately broad, with prominent tubercle, which, with the thick moustache, takes up two-thirds of the face. *Antennæ* small in proportion, the two basal joints same length; the third rather shorter than the two together, pointed at end, with a naked arista. *Thorax* short-haired, only posteriorly with some long hairs, but without bristles. *Abdomen* fine-haired, slender, no bristles at sides; eighth segment hidden (correct only of ♂); genital organs small; ovipositor egg-shaped, with two small lamellæ at end. *Legs* stout, femora not incrassate. *Wings* shorter than body, in the male dilated on the fore border; the submarginal cell rilled in both sexes; the discal cell long and narrow, the upper vein from it very much bent outwards, so that the second very broad posterior cell bulges very considerably into the first one; the fourth is closed, also the anal cell.

This last character is common to the large species of *Asilus*, such as *rufiventris*, *rufithorax*, *pelago*, *hyagnis*, and the submarginal cell is frequently rilled in them, and even the fore border of wing very slightly dilated, so that it appears as if the very great dilatation of wing on fore border in *Neoaratus hercules* is the only character that divides it off from *Asilus in sensu stricto*, and it remains the only species in the genus. *Rhadiurgus macquarti* is a male from New Caledonia; Bigot makes no mention in his description of the wing being dilated; without seeing his type it is impossible to decide whether he placed it in the right genus.

*Neoaratus hercules*, Wied., Auss. zweifl. Ins. i. p. 425 [*Asilus*] (1830).

Type of genus.—*Asilus plicatus*, Wied., l. c. ii. p. 643 (1830); Froggatt, Australian Insects, p. 299 (1907). *Asilus giganteus*, Macq., Dipt. Exot. Suppl. ii. p. 59, pl. i. fig. 9 (1847). *Asilus grandis*, Macq. l. c. Suppl. iii. p. 190, pl. iii. fig. 4 (1848).

For full list of references see Kertész, Cat. Dipt. (1909).

In Brit. Mus. Coll. specimens from Victoria (*Lea*) and Hunter River, New S. Wales.

A very large, dull, blackish-brown species, 30–40 mm. in length. *Wings* in males very much dilated on fore border.

*Face* with distinct tubercle, the moustache composed of black and yellowish hairs. *Antennæ* have the first joint twice as long as the second (not equal in length as v. d. Wulp states). *Abdomen* with yellowish-grey tomentum and very short fulvous pubescence on dorsum, sides with longer yellowish hairs. Male genitalia rather large, black. Female ovipositor small, the eighth segment distinct. *Legs* stout, red; base of femora, knees, and tarsi black, the numerous bristles are black. *Wings* much dilated in male, not usually so in females, but the submarginal cell is rilled as in male, hyaline, with yellowish-red veins; posterior branch of third vein strongly curved; second posterior cell broad at base, bulging into the first one; the third nearly as wide as the second, the fourth and anal cell closed, the small transverse vein beyond the middle of discal cell.

#### ASILUS in sensu stricto.

Linn., Syst. Nat. ed. x. pp. 605, 227 (1758).

This genus, in the narrowest sense, is usually defined as comprising large bright-coloured species; the abdomen at sides near the segmentations without any bristles; dorsum with short appressed pubescence; ovipositor conical, not compressed. The following species appear to belong to this genus, but *Asilus inglorius* and *discutiens* differ from the other species by the presence of thick tufts of hair on the basal segments of abdomen, on dorsum, though not reaching the median line; they approach *Pamponerus* in this character, but the facial tubercle and non-contrasted colouring of wings prevent their inclusion in that genus.

*Asilus inglorius*, Mackay, in King's 'Narrative of a Survey of the Coast of Australia,' London, ii. p. 467 (1827); Wied., Auss. zweifl. Ins. ii. p. 644 (1830); Schiner, Verh. zool.-bot. Ges. Wien, xvi. p. 690 (1866), et Reise 'Novara,' Dipt. p. 183 (1868).—*Asilus amycla*, ♀, Walker, List Dipt. ii. p. 423 (1849), et vii. Suppl. 3, pp. 730, 734, 741 (1855). *Asilus centho*, ♂, Walker, l. c. p. 431, id. l. c. pp. 730, 733, 740. *Asilus planus*, ♀, Walker, l. c. vii. Suppl. 3, pp. 730, 741; Schiner, Verh. zool.-bot. Ges. Wien, xvi. p. 690 (1866).

*Asilus murinus*, Macq., Dipt. Exot. i. (2) p. 260 (1838).

*Asilus rubrithorax*, Macq., Dipt. Exot. i. (2) p. 259 (1838).

*Asilus rufiventris*, Macq., l. c. p. 260.

*Asilus sydneyensis*, ♂, Macq., l. c. p. 260; Schiner, Reise Novara, Dipt. p. 189 [*Itamus*] (1868); Kertész, Cat. Dipt. [*Itamus*] (1909).—



- Asilus jacksonii*, ♀, Macq., *l. c.* p. 261. ? *Asilus tasmanica*, ♂, Macq., *l. c.* p. 261; v. d. Wulp, Termés. Füzetek, xxi. p. 237 [? *Aratus*] (1898). ? *Asilus nigratarsis*, Macq., Suites à Buffon, i. p. 304 (1834). *Asilus amythaon*, ♀, Walker, List Dipt. ii. p. 423 (1849). *Asilus maso*, ♀, Walker, *l. c.* p. 424.
- Asilus pelago*, Walker, *l. c.* p. 419, et vii. Suppl. iii. pp. 729, 731, 735 (1855); Schiner, Verh. zool.-bot. Ges. Wien, xvii. p. 400 (1867).
- Asilus blasio*, Walker, List Dipt. ii. p. 441 (1849), et vii. Suppl. iii. pp. 730, 731, 738 (1855).
- Asilus discutiens*, Walker, Ins. Saund. i. p. 135 (1851), et List Dipt. vii. Suppl. 3, p. 736 (1855).—*Asilus malleolus*, Walker, List Dipt. ii. p. 418 (1849), et vii. Suppl. 3, p. 736 (1855).
- Asilus hyagnis*, Walker, Ins. Saund. ii. p. 139 (1851).

### *Asilus inglorius*, Mackay.

*Asilus amycla*, ♀, Walker.

*Asilus centho*, ♂, Walker.

*Asilus planus*, ♀, Walker.

The types of *amycla* and *centho* are from New S. Wales; the type of *planus* from Australia.

There is a long series of specimens in the Brit. Mus. Coll. from Burpengary, Queensland. The identification of this apparently common species with *Asilus inglorius*, Mackay, is given on the authority of Schiner, who confidently asserts it, but the original description consists of merely a few lines. Schiner suggested that *A. planus* and probably *A. amycla* were synonyms of it, and was correct. The species is easily distinguished by the bushy bright yellow hairs on the three basal segments of *abdomen* and by the red *legs* with tarsi black.

Length, ♂ 25, ♀ 24 mm.

A series of this species is labelled in the Paris Museum as *Asilus sericeiventris*, evidently a MS. name only of Macquart's.

♂ ♀.—*Face* black, covered with greyish tomentum and with whitish or yellowish short pubescence. Moustache consists of bristly yellow hairs on the not very prominent tubercle, with weaker hairs below. *Palpi* black, with bristly yellow hairs. Beard pale yellowish or white. *Antennæ* reddish, the basal joints with yellowish hairs; bristle on third joint long. *Forehead* black, with grey tomentum and strong yellowish hairs on each side, at vertex some strong yellow bristles; pubescence on hind part of head pale yellow. *Thorax* brownish, with grey tomentose stripes and markings; pubescence on dorsum black, scanty, with very strong black bristles at sides and posteriorly. *Scutellum* as thorax, bordered with black bristles. *Abdomen* brownish, with a black median stripe, and covered with grey tomentum; pubescence largely fulvous, black on the median stripe; the pale yellow tufts on

basal segments nearly meet in the middle; sides of abdomen with yellow bristles on posterior border of each segment; underside brownish, with pale yellow pubescence; ovipositor of female distinct; genital organs of male blackish. *Legs* red; *coxæ*, knees, and tarsi black, *coxæ* covered with grey tomentum and with yellowish pubescence; femora with short black pubescence above, and longer yellowish hairs below, bristles chiefly black; tibiae with short black and yellow pubescence, the latter, more fulvous in colour, as a thick short fringe on the underside of fore pair, all are swollen at apex, bristles black; tarsi with black bristles and pubescence, with fulvous pubescence on the underside of the basal joints of fore pair. *Wings* hyaline, tinged yellowish, grey at the apex, veins reddish; neuration as in *Neoaratus hercules*, but the costa is not produced outwardly in either sex; small cross-vein is at about the middle of the discal cell.

*Asilus murinus*, Macq.

Type seen in Paris Museum, 12. 4. 11.

In Brit. Mus. Coll. a male and two females, from New South Wales.

Macquart's description is as follows:—

Greyish. *Legs* red; tarsi black.

Length, ♂ 9, ♀ 10 lines.

Face and forehead whitish yellow; moustache white, only occupying the lower part of face; a few black bristles below. Beard white. Thorax yellowish, with the intermediate stripe divided. Abdomen of a somewhat reddish grey, with white bristles; genital organs, ♂ and ♀, black. Knees slightly black. Wings hyaline, a little yellowish, at apex greyish. From New S. Wales. Paris Museum.

A dusky dull-coloured species with red *legs*. *Face* covered with greyish tomentum, tubercle prominent. Moustache composed of many stout yellowish or white bristles with black ones *above*. The first two joints of *antennæ* black, with black bristly pubescence. *Forehead* a little darker than face, with black hairs. *Thorax* blackish, with yellow tomentose stripes and markings. Pubescence on dorsum black. *Scutellum* covered with grey pubescence, some stout black bristles on posterior border. *Abdomen* black, covered with olive-coloured tomentum and with some appressed yellowish pubescence; hairs at sides yellowish; the eighth segment of abdomen deep black, with some black hairs; ovipositor very small (♀); in the male the eighth segment is hidden or very

small, the genital organs rather large, swollen, black, with black hairs; underside of abdomen black, covered with grey tomentum. *Legs* red, knees and tarsi black, bristles chiefly black. Pubescence white on fore coxæ and femora below, where it is long, short elsewhere with some black hairs. *Wings* tinged slightly yellow, greyish at apex and on fore border; venation as in *Neoratus hercules*; small transverse vein just below middle of discal cell.

Length of specimens 25-27 mm.

*Asilus rubrithorax*, Macquart.

A male seen by me in Paris Museum, 12. 4. 11; not the actual type, which is said to be in very bad preservation, but this specimen one of a series of specimens of the species. I also saw a female. A specimen I took for comparison is identical. The *thorax*, described as reddish, is denuded; the third joint of *antennæ* is reddish above.

In Brit. Mus. Coll. specimens from New South Wales.

A species with blackish *abdomen*, covered with grey tomentum; black and yellow striped *thorax*; reddish *legs*; *wings* clear.

Length 28 mm.

*Face* black, covered with greyish tomentum; tubercle large and prominent on lower part of face. Moustache of black bristly hairs, with long yellow ones below round mouth. *Palpi* with long yellowish and black hairs. *Antennæ* long, black, the first two joints with yellowish and black hairs, the third joint with a long arista. *Forehead* same colour as face, with black pubescence; on vertex and round head the hairs are white. Beard white. *Thorax* black, with grey tomentose stripes and markings, and rather long black pubescence on dorsum; sides black, with grey tomentum, black bristles above and greyish pubescence below. *Scutellum* covered with greyish tomentum and with yellowish and some black bristles. *Abdomen* blackish, with yellowish-grey tomentum and black pubescence and with yellow bristly hairs on posterior borders of segments at sides and whitish pubescence on sides; underside same colour, with whitish pubescence; genital organs in male prominent, black and fulvous; ovipositor in female distinct. *Legs* deep red, the knees, apices of tibiæ, and all tarsi black, the femora black on their upper outer borders; pubescence on coxæ and under part of femora whitish, on tibiæ short and whitish, all bristles black; posterior femora armed with row of short black bristles. *Wings* hyaline, grey at apex, veins brown; the second posterior cell bulging somewhat into the first posterior cell, but

its base outside the third vein not so wide as the part inside above discal cell in the male, in the female it is as wide as the small transverse vein just below the middle of discal cell.

*Asilus rufiventris*, Macquart.

Type seen by me in Paris Museum, 12. 4. 11.

Specimens in Brit. Mus. Coll. from Victoria, Moreton Bay, and Toowomba, Queensland.

A handsome species, not unlike *Asilus pelago*, Wlk., but easily distinguished by the reddish femora, the tibiæ pale yellow, and by only the ovipositor in the female being black; in the Walker species the last segment is also black.

Macquart describes it thus:—

Thorax chestnut, with black stripes. Abdomen red. Femora testaceous, tibiæ red, tarsi black.

Length 13 lines, ♂ ♀.

Face, moustache, and forehead pale yellow. Beard white. Antennæ with the first two joints testaceous, the third black. The intermediate stripe of thorax divided by a whitish line. Sexual organs brown, ♂ ♀. Posterior femora elongated. Wings yellow, apex brownish.

From New South Wales.

*Asilus sydneyensis*, Macquart.

*Asilus jacksonii*, Macq.

? *Asilus tasmaniae*, Macq.

? *Asilus nigratarsis*, Macq.

*Asilus amythaon*, Wlk.

*Asilus maso*, Wlk.

Type of *A. sydneyensis*, a male, seen in Paris Museum, 12. 4. 11: from Sydney. Type of *A. jacksonii*, a female, seen at the same time, is identical: from New South Wales. *Asilus tasmaniae*, from the description, would appear to be identical, also a male: from Hobart Town. *Asilus nigratarsis*, the same: from Hobart Town and New Guinea.

Type of *Asilus amythaon*, a female, is from Hunter River, New South Wales (presented by Lord Derby). Type of *Asilus maso*, a female, from unknown locality.

Face narrow, broader below, covered with yellowish tomentum; the tubercle large, taking up almost half the face, moustache on it composed of numerous white bristles and some black ones above. Palpi with black pubescence. Antennæ black, the first two joints with black bristly hairs. Forehead very similar to face, with black hairs. Thorax blackish, with yellow tomentose stripes and markings, black

bristles on sides and posteriorly, sides with grey tomentum. *Scutellum* covered with yellowish tomentum and some black bristles. *Abdomen* bright fulvous, blackish at base, at apex deep shining black, with no bristles, but some golden-yellow pubescence at sides and on segmentations; these last are blackish; genital organs large, black, with blackish pubescence. *Legs* red, knees and tarsi black, fore coxæ and femora with white hairs; all bristles black, middle and posterior femora below with bristles. *Wings* hyaline, yellowish, tinged grey at apex and on fore border; neuration as in *Neoratus hercules*, but the fore border is hardly perceptibly dilated; small cross-veins just below the middle of discal cell.

The species is very similar in general appearance to *Asilus rufiventris*, but is smaller, and the antennæ are dark and moustache not wholly yellow. The ovipositor in the female of this species is very small, appearing beyond the eighth segment of abdomen, which is black with black hairs.

Length, ♂ 24-26, ♀ 22-24 mm.

Schiner was of opinion that *Asilus nigratarsis* was the same as this species, but does not give the name priority owing to its being preoccupied; he also gave *Asilus tasmanicæ* as a synonym.

#### *Asilus pelago*, Walker.

Type (male) from Swan River.

Type (female) from New South Wales (presented by Haslar Hospital), and others from Swan River and Adelaide.

This is a handsome species, with reddish-yellow *abdomen*, sides and apex black, femora black, tibiæ yellow on basal half.

Length, ♂ 23, ♀ 27 mm.

*Male*.—*Face* black, covered with pale yellow tomentum on upper part; tubercle not prominent, bearing the thick yellowish-white moustache, composed of long weak bristles. Beard the same colour. *Palpi* blackish, with black bristly hairs. Antennæ brown, the third joint conical, rather short and broad compared with those of *Asilus rufiventris*, with a long terminal arista. Hind part of head with whitish hairs and with short black bristles at vertex. *Thorax* brownish, with black stripes; sides with stout black bristles and two below base of wing; posterior part of dorsum with numerous black bristles and hairs, the whole of dorsum with short black pubescence. *Scutellum* with two long, incurved, black bristles, and hairs or shorter bristles interspersed. *Abdomen*

reddish yellow, the first two segments almost wholly blackish, the eighth and genital organs black; underside dull rufous where the upper part is reddish yellow; dorsum almost bare, a tuft of black hairs on sides of first segment, and black hairs on remaining ones at sides; short yellow pubescence on dorsum. *Legs* black, the coxæ and fore femora below with white hairs, the middle and posterior femora with black bristles below; the tibiæ yellow on basal two-thirds, with short yellow pubescence; elsewhere pubescence is black; all bristles black. *Wings* hyaline, the veins yellowish, the small cross-vein beyond the middle of discal cell, submarginal cell rilled.

*Female* identical; the ovipositor conical, black, a little longer than the last segment.

*Asilus blasio*, Walker.

Type (♂) from Perth, W. Australia (purchased G. Clifton).

Two males and six females from Dandenong Ranges in Mr. French's Coll., from which the description is given; the type is very old and worn.

A well-marked species, with black-striped *thorax* and *abdomen* and red *legs*, with knees, tarsi, and short stripes on the femora black.

Length, ♂ 15–19, ♀ 16–22 mm.

*Face* black, with yellowish tomentum, whitish below the antennæ; tubercle prominent, large, bearing the black moustache, some white bristles intermixed, chiefly below. *Palpi* black, with long black pubescence and some white hairs. Beard of long white pubescence. *Forehead* greyish, with black pubescence, hairs round hind part of head white, with black bristles at the vertex. *Thorax* grey, with five black stripes, the median one divided, those next to it short, not reaching the shoulders, the outer ones a little longer; pubescence black, longer posteriorly; sides and breast covered with stripes of yellowish tomentum and some scanty white pubescence; black bristles on sides and posterior part of thorax; *scutellum* covered with yellowish-grey tomentum and with black bristles posteriorly. *Abdomen* covered with yellowish-grey tomentum, with a wide, black, median dorsal and narrower lateral stripes; pubescence on dorsum follows the colours; weak yellow bristles are apparent on the sides of each segment as far as the sixth one, with yellowish-white hairs below; on the last two segments bristles and pubescence are black; anus of female black, shining, with black hairs; the genitalia of male prominent, black; underside of

abdomen black, with greyish tomentum and white pubescence. *Legs* bright red; knees, apices of tibiæ, all tarsi black; in some of the specimens (not in the type) a black streak is present on basal half of hind femora; pubescence of legs black; on femora below are white hairs; all bristles black, some stout ones on underside of middle and posterior femora. *Wings* hyaline, grey; veins blackish, the small cross-vein a little above the middle of the discal cell; first posterior cell hardly narrower where the first vein from the discal cell borders it, as the second posterior cell hardly bulges at base; fourth posterior cell closed. *Halteres* reddish yellow.

*Asilus discutiens*, Walker.

*Asilus malleolus*, Walker.

Type (female) from New South Wales (Saunders Coll.), and a male from the same place (*J. J. Walker*); another from Van Diemen's Land (*Jensen*).

Type of *malleolus* (male) from unknown locality.

Var. B is not to be identified.

In the Paris Museum a long series of this species is labelled in Macquart's handwriting "*Asilus unilineatus*," evidently only a MS. name.

The species is nearly allied to *Asilus inglorius*, Macleay, but is distinguished by the more robust form of the males and by the darker colouring of the *abdomen* in both sexes and by the thick hairs on abdomen being continued on the sides of the third segment. It is blackish in colour, with tufts of yellow hairs and short yellowish pubescence on the abdomen. *Palpi* with black pubescence, and the yellow moustache has some black hairs above and below. The yellow bristles on the *legs* mentioned by Walker appear only as two paler bristles on the posterior tibiæ in the female, and are not present in the male.

*Asilus hyagnis*, Walker.

Type (male) from New South Wales (Saunders Coll.). Two males and three females from Burpengary, Queensland (*Dr. T. L. Bancroft*), 1904.

This species is apparently distinct, not a synonym of any of Macquart's, as far as can be judged without seeing all the types of the latter author. The redescription is based on the fresh specimens.

Species with reddish *legs*, armed partly with white bristles

on the femora and tibiæ. *Abdomen* olive-coloured, with greyish-yellow tomentum. *Wings* hyaline, grey at base.

Length 23 mm.

*Face* black, covered with yellowish-grey tomentum; the moustache on the prominent tubercle consists of yellowish-white bristles; palpi black, with yellowish-white hairs. Beard whitish. *Antennæ* with black pubescence on the first two joints; forehead same as the face, with some white hairs; hind part of head with yellowish-white hairs. *Thorax* black, with greyish stripes and markings; pubescence short and black, some black bristles on sides and posteriorly; sides and breast covered with ashy-grey tomentum, and long white hairs on breast. *Scutellum* as thorax, armed posteriorly with two strong black bristles. *Abdomen* covered with greyish-yellow tomentum and with short fulvous pubescence, at the sides with yellowish hairs, and some yellow bristles on each segment at the sides and before the segments; genital organs prominent, black; underside of abdomen chiefly covered with greyish tomentum. *Legs* reddish yellow, shining; coxæ grey, with yellowish-white pubescence; femora with some long, scanty, yellowish bristly hairs below and short black pubescence above, with short and long yellowish bristles; on the middle femora there are some stout black ones; anterior and middle tibiæ with weak yellowish hairs and some very short black pubescence, the posterior pair with short black and yellow pubescence; the bristles on the anterior and middle pair are yellow, long and short ones, with some black ones at their extreme apices and on the underside of the middle pair; the posterior tibiæ with strong yellow bristles; tarsi largely black at their apices, with yellow and black bristles, but only black ones on the posterior pair, pubescence black, yellowish below. Halteres yellow. *Wings* hyaline, the grey shading extends from the apex almost to the base of the two branches of the third longitudinal vein and as far as the fifth posterior cell; neuration as in *Asilus inglorius*, Macleay, but the small transverse vein is below the middle of the discal cell; veins yellowish.

#### ASILUS in sensu lato.

*Asilus alcetus*, *cœdicius*, *margitis*, and *villicatus*, Walker, are not true *Asilus* species, but their genus, owing to state of types, is impossible to determine.

The same is the case with *Asilus exilis*, *laticornis*, and *rarifemoratus*, Macq.



The following species not known to me must remain in *Asilus in sensu lato* for the present :—

*Asilus acutangulatus*, *armatus*, *australis*, *coognatus*, *ferrugineiventris*, *filifera*, *fulvipubesces*, *longiventris*, *nigrinus*, *rusticoratus*, *rufometatarsus*, *setijemoratus*, *vittipes*, Macq. ; *belzebul*, Wied. (v. d. Wulp could not find this type in the Leyden Museum ; Wiedemann described it from unknown locality, but later Macquart recorded a male he thought was a specimen of this species from New South Wales) ; *regius*, Jaennicke ; *smithii*, Hutton.

*Asilus crabroniformis*, L., in Kertesz's Cat., has Tasmania given with a query as one of the localities in which it occurs ; but this is probably an error on the part of Walker (see Verrall, 'British Flies,' vol. v. p. 649, 1909).

The following Walker types from Australia and Van Diemen's Land are not to be found in the Brit. Mus. Coll., and should be expunged from any future list :—

*Asilus elicitus*.

*Asilus alicis*.

*Asilus luctificus*.

*Asilus alligans*.

The following types from unknown localities are also not to be found :—*Asilus eanes*, *halmus*, and *inumbatus*,

*Asilus antiorus* and *corythus* are species of the genus *Proctacanthus*.

The following types of Walker cannot be placed in their correct genus, owing to their imperfect condition ; all, with the exception of *Asilus alcetus*, are small species which will not belong to *Asilus in sensu stricto*.

*Asilus obumbratus*, Walker,

Dipt. Saund. p. 145 (1851), et List Dipt. vii. Suppl. 3, p. 735 (1855).

Type (female) from New South Wales (Saunders Coll.) seems allied to the genus *Cerdistus*, but the ovipositor ends in a fork. It is a small black species with apparently dull yellow legs.

*Asilus alcetus*, Walker.

List Dipt. ii. p. 425 (1849), et vii. Suppl. 3, p. 736 (1855).

? *Asilus trachalus*, Walker, Dipt. Saund. i. p. 143 (1851), et l.c. p. 738.

This type is from Van Diemen's Land (*R. Buller*), in bad preservation. A medium-sized greyish-black species.

Schiner placed it in the genus *Neoitamus*, but it does not belong to that genus, and the species Schiner described in *Verh. z.-b. Wien*, xvii. p. 408 (1867), must be an altogether different species from this type, which is apparently an *Asilus* species, though the sides of *abdomen* have strong black bristles; ovipositor small, conical. *Legs* red, tarsi blackish, fore femora with some black bristles below. Moustache chiefly yellow.

The type of *Asilus trachalus* from same locality, a female in a very greasy state, is probably identical with the above.

*Asilus cœdicius*, Walker.

List Dipt. ii. p. 457 (1849), et vii. Suppl. 3, p. 735 (1855).

Type from New Holland (abdomen destroyed) and another female may possibly belong to the genus *Eutolmus*, but are in too imperfect a state for identification. A small black species, with the tibiæ partly yellow.

*Asilus margitis*, Walker.

List Dipt. ii. p. 461 (1849), et vii. Suppl. 3, p. 737 (1855).

Type (female) from Melbourne has lost its abdomen. A small black species with tibiæ dull testaceous. Walker suggests his *Asilus cœdicius* may be a variety of this species.

*Asilus villicatus*, Walker.

Dipt. Saund. i. p. 147 (1851), et List Dipt. vii. Suppl. 3, p. 734 (1855).

The type (a female), from New South Wales, is very small; the male type mentioned by Walker is not to be found. It was suggested by Schiner that it might be identical with his *Neoitamus melanopogon*, now identical with *Neoitamus varius*, Walker; this is not the case, and the species hardly seems to belong to the genus *Neoitamus*. Till further material is available, its correct generic place must be left uncertain. In size and general appearance it seems related to *Asilus exilis*, Macquart.

The following three types of Macquart, seen by me in the Paris Museum, 12. 4. 11, could not be placed in their correct genus either owing to being isolated specimens or because of their state of preservation.

*Asilus exilis*, Macquart.

Type (a male) seen by me in Paris Museum, 12. 4. 11.

A very small species, measuring 12 mm.

Face narrow, with a distinct tubercle. Moustache composed of many white and black hairs. *Antennæ* black, the first two joints with black hairs, the third conical, with a long arista. *Thorax* black, marked with grey tomentose stripes and with black bristles at sides and posteriorly; *scutellum* with white bristles. *Abdomen* blackish, with lighter segmentations and pale pubescence. *Legs* black, tibiæ and coxæ reddish, femora with white hairs below. Genitalia club-shaped, with fine filaments below.

*Asilus villicatus*, Wlk., might possibly be identical.

*Asilus laticornis*, Macquart.

Type (a female) in very bad preservation, with the antennæ destroyed, seen by me in Paris Museum, 12. 4. 11.

It is evidently a small species of the genus *Asilus in sensu lato* with the neuration of wings normal, the fourth posterior cell closed, the small transverse vein situated just beyond the middle of discal cell. *Abdomen* with a short conical ovipositor, the segmentations greyish tomentose. *Legs* black, tibiæ apparently testaceous.

In Macquart's figure of the *antennæ* the third joint is short, about as long as the first two together, and broad, with a terminal arista shorter than the joint itself.

*Asilus varifemoratus*, Macquart.

Type seen in Paris Museum, 12. 4. 11; part of the abdomen gone.

A small species. Moustache white, *antennæ* black. *Abdomen* black, the pubescence white; segmentations appear to be reddish. *Legs* black, femora with white hairs below; tibiæ yellow-red, black at apices; tarsi yellow-red, black at apices, bristles largely white. *Wings* clear, grey at apex, the fourth posterior cell closed.

Of the *Asilus* species of Walker from other parts of the Australasian Region, *Asilus areolaris* ♂ ♀ and *areolatus* ♂, from Celebes, are species of *Pamponerus*. *Asilus determinatus* and *introducens* are nearly allied to *Asilus discutiens*, Wlk., having tufts of bright-coloured or white hairs on basal segments, but the ovipositor in females seems entirely different.

*Asilus condecorus* type appears to be lost. *Asilus biligatus*, *didymoides*, *depulsus*, and *tenuicornis* appear to be species of *Asilus* in *sensu stricto*. The generic place of *Asilus complens*, *lævis*, and *superveniens* appears to me doubtful.

#### PAMPONEURUS, Loew.

Linn. Ent. iv. p. 135 (1849).

This genus was divided off from *Asilus* by Loew, being distinguished by the long outstanding pubescence on abdomen, whereas in *Asilus* the abdomen is almost bare. Wings with two strongly marked colours, usually whitish at base. Face with a large tubercle; moustache nearly reaching the antennæ.

The species are few.

The type of genus is the widely spread European *P. germanicus*; the only other species are *P. nigritulus*, v. d. Wulp, from Molucca Isles, *P. mendax*, Wlk., from Celebes, and *P. areolaris* ♂ ♀ and *areolatus* ♂, Wlk. [*Asilus*], also from Celebes.

The typical colouring of wing is only present in the male of *areolaris*, a species very similar to *mendax*, but the legs are almost wholly reddish yellow.

#### *Pamponeurus mendax*, Walker.

Trans. Ent. Soc. London, 2 ser. iv. p. 130 (1857), et Proc. Linn. Soc. London, v. p. 260 [*Asilus*] (1861); v. d. Wulp, Tijd. v. Entom. xli. p. 135, pl. iv. figs. 9-10 (1898), et xlii. p. 55 (1899).

Type (male) from Menado, Celebes.

Wings milky white at base. It has been fully redescribed by v. d. Wulp.

#### *Pamponeurus nigritulus*, v. d. Wulp.

Tijd. v. Entom. (2) vii. (xv.) p. 235 (1872), et Tijd. v. Entom. xli. p. 137 (1893).

From Moluccas.

Described as black, the pleuræ and abdominal segmentations grey. Face yellowish or grey; moustache black, with a few whitish hairs below. Abdomen rather broad, black or blue-black; the hairs on sides of first two segments whitish, elsewhere black. Wings pale brownish, grey at apex.

Length 7-8 lines.

EUTOLMUS, Loew.

Linn. Ent. iii. p. 459 (1848).

A species described by Macquart as *Asilus armatus* (see Dipt. Exot. Suppl. 1, p. 219, pl. viii. fig. 17, 1846) has been placed, evidently in error, under *Eutolmus* in Kertész's Cat. The reference given to Loew, Besch. Europ. Dipt. ii. p. 164, note 2 (1871), refers to *Machimus armatus*, Jaenn., a European species now stated to be a synonym of *Machimus pilipes*, Meig. From the figure of *Asilus armatus* it is evidently not a species of *Eutolmus* or *Machimus*, if the figure is at all correct.

The genus has thus not yet been recorded from the Australasian Region nor from the Oriental Region.

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I.—Note on some *Pseudoscorpions* in the British Museum.

By EDV. ELLINGSEN.

ONE of the most interesting facts to record concerning the collection in question is a biological one—that of the capture of *Chelifer bayoni*, Ellingsen, on a bird, *Anas undulata*. In my paper "Die Pseudoskorpione des Berliner Museums"\*, p. 402, I made a remark regarding the capture of *Chthonius tetrachelatus*, Preyssler, a Palæartic species, in the Seychelles Islands, in the Indian Sea. I wrote:—"Wie diese zerbrechlichen, kleinen Tierchen, die paläarktisch sind, in die weit entfernt liegende Inselgruppe Seychellen gekommen sind, ist nicht leicht zu fassen; vielleicht möchten sie mit Vögeln verschleppt worden sein." Till that time (1910), or, rather, till now, no record of the capture of a pseudoscorpion on a bird has, as far as my knowledge goes, been given in the literature. The notice mentioned above is thus the first record of such a thing, and this fact is of great value in the explanation of the occurrence of pseudoscorpions in places where they beforehand could not be expected to be found, such as the capture of *Chthonius tetrachelatus* in the Seychelles. Thus this biological fact is available for the solution of a zoogeographical question.

Another fact of some interest is the occurrence of *Chelifer nodosus*, Schrank, in Africa. This is a European species, often found clinging to the feet of flies in houses; the same is the

\* Mitt. aus. d. zoolog. Museum in Berlin, iv. Bd. iii. Heft. (1910).

case with the West-African specimens, "clinging to legs of muscid, taken in office." The species is certainly imported from Europe.

The species of the collection, in systematic order, are the following:—

*Chelifer equester*, With.

Africa: Mbuyuni. 1 ♂, 2 ♀, taken from under the elytra of a longicorn beetle, 12. iv. 1897.

*Chelifer feæ*, Ellingsen.

Africa, Gold Coast: Bibianaha. 1 ♂, 1 ♀, 1 jun., found under the bark of a log by Dr. H. G. F. Spurrell, 12. iv. 1912.

*Chelifer pusillus*, Ellingsen.

West Africa, Gold Coast: Aburi. 11 ♂, 25 ♀, taken from under the elytra of a large beetle, 4. iv. 1911, by Mr. Armstrong.

*Note.*—This species was, before now, only known from the locality of the type specimens, the island of San Thomé, on the West African coast. I add a few remarks to the description of the type. The species belongs to the *birmanicus* group. As regards the granulation of the palps, the tibia, and the hand too, may be somewhat granulate on the inner side. Abdomen is very pale, the tergites and sternites being light brown. The curved "inner" division of the cephalothorax is, as a rule, very distinct.

*Chelifer sjöstedti*, Tullgren.

Africa, Cameroons: Kribi. 1 ♂, collected by G. L. Bates.

*Chelifer argentinus*, Thorell.

? Brazil: Rio Grande. 1 ♂.

*Chelifer camerunensis*, Tullgren.

West Africa, Gold Coast: Aburi. 1 ♀, taken from under the elytra of a large beetle (together with *Ch. pusillus*, Ellingsen, see above), 4. iv. 1911, by Mr. Armstrong.—Eastern Province of Nigeria, Bende District: Cross River. 1 ♀, collected by Major W. A. C. Cockburn.

*Note.*—The palpal fingers may vary somewhat as regards the length, and the hand may be either nearly smooth or

distinctly granulate. The specimen from Aburi has the fingers proportionally shorter and the hand nearly smooth, while the specimen from Cross River has the fingers proportionally somewhat longer and the hand distinctly granulate.

*Chelifer intermedius*, Balzan.

Guatemala: Vera Paz. 1 ♀.

*Chelifer macrochelatus*, Tömösváry.

West Indies, Trinidad: St. Annes. 4 ♂, 5 ♀, taken from under the wings of a beetle (*Macropus longimanus*), 28. viii. 1908, by P. Carmody.

*Chelifer nodulimanus*, Tömösváry.

Guatemala: Vera Paz. 1 ♂.

*Chelifer nodosus*, Schrank.

Europe, England, Isle of Sheppey: Minster. 2 ♀. The specimens were found attached to the legs of a fly, 23. ix. 1912, collected by J. W. Dunn.

West Africa, Gold Coast: Aburi. 5 ♀, found clinging to the legs of a muscid, taken in office, 22. iv. 1911, by Mr. Armstrong. Certainly imported (see the introduction).

*Chelifer scorpoides*, Hermann.

England, London: South Kensington. 3 ♂, 19 ♀, 3 jun. The specimens were found in the sand-pit at the back of the Natural History Museum, under the skull of a whale, 22. vii. 1912.

*Note.*—There were several, in all eleven, larval masses, some fixed at the underside of the abdomen, some loose; the greatest number of larvæ (or eggs) in one larval mass was about twenty.

*Chelifer bayoni*, Ellingsen.

Africa, Uganda: Chagwe, Seziwa Swamps. 1 ♂, on *Anas undulata*, 27. viii. 1911, collected by S. A. Neave (Imperial Bureau of Entomology).

Nyasaland: Blantyre. 1 ♂, 1 ♀, from vegetation, Nov. 1910, collected by Dr. J. E. S. Old (Imperial Bureau of Entomology).—Chiromo. 1 ♀, May 1911, collected by Dr. J. E. S. Old.

South Africa, near Kalahari: Lake Ngami. 1 ♂, collected by Mr. Woosnam.

Belgian Congo. 1 ♂.

*Note.*—As regards the capture of this species on *Anas undulata* in Uganda I refer to the introduction. The types of *Ch. bayoni* were also from Uganda.

*Chelifer cancroides*, L.

Corsica: Bastia. 1 ♂, collected by Mrs. Southwell.

*Chelifer latreillii*, Leach.

England, Lincolnshire: Alford. 2 ♂, 3 ♀, 1 jun.

*Chelifer simoni*, Balzan.

Africa, Nyasaland: Port Herald. 1 ♂, 1 ♀, v. 1911, collected by Dr. J. E. S. Old (Imperial Bureau of Entomology).

*Chelifer tuberculatus*, Lucas.

Africa: Algiers. 1 ♀, 1 jun., collected by Mr. S. Hirst.

*Garypus senegalensis*, Balzan.

Africa, Gold Coast: Tomotoku. 1 jun., on sheep, 8. ix. 1911, collected by H. Palmer.

*Note.*—The only species of the genus *Garypus* known from tropical West Africa is *Garypus senegalensis*, Balzan. The specimen mentioned above is very young and immature, and has not yet got its final colour and forms. In comparing it with what I think is *G. senegalensis* from South Africa, the specimen may well go as a young one of this species; yet there is one fact which makes this identification a little uncertain, namely, that there is a slight transverse impression at the tip of the palpal hand on the upper side, such as is highly pronounced in *Garypus impressus*, Tullgren, from South Africa. The palpal hand of many species of *Garypus* is, however, often so irregular, especially in immature specimens, that I prefer to refer the specimen from Tomotoku, being very young, to the species which is sure to be found in tropical West Africa, instead of referring it to the South-African *Garypus impressus*.

The capture of the specimen on sheep is of interest.



*Olpium jacobsoni*, Tullgren.

Asia, Siam: Bangkok. Seven specimens, collected by Capt. S. S. Flower.

Ceylon. One specimen, 22. x. 1906, collected by Prof. Arthur Willey.

*Olpium pallipes*, Lucas.

Italy: Genoa. One specimen, collected on the sea-shore by O. Thomas.

*Ideobisium cambridgii*, L. Koch.

Africa, Algiers. Two specimens, collected by Mr. S. Hirst.

*Note.*—This species has been recorded from Algiers and Morocco before by Eug. Simon, but that was before the recognition of the species belonging to the genus *Ideobisium*; there was also some confusion between *Obisium* (*Roncus*) *lubricum*, L. Koch, and *Obisium* (*Roncus*) *cambridgii*, L. Koch. It is therefore of some interest to have authentic specimens of the above species from the north of Africa. The specimens have been compared with English ones.

*Obisium lubricum*, L. Koch.

Italy: Genoa. Six specimens, collected by O. Thomas.

*Obisium doderoi*, E. Simon.

Africa, Algiers. Some specimens, collected by Mr. S. Hirst.

*Note.*—This species has not before now been recorded from the north of Africa. I have compared it with specimens from Italy, and I find no essential differences.

*Chthonius rayi*, L. Koch.

Italy: Genoa. 6 ♂, collected by O. Thomas.

*Chthonius tetrachelatus*, Preysslner.

Italy: Genoa. 1 ♀, collected on the sea-shore by O. Thomas.

LI.—*Some new Species of Lamellicorn Beetles from Brazil.* By GILBERT J. ARROW.

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THE beetles here described formed part of the collection made by Mr. W. M. Mann, partly in conjunction with Mr. C. F. Baker, during the Stanford Expedition to Brazil in 1911, under the direction of Dr. J. C. Branner. They were taken partly on the line of the Madeira-Mamore Railroad (Rio Madeira) in the State of Matto Grosso and partly at Ceara, Natal, and Parahyba on the coast of the north-eastern corner of Brazil.

COPRINÆ.

*Canthon felix*, sp. n.

Minutus, late rotundatus, nigro-æneus, capite antice, prothoracis lateribus, elytrorum humeris (aut lateribus totis) parteque tertia posteriori, pedibus et abdomine læte flavis; capite plano, æqualiter punctato, antice 4-dentato, dentibus internis longioribus; prothorace undique minute punctato, haud basi marginato, lateribus arcuatis, ante medium vix angulatis, angulis posticis obtusis; elytris profunde simpliciter striatis, interstitiis minute punctatis et setosis; pygidio corporeque subtus lævibus, minute punctatis; tibiis anticis fortiter 3-dentatis, minute serratis.

Long. 4-4.5 mm.; lat. 3 mm.

*Hab.* E. BRAZIL: Pernambuco, Ceara (Baturite Mts., Maranguape Mts.), Para, Santarem, Rio Janeiro.

This widely distributed little species is easily recognized by its bright orange markings upon the front part of the clypeus, the sides of the prothorax (the hind angles usually excepted), the shoulders of the elytra and their posterior part, the last forming an angular patch extending along a third of the suture, rising at the sides to beyond the middle, and sometimes coalescing with the large shoulder-patch. The legs and abdomen are also orange in colour.

*C. xanthurus*, Bl., appears to be a nearly related species, but Mr. Lesne, who has kindly compared the type with a specimen of the present species, tells me that the pronotum is less strongly punctured and the elytra not punctured at all, and the yellow marking is confined to a slight tinge at the extreme apex of the body.

*Pinotus geminatus*, sp. n.

Niger, subopacus, latus, convexus; clypeo antice capitisque lateribus rugulosis, illius margine medio minuto inciso, dentibus haud productis, fronte tuberculato, capite ante et post tuberculum sublævigato; pronoto brevi, lato, undique dense sat minute punctulato, punctis medio minus fortibus, pronoto toto marginato, angulis posticis fere obsoletis haud fossulatis; elytris opacis, singulo elythro stria suturali parisque tribus ornato, his fortiter impressis, punctatis, punctis haud crebris aut profundis, interstitiis alternis angustis et convexis; pygidio minute et crebre, haud profunde, punctato.

Long. 12.5-13.5 mm.; lat. 8-8.5 mm.

*Hab.* E. BRAZIL: Natal, Ceara.

This belongs to the *carbonarius* group of species, in which the upper surface is wholly or partly opaque. It is very easily distinguished by the characteristic striation of the elytra, the striæ forming three pairs, the interstices of which are rather narrow and convex. The striæ are moderately deep and contain punctures, which are rather feebly impressed and remote.

Two specimens were taken by Mr. Mann.

*Pinotus calcaratus*, sp. n.

Niger, modice nitidus, paulo elongatus; capite subtiliter ruguloso, posticæ sublævigato, clypeo antice bidentato, dentibus obtusis, haud valde approximatis, vertice breviter cornuto, cornu basi utrinque minute tuberculato; pronoto polito, minutissime punctulato, antice magis perspicue, angulis anticis crebre et distincte, his fere acute productis, angulis posticis obtusissimis sed distinctis, disco antice retuso, medio obtuse biacuminato; elytris subtilissime punctulatis, leviter striatis, striis vix distincte punctatis, interstitiis æqualibus, planis; pygidio parum convexo, minutissime sat parce punctato; pedis postici calcare apice acute bifido.

Long. 21 mm.; lat. 13.5 mm.

*Hab.* MATTO GROSSO: Madeira-Mamore Railroad, Camp 41.

A single specimen of a species nearest to *P. deyrollei* amongst the species contained in Harold's Revision of the genus. It is very different from that, however, being less short and convex, the elytra much flatter and less deeply striated, the head broader, less produced, and more finely rugose, and the pronotum having in the middle two blunt points directed forward. The sharply bifid spur of the hind tibia is another very distinctive feature.

*Pedaridium cryptops*, sp. n.

Fusco-nigrum, opacum, setis fulvis ubique instructum, pedibus rufescentibus, antennis fulvis: breviter ovatus; clypeo fortiter sat crebre punctato, margine antico arcuato, medio leviter emarginato et utrinque acute dentato; pronoto convexo, profunde sat crebre et æqualiter punctato, baseos medio obtuse angulato, angulis anticis acutis, posticis rotundatis; elytris profunde sed anguste crenato-striatis, interstitiis planis, utroque elytro lineis duabus rectis punctorum ornato, punctis setas erectas robustas ferentibus; corpore subtus nitido, parce punctato et setoso, abdomine grossissime et creberrime fossulato, lateribus antice dense strigilato; tibiis anticis valde 3-dentatis, supra minutissime serratis.

Long. 4.5 mm.; lat. max. 3 mm.

*Hab.* PROV. GOYAZ: Jatahy. E. BRAZIL: Natal.

Two specimens were found by Mr. W. Mann.

The head and thorax are deeply and rather evenly punctured. The elytra have deep sharply defined striæ formed of coalescing pits, the interstices are broad and flat and each bears two straight rows of deep round punctures, rather far apart and each bearing a stiff yellowish bristle. The eyes are entirely ventral.

Only a single species of this genus has been hitherto known (*P. hirsutum*, Har.), but three others are known to me. They are all much alike in size and general appearance, but may be distinguished as follows:—

Elytral striæ chain-like; eyes entirely ventral.....	<i>cryptops</i> .
Elytral striæ simple; eyes divided.	
Head rugose .....	<i>rugiceps</i> .
Head sparsely punctured .....	<i>fulgens</i> .

*P. hirsutum*, Har., which I do not know, is larger than any of these species and differently sculptured.

The two remaining species are shortly described here.

*Pedaridium fulgens*, sp. n.

Cupreum, subtus piccum, toto nitidum, setis flavis erectis parce vestitum: elongato-ovale, capite pronotoque lævibus parce setosis, illo acute bidentato, dentibus haud valde approximatis, denticuloque utrinque externo, pronoto paulo convexo, lateribus leviter arcuatis, angulis anticis obtusis, posticis toto rotundatis, basi recto; elytris profunde sed anguste striatis, interstitiis paulo convexis, utrinque parce punctatis, punctis setiferis, cum striis fere contiguis; tibiis anticis acute 3-dentatis.

Long. 4 mm.; lat. 2.3 mm.

*Hab.* N. ARGENTINA (Gran Chaco): Rio Salado.

Two specimens were sent to the British Museum by Mr. E. Wagner.

The shining, metallic, thinly setose surface renders this very easily distinguishable.

*Pedaridium argentinum*, sp. n.

Nigrum, vel nigro-brunneum, nitidum, erecte griseo-setosum, pedibus obscure rufis, antennis flavis: elongatum, capite rugoso, margine arcuato, medio emarginato et utrinque acute dentato; pronoto convexo, profunde sat æqualiter et crebre punctato, lateribus ante medium fere rectis, post medium late rotundatis, basi medio obtusissime angulato; elytris anguste sat profunde striatis, interstitiis planis, utroque lineis punctorum duabus ornato, punctis paulo vage impressis, cum striis nexis, setiferis.

Long. 4-4.5 mm.; lat. 2.5 mm.

*Hab.* N. ARGENTINA (Gran Chaco): Icaño, Rio Salado.

Taken by Mr. E. Wagner.

This is more elongate than *P. setosum*; the head is rugose and not distinctly punctured, and the punctures of the elytra are not so sharply defined, but occupy depressions which are connected with the striæ.

*Chæridium tridenticeps*, sp. n.

Nigro-piceum, nitidum, late ovatum, convexum; capite leviter punctato, trituberculato, margine antico acute bidentato; pronoto convexo, subtiliter punctulato, postice medio fortiter sulcato, margine postico crebre lineato-punctato; elytris sat fortiter striatis, striis transverse haud grosse aut crebre punctatis, interstitiis minute punctulatis; pygidio antice plano, dense et fortiter punctato, postice convexo, fere lævi:

♂, tibiis anticis longissimis, prope finem acute 3-dentatis, supra denticulatis, calcare bifido armatis.

Long. 8 mm.; lat. 5 mm.

*Hab.* MATTO GROSSO: Madeira-Mamore Railroad, Camp 28.

A single male was found by Messrs. Mann and Baker. It differs from all hitherto known in its head armed with three small tubercles, of which the two lateral ones are placed at the ends of the obsolete sutures of the ocular lobes. It has somewhat the form and size of *C. squalidum*, F., but is more convex, the pronotum has a strongly punctured basal line, and the elytral striæ are distinctly but not closely punctured. The pygidium is convex and shining, except at the base, where it is strongly and densely punctured. The front legs

of the male are very long and slender, the tibiæ serrated along the basal two-thirds of their length and then sharply tridentate. The hind femora have a subangular dilatation beyond the middle.

*Canthidium manni*, sp. n.

Nigrum vel cæruleo-nigrum, antennis tarsisque rufis, illorum clava pallide flava, capite plerumque æneo, lævi, pronoto nitidissimo, elytris subopacis; corpus globosum, compactum, capite prothoraceque lævissime punctatis, illo antice acute bidentato, medio minute 3-tuberculato; pronoto valde convexo, lateribus fortiter arcuatis, ante medium obtuse angulatis, baseos lateribus minute seriato-punctatis; elytris lævissime striatis, striis minute et remote punctatis; pygidio minute punctato.

Long. 7-8 mm.; lat. 4.5-5 mm.

*Hab.* E. BRAZIL: Ceara, Natal.

Although very easily distinguished by its smooth head and the much more rounded sides of the thorax, this is very similar in size, colour, and general appearance to *C. breve*, Germ., which also has three tubercles upon the head. The two clypeal teeth are more acute, the pronotum more smooth and shining, and its sides distinctly angulated before the middle.

*Onthophagus onthochromus*, sp. n.

Fulvus, capite, prothoracis disco metasternique partibus obscure æneis, elytrorum striis punctisque omnibus fuscis: elongato-ovatus, subnitidus; pronoto parcellissime inæqualiter punctato, postice longitudinaliter sulcato; elytris leviter striatis, striis vix perspicue punctatis, interstitiis parce irregulariter punctatis; pygidio haud crebre rufo-ciliato:

♂, capite antice subtiliter crebre punctato, clypeo quadratim producto, reflexo, fronte polito, carinis nullis, pronoto antice late excavato, lævissimo, supra carinato, carina leviter 4-lobata:

♀, clypeo crebre et rugose punctato, antice fortiter arcuato, carina mediana arcuata, fronte vix punctato, carina recta, fortiter elevata armata; pronoto antice carinato, carina medio interrupta, utrinque sinuata.

Long. 12.5 mm.; lat. max. 7 mm.

*Hab.* MATTO GROSSO: Madeira-Mamore Railroad, Camp 41.

*O. onthochromus* is evidently nearly related to *O. nasutus*, Guér., but it is much larger and differently coloured, the coloration (and also the size) being almost the same as that of the common Old-World species *O. gazella*, F., to which the female bears a remarkable resemblance. It is an entirely

hornless species, the female having the head rounded in front, finely rugose, and bearing two strong transverse carinae, while that of the male is very smooth, very finely punctured in front, and impunctate behind, with its anterior margin produced into a rectangular, strongly reflexed plate. The pronotum is carinate in front in both sexes, the carina having four blunt prominences, but that of the male is more highly developed and overhangs a wide smooth excavation.

*Onthophagus ranunculus*, sp. n.

Parvus, sat elongatus, opacus, fusco-aeneus, elytris fulvis, sutura aenea, interstitiisque alternis vel parte discoidali tota obscurioribus, pedibus rufis, femoribus pygidioque laete flavis, hoc nonnunquam fusco-maculato; clypei margine antico semicirculari, reflexo; prothoraco crebre punctato, griseo-setoso, postice medio laevigato, depresso, haud nitido; elytris subtilissime striatis, interstitiis biseriatis punctulatis et setosis, lateribus nitidis; pygidio nitido, fortiter punctato:

♂, capite polito, impunctato, sine carinis, postice cornubus duobus retrorsum directis armato; pronoto antice medio gibbose prominenti, utrinque retuso, polito:

♀, capite fortiter transverse bicarinato, clypeo nigro, transverse crebre ruguloso, fronte sublævi; prothoracis medio antice breviter carinato, haud tuberculato.

Long. 5-6.5 mm.; lat. max. 3-3.5 mm.

*Hab.* N.E. BRAZIL: Baturite Mts. (Prov. Ceara), Natal (Prov. R. Grande del Norte), Para.

This little species is closely allied to *O. osculatii*, Guér., which, however, is uniformly coloured. It has almost the colouring of *O. bidentatus*, Drap., and, as in that, the femora are bright yellow. In *O. ranunculus* the pygidium is also bright yellow and the upper surface is opaque and setose. The male is also distinguished by the quite smooth unpunctured head, without trace of carinae.

GEOTRUPINÆ.

*Bolboceras parcepunctatum*, sp. n.

Ferrugineum, nitidum, globosum; clypeo breviter transverso, a fronte carina valida, paulo arcuata, medio leviter acuminata, diviso, fronte leviter excavata, parvissime punctata; pronoto parce punctato, medio sulcato, ante marginem anticum tuberculo parum elevato, fere bidentato instructo; scutello lævi; elytris profundo 9-striatis, striis geminatis, puncta magna sat remota ferentibus:

♂, clypeo lævi, fronte utrinque intra oculos sat acute tuberculata :  
 ♀, clypeo rugose punctato, fronte ad oculos vix tuberculata.  
 Long. 7 mm. ; lat. 5 mm.

*Hab.* E. BRAZIL (R. Grande do Norte) : Ceara-Mirim (Parahyba), Independencia, Bahia.

A series of both sexes of this insect was obtained at Bahia in 1860 by the late Alexander Fry. One of these (a male) becomes the type. The specimens found by Messrs. Mann and Heath at Ceara and Independencia are all females.

This is near *B. cæsum*, Kl., and, indeed, the short description of that species applies to our females so far as the head and thorax are concerned, but the puncturation of the elytra sufficiently distinguishes it. The punctures do not stand close together, but rather far apart, and the rows are not almost equidistant except upon the anterior half of the elytra, being distinctly arranged in pairs beyond the middle. *B. globosum*, Cast., the fragmentary description of which renders it entirely unrecognizable, is a larger species.

The prothorax is of the same form in both sexes, having a longitudinal channel slightly dilated at the front margin and a feeble two-pointed eminence in the depression. The clypeus is smooth in the male and rugosely punctured in the female, and there is a sharp tubercle close to the inner margin of each eye of the male, but scarcely perceptible in the female.

Like all the species from this region of the earth, this is a dwarfed form. The genus, which is found in all tropical countries, is evidently represented in South America by the allied genus *Athyreus*, whose head-quarters are in that region. It is interesting to find that in Chili, the only part of South America in which well-developed species of *Bolboceras* occur, *Athyreus* is apparently unrepresented.

*Athyreus fissicollis*, sp. n.

Castaneo-rufus, elytris pallidioribus, corpore subtus dense lateribusque supra parce flavo-hirsutis, antennis etiam flavis, capite et prothorace haud dense granulatis, illo subplano, clypeo carinis 4 medio in cornu acuto brevi convergentibus, utroque latere supra antennam elevato et angulato; pronoto medio excavato sublævigato, carinis 2 haud acutis medio angulatis marginato, lateribus medio profunde fissis, margine antico medio acute tuberculato tuberculisque duobus minutis utrinque positis; elytris punctato-striatis, interstitiis lævibus; tibiis anticis 5-dentatis.

Long. 14 mm. ; lat. 9 mm.

*Hab.* E. BRAZIL: Natal (*W. M. Mann*). A single specimen.



It is very much like *A. 3-tuberculatus*, Kl., which, with other allied species, has the sides of the prothorax similarly cleft. In *A. fissicollis*, however, the thoracic carinæ are much less sharp, and instead of forming nearly parallel straight lines, each forms two arcs meeting in an angle. The elytra are more shining, with the punctures moderately large and arranged in regular rows. *A. catherinæ*, Bates, is also nearly related, but the whole upper surface is closely granulose and the sides of the prothorax are not cleft.

Another Brazilian species in the British Museum is exceedingly close to *A. fissicollis*, and it is perhaps desirable to distinguish them. It is characterized as follows:—

*Athyreus bahicæ*, sp. n.

*A. fissicollis* simillimus, sed prothoracis tuberculo mediano pone marginem posito, compresso, excavatione toto granuloso, carinisque magis acutis, elytris irregulariter haud lineare punctatis, distinctus.

Long. 10–14 mm. ; lat. 6·5–9·5 mm.

*Hab.* BRAZIL: Bahia, Jatahy (Prov. Gozas), Itaparica I. (near Bahia).

MELOLONTHINÆ.

*Lachnosterna vulpes*, sp. n.

Fulvo-ferruginea, capite, prothorace tibiisque obscure rufis: elongata, cylindrica, omnino brevissime erecte fulvo-pubescentis; capite punctato-rugoso, clypeo fortiter punctato, margine valde reflexo, medio vix indentato; pronoto brevi, crebre punctato, breviter haud dense piloso, postice medio opaco, lateribus medio angulatis, postice parallelis, angulis fere rectis; scutello opaco, punctato; elytris opacis, densissime punctatis et setosis, pilis longis nonnullis prope margines anticum et suturalem, costa suturali distincta, aliis indistinctis; pygidio crebre subrugose punctato, setoso, metasterni lateribus parce fulvo-villoso, medio polito, punctato, abdomine minute punctato, parce et brevissime pubescente; antennis 9-articulatis, clava utriusque sexus brevissima; tibiis anticis fortiter 3-dentatis:

♀, tibia antica paulo validiori, dente tertio minore, femore postico paulo crassato.

Long. 18·5–20 mm. ; lat. 9·5–11 mm.

*Hab.* MATTO GROSSO: Madeira-Mamore Railroad, Camp 39. Fourteen specimens were taken by Messrs. Mann and Baker.

The entire surface is very finely punctured, except the head, which is closely rugose, and there is a very fine and close pubescence, with a few long erect hairs upon the prothorax and near the anterior and sutural margins of the elytra.

This species resembles *L. fulvipennis*, Bl., with the type of which in the Paris Museum it has been kindly compared for me by M. Lesne. It differs not only in having a joint less in the antenna, but in the much shorter and sparser hairy clothing of the breast and much scantier long hairs upon the pronotum.

Blanchard divided the genus into two sections having nine and ten joints respectively in the antennæ; but this is an unsafe distinction to rely upon, the number and shape of the joints being liable to vary in the individuals of a species. In a species\* in the British Museum closely allied to *L. fulvipennis* and the present one males taken at the same time show both 9-jointed and 10-jointed antennæ, the fourth and fifth joints being sometimes distinct and sometimes reduced to a single one.

#### DYNASTINÆ.

A series of specimens of *Enema pan*, F., from Porto Velho, confirm in an interesting way the conviction I expressed in a paper published two years ago, that the form called *E. infundibulum*, although strikingly different and apparently unconnected by intermediates, is really only a phase of the male of *E. pan*. Eight specimens taken together by Messrs. Mann and Baker consist of three females, three typical males of varying degrees of development and two males of the *infundibulum* phase.

\*

#### *Lachnosterna nitidicauda*, sp. n.

Rufa, elytris pallidioribus, corpore toto brevissime sat dense griseo-pubescenti, pronoto elytrorumque basi pilis longioribus parce vestitis, pectore dense, haud longe, flavo-villoso; clypeo rotundato, haud emarginato, fortiter crebre punctato, fronte grosse punctato-rugoso; pronoto nitido, fortiter punctato, lateribus haud crenatis, medio angulatis, antice convergentibus, postice fere parallelis, angulis posticis rectis; scutello elytrisque haud nitidis, crebre punctatis; pygidio crebre et fortiter punctato, antice sericeo-opaco, postice nitido; antennis 10- vel 9-articulatis, tibiis anticis 3-dentatis, dente supero minuto:

♂, clava antennali longa.

Long. 18 mm.; lat. max. 9.5 mm.

Hab. CENTRAL BRAZIL: Chapada (2600 ft., *A. Robert*).

*Cyclocephala perforata*, sp. n.

Oblonga, nuda, nitida, late rufa, elytris flavis; clypeo lato, fovea transversa sat profunda a fronte diviso, nitido, vix punctato, antice truncato, leviter emarginato, lateribus arcuatis, valde reflexis, fronte fortiter haud crebre punctato, oculis magnis et prominentibus; pronoto fortiter irregulariter punctato, basi et lateribus linea sat profunda distincte marginatis, angulis anticis acutis, posticis rotundatis; scutello minute punctato; elytris undique fortissime irregulariter punctatis, absque lineis longitudinalibus (linea punctorum suturali excepta), punctis omnibus brunneo-tinctis; pygidio minute punctulato-ruguloso; corpore subtus laevi, metasterni medio profunde sulcato:

♂, tarsi anticis incrassatis, articulo penultimo angulatim producto, ungue interno valde incurvo, dilatato, profunde fisso.

Long. 13·5-15 mm.; lat. max. 7 mm.

*Hab.* MATTO GROSSO: Madeira-Mamore Railroad, Camp 41; Porto Velho.

A single male was found at each place by Messrs. Mann and Baker.

Although at first sight very much like many other species of the genus, a close examination shows this to have many peculiarities which make it in reality a very isolated form. The clypeus is smooth and shining, cut off by a deep furrow behind, and of rather unusual shape, being short and broadly emarginate, with reflexed sides; the pronotum is very distinctly margined all round and the elytral punctures are very strong, pigmented and irregular, the usual longitudinal rows being broken up, except that adjoining the suture.

*Stenocrates inelegans*, sp. n.

Niger, nitidus, elongato-ovatus; clypeo fortiter transverse rugoso, antice attenuato apice truncato, margine antico minute reflexo, haud exciso, fronte obsolete punctato a clypeo carina recta parum valida diviso; pronoti lateribus sat fortiter et parce, medio subtiliter, punctatis; scutello polito; elytris lineis geminatis 4 grossa punctatis ornatis, intervallis latis, profunde irregulariter punctatis; pygidio crebre et profunde haud grosse punctato.

Long. 18-19 mm.; lat. max. 9·5-10·5 mm.

*Hab.* RIO MADEIRA: Porto Velho.

Very closely allied to *S. rufipennis*, F., but with the pygidium closely and not coarsely punctured, and the clypeus rugose, with the front margin only feebly reflexed and not at all excised. The type of *S. rufipennis*, which has been kindly sent to me from Copenhagen by Dr. Adam Boving,

has the clypeus almost smooth and its front margin strongly reflexed and feebly excised. Burmeister's description of his *S. saucius* exactly applies to the Fabrician species, and the localities also agree, the Copenhagen type being labelled "Essequibo."

*Ligyrys maximus*, sp. n.

Niger, nitidus, subtus piceo-rufus, elongatus; capite toto transverse rugato, antice angustato, acute bidentato, sutura clypeali obsoleta, tuberculis duobus sat remotis indicata; pronoto convexo, crebre haud grosse punctato, postice parcius, margine antico medio acute tuberculato et post tuberculum sat late et profunde excavato, marginibus lateralibus regulariter valde arcuatis, antice contractis; scutello lævi; elytris ubique crebre sat minute punctatis, lineis geminatis tribus inconspicuis discoidalibus; pygidio minute et crebre punctato, apice fere lævi; corpore subtus medio impunctato, lateraliter rugose punctato:

♂, pygidio convexo:

♀, pygidio subplano.

Long. 30-33 mm.; lat. 15-18 mm.

*Hab.* AMAZONS: Porto Velho, Santarem, Serpa.

This is very near *L. maimon*, Er., and *latifovea*, Bates, but is larger than these and all other known species of the genus; the pronotum is more strongly and closely punctured, the anterior fovea deeper and broader, and the pygidium more strongly sculptured.

LII.—*The Fishes described by Carmichael  
from Tristan da Cunha.* By C. TATE REGAN, M.A.

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IN 1818 (Trans. Linn. Soc. xii.) Captain Carmichael described and figured four species of fish found on the coast of Tristan da Cunha, namely:—

*Chatodon monodactylus*, p. 500, pl. xxiv.

*Perca antarctica*, p. 501, pl. xxv.

*Callionymus diacanthus*, p. 501, pl. xxvi.

*Labrus ornatus*, p. 502, pl. xxvii.

The first of these is a *Chilodactylus* which has been redescribed from the Island of St. Paul by Kner ('Novara')

Fische, p. 90, pl. v. fig. 1), who has shown that it is not the same as the Chilian form with which Cuvier and Valenciennes (Hist. Nat. Poiss. ix. p. 489) and Günther (Cat. Fish. iv. p. 81) identified it.

The second species seems to have escaped the notice of later writers, but there can be little doubt that it belongs to the family Stromateidæ and that it is rather closely related to Sauvage's *Seriollella velaini* from the Island of St. Paul (Arch. Zool. Exp. viii. 1879, p. 32, pl. i. fig. 2).

The third species is a *Bovichthys* that has recently been rediscovered by the 'Scotia' at Gough Island, thus enabling me to show its distinctness from the Chilian species with which it had been confused.

The fourth species has just been received for identification from the Director of the South African Museum, and proves to be a *Labrichthys*. In the original figure the scales on the head are not shown, those on the body are too numerous, and there are other errors; nevertheless the form, proportions, fin-structure, markings, &c., are given with sufficient accuracy to leave no doubt as to the identity of the species. This may be judged by a comparison with the excellent figure given by Sauvage, who redescribed this form from St. Paul under the name *Labrichthys lantzii*, but mistook the female for another species, which he called *L. isleanus*. A description of the specimens from Tristan da Cunha follows.

#### *Labrichthys ornatus.*

*Labrus ornatus*, Carmich. Trans. Linn. Soc. xii. 1818, p. 502; pl. xxvii.

*Labrichthys lantzii*, Sauvage, C. R. Ac. Sci. lxxxii. 1875, p. 983, and Arch. Zool. Exp. viii. 1879, p. 37, pl. ii.

*Labrichthys isleanus*, Sauvage, *l. c.* and *t. c.* p. 39, pl. iii.

Depth of body equal to or a little more than length of head, which is nearly 4 in length of the fish. Snout blunt, longer than diameter of eye, which is 5 in length of head; interorbital width 4 to 5. Cleft of mouth not extending to below eye; a posterior canine. Cheek covered by 2 or 3 series of scales; præoperculum naked. 26 scales in a longitudinal series. Dorsal VIII-IX 12; not scaly at base. Anal III 11-12. Pectoral  $\frac{2}{3}$  or  $\frac{3}{4}$  length of head. Caudal rounded. Head with narrow stripes, 4 or 5 subvertical on lower part, 2 nearly horizontal from eye or cheek to operculum, continued on adjacent series of scales on the body; dorsal and anal with 2 or 3 longitudinal stripes; caudal crossed by similar stripes. A black spot between two first dorsal spines. Female with markings on fins less distinct

than in male, and with a black spot at base of posterior part of soft dorsal and another on upper part of base of caudal.

Two specimens, 140 and 175 mm. in total length.

It is of great interest to note that of the four species described by Carmichael from Tristan da Cunha two occur also at St. Paul, an island in the same latitude but 4500 miles distant, whilst the other two are represented at St. Paul by related species. None of the four genera is known from the islands to the south, Kerguelen and Marion Island, and only one (*Chilodactylus*) from the Cape, a little to the north; but all are represented on the coasts of Chile, New Zealand, and Southern Australia.

LIII.—*A new Shrew from the Andaman Islands.*

By OLDFIELD THOMAS.

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*Crocidura hispida*; sp. n.

A large *Crocidura* with semi-spinous fur and long tail.

Size about as in the large Nicobar and Andaman *Crociduræ* described by Miller, therefore conspicuously larger than in other *Crociduræ* of the East Indies, where the other large shrews are *Pachyura*. Form slender, limbs apparently long in proportion to the size of the body: Fur much stiffer than in any known shrews, the hairs more or less spinous and many of them flattened, as in spinous rodents; those on the back about 8 mm. in length. General colour grey, with a brownish wash, apparently (so far as can be judged in a spirit-specimen) not unlike the other large Eastern shrews. Hands and feet white. Tail slender, longer than head and body, well clothed, with many long bristly hairs, its short hairs the diameter of two to three tail-rings in length, brown above, whitish below. Lateral glands well defined, nearer the elbows than the hips.

Skull without marked peculiarities. Pterygoid region as in typical *Crociduræ* \*. First unicuspid slightly larger than the third, which in turn is about the same degree larger than the second.

Dimensions of the type (measured on the spirit-specimen):—

Head and body 85 mm.; tail 103; hind foot 255; ear 13.

\* Cf. Thos. Ann. & Mag. Nat. Hist. (8) xi. p. 320 (1913).

Skull: condylo-incisive length 28·5; condylo-basal length 27·7; mastoid breadth 12·5; length of upper tooth-series 12·7; breadth between outer corners of  $m^1$  8·5.

*Hab.* Middle Andaman Island. Type from the northern end.

*Type.* Adult male. B.M. no. 13. 3. 13. 1. Collected and presented by C. G. Rogers, Esq.

This striking species is almost or quite unique among large shrews by its tail being longer than its head and body and by the semi-spinous character of its fur, these being the main reasons for distinguishing it from *C. nicobarica* and *andamanensis*, Miller\*, with which alone among Eastern *Crocidura* it agrees in its comparatively large size.

In the partially spinous nature of its pelage *C. hispida* is unique in the family, although there is a slight stiffening and thickening of the hairs in many of the larger species of *Crocidura* and *Pachyura*.

P.S.—Since the above was written, Mr. Miller has been good enough to send me samples of the fur of his *C. nicobarica* and *andamanensis* for comparison with that of *C. hispida*. In *C. andamanensis* the hairs are slightly flattened, but not broadened; in *C. nicobarica* they are flattened, broadened, and thickened at the edges, somewhat as in *C. hispida*, but very much less so, the difference in structure representing the difference between merely “crisp” and what might be called “semi-spinous” fur.

#### LIV.—A new Pteropus from the Polynesian Subregion.

By KNUD ANDERSEN.

##### *Pteropus eotinus*, sp. n.

*Diagnosis.*—Similar to *Pt. anetianus* (known from Aneiteum only, at the southern extremity of the New Hebrides group), but with conspicuously larger skull, heavier dentition, longer wings, much shorter fur, and different coloration.

*Hab.* Aurora Island (Maiwo), one of the northern New Hebrides.

\* Proc. U.S. Nat. Mus. xxiv. pp. 776-7 (1902).

*Skull and dentition.*—Principal characters of teeth as in *Pt. anetianus*—i. e. upper incisors with strong posterior ledges,  $i_2$  enlarged, about three times the bulk of  $i_1$ ,  $p_1$  enlarged, about twice the size of  $i_2$ ,  $p^3$  (second upper premolar) with distinct small antero-internal tubercle, the posterior ledge of  $p_4$ ,  $m_1$ , and  $m_2$  continued forward along inner side of teeth—but individual teeth noticeably heavier.

Measurements of skull †:—Total length to gnathion \*62.5 mm. (55.7–58); from front of orbit to tip of nasals \*18.2 and †18.3 (15.2–16.2); width of brain-case at zygomata \*23.5 (21–22); zygomatic breadth \*38.5 (31.7–32.7); across crowns of  $m^1$ – $m^1$  (externally) \*17.5 and †18 (14.8–15.8); length of lower jaw from condyle \*50.5 and †49 (42.8–44.8); c– $m^2$  (crowns) \*23.5 and †23 (20.8–22); c– $m_3$  (crowns) \*26.3 and †25.2 (22.8–23.7).

Measurements of teeth:— $p^3$  (second postcanine tooth, above), length (antero-posterior extent) \*4.7 and †4.5 (4.2–4.6), breadth \*3.5 and †3.3 (2.8–3);  $p^4$ , length \*5 and †4.8 (4.2–4.7), breadth \*3.6 and †3.7 (3–3.2);  $m^1$ , length \*5.7 and †5.8 (5–5.4), breadth \*3 and †3 (2.7–2.8);  $m^2$ , length \*2.2 and †2.2 (1.9–2.1), breadth \*1.5 and †2 (1.7–2);  $p_1$ , length \*2.8 and †2.7 (2.2–2.7), breadth \*2.2 and †2.5 (2–2.2);  $p_3$  (second postcanine tooth, below), length \*4.8 and †4.5 (4.5–4.8), breadth \*3 and †2.9 (2.7–3);  $p_4$ , length \*5 and †4.8 (4.2–4.8), breadth \*3 and †3 (2.7–2.8);  $m_1$ , length \*5.1 and †4.8 (4.5–4.9), breadth \*2.9 and †2.9 (2.5–2.7);  $m_2$ , length \*3.5 and †3.8 (3.7–3.8), breadth \*2.5 and †2.7 (2.2–2.5);  $m_3$ , length \*1.8 and †1.8 (1.7–1.8), breadth \*1.2 and †1.8 (1.4–1.7).

*Wings.*—The greater length of the wings of *Pt. eotinus*, as compared with *Pt. anetianus*, appears to be due chiefly to a lengthening of the three long metacarpals and of the second phalanx of the third (longest) finger; the other phalanges and the forearm would seem only to average a little longer than in *Pt. anetianus*.

Forearm \*132 and †128.5 mm. (123.5–130); third finger, metacarpal \*89 and †87.5 (80–83), first phalanx \*36 and †67.5 (61.5–66), second phalanx \*93.5 and †95 (81.5–90.5); fourth finger, metacarpal \*87 and †85.5 (78.5–81), first phalanx \*56 and †55 (51–56), second phalanx \*50.5 and

† Measurements of the type of *Pt. eotinus* are marked with an asterisk, those of the paratype with a dagger; between parentheses are added, for comparison, the minimum and maximum measurements of a series of *Pt. anetianus* (copied from Cat. Chir. 2 ed. i. pp. 291–292).



†53·5 (49·5–50·5); fifth finger, metacarpal \*93·5 and †93 (85·5–89), first phalanx \*40 and †42·5 (39·5–42), second phalanx \*36·5 and †42·5 (39·5–42).

*Fur*.—Length of fur in centre of back \*19·5 and †20·5 mm. (longest hairs; in *Pt. anetianus* 31), and \*12 and †12·5 (general mass of hair; in *Pt. anetianus* 17). Distribution of fur unmodified.

*Colour*.—Type (adult male): General colour of back approximately pale cream, if viewed against the tips of the hairs, with side light, and with the surface of the fur below the level of the eye; if viewed against the tips of the hairs and with the eye between the light and the object, the fur of the back appears conspicuously washed with a very pale tinge of tawny or russet-tawny; individual hairs uniform from base to tip. Mantle, nape, and sides of face similar to back, but (in any light and position) strongly suffused with a tinge of russet-tawny considerably deeper than that noticeable on back. Underparts similar to back, but decidedly more washed with buff or pale ochraceous-buff, particularly on foreneck and centre of breast.—This coloration is strikingly like that of the unrelated *Pteropus keyensis*.

Paratype (adult female): Different in colour from type. Back russet mars-brown, sprinkled with many pale cream hairs, this lightening of the russet mars-brown colour being noticeable all over the back, though more conspicuously so on the rump; individual hairs uniform from base to tip. Head similar to back, but more heavily sprinkled with cream-coloured hairs. Mantle and sides of neck essentially as in *Pt. anetianus*, buffy washed with ochraceous or (on the sides) russet-ochraceous. Throat, breast, and belly mars-brown thickly sprinkled with pale hairs.

So far as the colour of the fur is concerned, the paratype described above differs from *Pt. anetianus* chiefly in the more russet or russet mars-brown (not Vandyck-brown) general tinge of the fur. At first sight the type presents a totally different style of colour, but in reality the difference is evidently due simply to an excessive development of the pale (cream or buff) element, which in the paratype is noticeable only as a "sprinkling" of the darker tinges; in the type this cream and buff colour has spread uniformly all over the animal above and below, reducing the russet or mars-brown element to a delicate wash of the colour of the back.

Judging from other species of the genus it appears rather unlikely that the colour-difference is sexual.

*Type*.—♂ ad., skin and skull, Aurora Island (Maiwo),

North New Hebrides, B.M. 13. 4. 6. 1. A paratype (♀ ad.) from same locality. Both specimens have been skinned from alcohol, but the colour of the fur is probably uninfluenced by the preserving fluid.

LV.—*A Review of the Clupeoid Fishes of the Caspian Sea, with Remarks on the Herring-like Fishes of the Russian Empire.* By Dr. L. S. BERG (St. Petersburg).

THE family Clupeidæ is represented within the limits of the Russian Empire by the following genera:—

### 1. CLUPEONELLA, Kessler.

*Clupeonella*, Kessler, Fishes of the Aralo-Caspio-Pontical Region, 1877, p. 187, tab. vi. fig. 24 (Russ.; type *Cl. grimmi*, Kessler, juv.).  
*Alosa auctororum*.

Belly compressed; ventral scutes strong, not concealed, 29 to 35 in number. Scales more or less deciduous, 49 to 60 in a longitudinal series; two elongate scales (alæ) at base of caudal fin. Mouth large, terminal, the maxillary nearly or quite reaching vertical from posterior edge of eye; jaws nearly equal anteriorly; upper jaw distinctly notched. Teeth on vomer persistent; teeth usually present in jaws and on palatines and tongue. Eyelids distinct; cheek higher than long; operculum with radial striæ. Dorsal II–IV 12–16; origin nearer to tip of snout than to base of caudal; last ray not produced. Anal II–IV 17–20. Pelvics I 8–9, inserted below origin or anterior third of dorsal. Vertebrae 48 to 52. Pyloric appendages about 50. Ovaries yellow.

Total length 160–500 mm.

Black and Caspian Seas. Some ascending rivers. Accidentally penetrating in the Mediterranean as far west as Cete, France (1885)\*.

### 2. ALOSA, Cuvier, 1829.

Type, *Clupea alosa*, L.

Closely allied to *Clupeonella*, but vomer toothless. Vertebrae 56–59. Appendices pyloricæ 100. Transverse series of scales 60–80.

In Russia only *A. finta*, Cuv. (Baltic Sea, Gulf of Finland, Gulf of Bothnia).

\* Moreau, 'Histoire naturelle des poissons de la France,' Supplement (Paris, 1891), p. 75.

## 3. CLUPEA, Linn.

Type, *Cl. harengus*, L.

Belly rounded; ventral scutes weak, inconspicuous, 36 to 48. 56 to 70 scales in a longitudinal series. Maxillary extending to below middle of eye; lower jaw projecting; upper jaw not notched. Small but persistent teeth on vomer; sometimes minute teeth in jaws and on palatines and tongue. Eyelids rudimentary; cheek longer than high; operculum smooth. Gill-rakers about 70. Dorsal III-V 13-17; origin nearer to tip of snout than to base of caudal. Anal II-IV 12-17. Pelvics I 7-8 (9), inserted below anterior  $\frac{1}{3}$  of dorsal. Vertebrae 50-59. Pyloric appendages 18-23.

A single species, with many subspecies, races, and forms in the northern parts of the Atlantic and Pacific; absent from the Black and Caspian Seas.

## 4. SPRATELLA, Val.

*Spratella*, Valenciennes, Hist. nat. poiss. xx. 1847, p. 356 (*pumila*=*sprattus*).

*Meletta*, Val. t. c. p. 366 (*vulgaris*=*sprattus*).

*Pomolobus* (non Raf.), Jordan and Evermann, Fish. of N. Amer. i. 1896, p. 424 (only synonymy, partim).

Differs from *Clupea* in the absence of vomerine teeth. Ventral scutes distinct. Maxillary scarcely extending beyond vertical from anterior edge of eye. Dorsal origin nearer to base of caudal than to tip of snout; pelvics inserted below or somewhat in advance of origin of dorsal. Vertebrae 45 to 50. Pyloric appendages 8 to 10.

*S. sprattus*, L., from the Baltic, *S. phalerica*, Risso, from the Mediterranean, and *S. sulinae*, Antipa, from the Black Sea.

## 5. HARENGULA, Val.

*Harengula*, Val. t. c. pp. 277, 280 (*latula*); Jordan and Herre, Proc. U.S. Nat. Mus. xxxi. 1906, p. 633.

Closely related to *Spratella*, but the dorsal fin more anterior in position. The following diagnosis is based on the species of the Black and Caspian Seas:—

Belly compressed; ventral scutes strong, not concealed, 22 to 31 in number. Scales deciduous, 40 to 63 in a longitudinal series; no ake at base of caudal fin. Mouth rather small, the maxillary reaching vertical from anterior edge of eye; lower jaw projecting; upper jaw not notched. No

vomerine teeth; teeth sometimes present on palatines. Eyelids absent or rudimentary; cheek longer than high; operculum without radial striæ. Dorsal III-IV 11-14; origin nearer to tip of snout than to base of caudal. Anal II-III 15-18. Pelvics I 6-7, inserted below anterior  $\frac{1}{3}$  of dorsal. Vertebrae 44. Pyloric appendages 8. Ovaries pink or purplish violet. No spots on side of body.

Total length to 165 mm.

Coasts of the Atlantic and Pacific; four species in the Black and Caspian Seas.

#### 6. SARDINELLA, Val.<sup>1</sup>

*Sardinella*, Val. Hist. nat. poiss. xx. 1847, p. 261 (*aurita*).

*Sardinia*, Poey, Memorias, ii. 1860, p. 31 (*pseudohispanica*; fide Jord. & Everm.).

*Clupanodon* (non Lac.), Jordan and Evermann, Fish. N. Amer. i. 1896, p. 422.

*Sardina*, Antipa, Denkschr. Ak. Wien, lxxviii. 1905, p. 42 (*pilchardus*).

Intermediate between *Clupea* and *Alosa*.

Ventral scutes nearly concealed. Scales deciduous, 28 to 52 in a longitudinal series; alæ present. Maxillary scarcely extending beyond vertical from anterior margin of eye; upper jaw slightly notched. No vomerine teeth; very feeble teeth on palatines and tongue. Eyelids present; opercles with or without radial striæ. Dorsal origin much nearer to tip of snout than to base of caudal; pelvics inserted below anterior  $\frac{1}{3}$  or middle of dorsal. Vertebrae 50-54. Pyloric appendages numerous.

Coasts of the Atlantic and Pacific; within Russian limits *S. euxina*, Antipa, 1905, and *S. pilchardus* (Walbaum), both from the Black Sea.

Two of the six genera occur in the Caspian Sea, namely, *Clupeonella* and *Harengula*. A revision of the Caspian species follows, with the Black Sea species of these genera included, so that all the known species of *Clupeonella* are enumerated.

#### CLUPEONELLA.

##### *Synopsis of the Species of the Caspian Sea* \*.

I. Less than 50 gill-rakers on first arch; teeth in jaws distinct.

A. Pectoral extending more than 61 % of distance from its base to root of pelvics; diameter of eye 5 to 7.4 % of length of fish (to end of middle caudal rays); total length not more than 200 to 250 mm.

\* *C. grimmi*, Kessler, is not included in this synopsis (v. p. 479).

1. Body immaculate or with spots larger than pupil; no dark lateral stripe.

Head acute, with straight upper profile; depth at occiput 70 to 77.4 % of its length. Lower jaw with a distinct symphysial tubercle ..... *saposhnikovii*.

Head with convex upper profile; depth at occiput 78.7 to 85.7 % of its length. Lower jaw without or with feeble tubercle ..... *sphaerocephala*.

2. A dark lateral stripe ..... *curensis*.

B. Pectoral (in adults) extending less than 61 % of distance from its base to root of pelvics; diameter of eye 4 to 5.9 % of length of fish; total length usually more than 250 mm.

25 to 44 gill-rakers on first arch; lower jaw with a tubercle ..... *brashkinovi*.

18 to 26 gill-rakers on first arch; lower jaw rounded at tip ..... *leucocephala*.

- II. More than 50 but less than 100 gill-rakers on first arch; teeth in jaws distinct.

Gill-rakers 60 to 89 ..... *kessleri*.

Gill-rakers about 53 ..... *suworowi*.

- III. Gill-rakers long, slender, reaching in advance of base of tongue, 100 or more on first arch; lower jaw sometimes toothless. *caspia*.

1. *Clupeonella saposhnikovii* (Grimm).

*Clupea saposhnikovii*, Grimm, The Herring of Astrakhan (in Russ.), 1887, pp. 7, 16 (Volga Delta).

*Clupeonella saposhnikovii*, Berg, The Herrings of the Caspian Sea (in Russ.), 1913, p. 15, tab. viii.-ix. (full synonymy).

D. III-IV 12-13. A. III-IV 17-18. Sq. 52-55. Gill-rakers 26-40 (average 30-31). Teeth strong. Eye large, 6.0-7.4 % of the length of the fish \*. Body deep, its depth 23.3-28.7 % of the length (if more than 27 %—*morphia elata*).

Total length usually 220-250 mm., sometimes 300 mm.; *morphia elata* 340 mm.

Caspian Sea, ascending only the lower part of the Volga Delta.

2. *Clupeonella sphaerocephala*, Berg.

*Clupeonella sphaerocephala*, Berg, The Herrings of the Caspian Sea (in Russ.), 1913, p. 20, tab. xii. figs. 1, 1 a.

D. III 13-14. A. III 17-19. Sq. 49. Ventral scutes 30-32. Gill-rakers long, robust, 26-36 (average 30).

\* The length of the fish is measured to the end of the middle caudal rays, the total length to the tips of the caudal lobes.

Teeth strong. Upper profile of head rounded. Depth of body 24.4–28.8% of the length of fish, least depth 8.1–9.1% of head 24.5–26.0% of its length. Depth of head at occiput 78.7–85.7% of its length. Eye large, 5.1–6.5% of the length of fish. Pectorals extending 70–77% of the distance from their base to that of pelvics. Scales rather firm. Sometimes dark spots on the sides of body.

Total length 160–185 mm. (sometimes to 233 mm.).

Caspian Sea: Bay of Agrakhan, Tiuleny (Seal) Island.

### 3. *Clupeonella curensis* (Suworow).

*Clupea (Alosa) curensis*, Suworow, Trudy, Casp. Exp. 1904 (in Russ.), i. 1907, pp. 166, 192–194; ii. 1908, p. 46.

*Clupeonella curensis*, Berg, The Herrings of the Caspian Sea (in Russ.), 1913, p. 22, tab. xiii. figs. 1, 2.

D. III–IV 12–14. A. III 17–19. Sq. 52–53. Ventral scutes 29–35. Gill-rakers 30–45 (average 35.7), long, slender. Teeth moderate. A distinct tubercle at the antero-inferior end of the lower jaw. Upper profile of head straight. Depth of body 18.4–27.2% of the length of the fish, eye 5.4–6.2% of the length of head. Depth of head at occiput 65.8–73.6% of the length of head. Pectoral extending 68–81% of the distance from its base to that of pelvics. A dark band along sides of body. Small specimens with back in front of dorsal fin distinctly keeled.

Total length to 200 mm.

West coast of the Caspian Sea, from the mouth of Kura to near Petrowsk.

### 4. *Clupeonella brashnikovi* (Borodin).

*Clupea saposchnikovi*, var., Brashnikov, Viest. Rybopr. 1898, p. 231 (in Russ.).

*Clupea caspiopontica*, var. *brashnikovi*, Borodin, *ibidem*, 1904, p. 176 (in Russ.).

*Clupeonella brashnikovi*, Berg, The Herrings of the Caspian Sea (in Russ.), 1913, p. 24, tab. x., xi.

D. III 15. A. III 18. Sq. 51–54. Gill-rakers 25–40 (average 32.2), long, thick. Teeth strong. Head cuneiform. Eye small, in adults 4.5–5.0% of the length of body. Body usually elongate, its depth 21–24% of the length of the fish, but sometimes as much as 29% (*morpha elata*). Pectoral, in adults, extending not more than 61% of the distance from its base to that of pelvics.

Total length to 483 mm.

Caspian Sea, principally at Manghyshlak. Not entering rivers.

5. *Clupeonella leucocephala*, Berg.

*Clupea caspiopontica*, var. *grimmi* (non Kessl.), Borodin, Viest. Rybopr. 1904, p. 180 (in Russ.).

*Clupea (Alosa) grimmi* (non Kessl.), Suworow, Trudy Casp. Exp. 1904 (in Russ.), ii. 1908, p. 45.

*Clupeonella leucocephala*, Berg, The Herrings of the Caspian Sea (in Russ.), 1913, p. 27, tab. xiv.

D. III 13-15. A. III 18-20. Sq. 51-53. Ventral scutes 31-33. Gill-rakers 18-26 (average 20.9), strong, long. Teeth strong. Tip of lower jaw rounded. Body elongate, its depth 18.6-22.8 % of the length of the fish. Head cuneiform, its depth at occiput 62-63 % of its length. Eyes small, 4.0-4.7 % of the length of the fish. Pectoral as in *Cl. brashnikovi*, extending 40-58 % of the distance from its base to that of pelvics.

Total length to 375 mm.

South part of the Caspian, northward to Belidshi.

6. *Clupeonella mæotica* (Grimm).

*Clupea mæotica*, Grimm, Viest. Rybopr. 1901, p. 67 (Kerch Strait) (in Russ.).

*Alosa mæotica*, Brauner, Trav. Soc. Nat. Bessarabie, ii. 1912, pp. 218, 221 (Liman of Dniestr).

Gill-rakers 27-35. Depth of head at occiput 70-71.5 % of its length.

Total length 330 mm. or more.

Sea of Asov and Black Sea (mouth of Dniestr).

7. *Clupeonella suworowi*, Berg.

*Clupeonella suworowi*, Berg, The Herrings of the Caspian Sea (in Russ.), 1913, p. 28, tab. xii. fig. 2.

D. IV. 13. A. III 18. Sq. 51. Ventral scutes 31. Gill-rakers 53. Teeth weak. Scales rather firm. Depth of body 27.2 %, head 25.3 %, eye 6.0 % of the length of the fish. Depth of head at occiput 81.4 % of its length. Pectoral extending 72.5 % of the distance from its base to that of pelvics.

Allied to *Cl. kessleri*, from which it differs by fewer gill-rakers, weaker teeth, and deeper body.

Total length 190 mm.

One specimen from near Volga Delta.

8. *Clupeonella pontica* (Eichwald).

*Clupea piltshardus* (non Walb.), Pallas, Zoogr. ross.-as. iii. 1811, p. 204 (ex parte: Pontus Euxinus, Palus Mæotis).

*Clupea pontica*, Eichwald, Bull. Soc. Nat. Moscou, 1838, p. 135 (in Ponto Euxino prope Odessam).

*Clupea eichwaldi*, Grimm, Viest. Rybopr. 1901, p. 67 (in Russ.) (Asov Sea, Don, Kalmius).

*Alosa pontica*, var. *russac*, Antipa, Denkschr. Akad. Wien, math.-nat. Kl. lxxviii. 1905, p. 22, Taf. ii. figs. 1-5 (N.W. part of the Black Sea).

*Alosa pontica*, Brauner, l. c. p. 218.

Gill-rakers 40-60. Body elongate.

Allied to *Cl. kessleri*.

Black Sea.

#### 8 a. *Clupeonella pontica nigrescens* (Antipa).

*Alosa pontica*, var. *nigrescens*, Antipa, t. c. p. 21, Taf. i. figs. 1-3.

Body deeper than in *Cl. pontica* typica.

West coast of the Black Sea.

#### 9. *Clupeonella kessleri* (Grimm).

*Clupea pilschardus*, var., Pallas, Zoogr. rosso-asiat. iii. 1811, p. 206 (Volgam usque ad Camam et Occam fl. adscendit anadromus).

*Clupea pontica* (non Eichw.), Kessler, Trav. Soc. Nat. Pétersb. (in Russ.) i. 1870, p. 281 (Volga).

*Clupea kessleri*, Grimm, The Herring of Astrakhan (in Russ.), 1887, p. 7 (Volga Delta).

*Clupeonella kessleri*, Berg, The Herrings of the Caspian Sea (in Russ.), 1913, p. 29, tab. vi., vii.

D. III-IV 13-15. A. III 17-20. Sq. 53-56. Ventral scutes 33. Gill-rakers short, 60-89. Teeth distinct. Body elongate, its depth 21.1-25.1 % of the length of the fish, sometimes (morpha *elata*) to 30 % of the length of the fish. Eye small, 4.1-4.9 % of the length of the fish. Pectorals extending 54.1-66.1 % of the distance from their base to that of pelvics. Scales rather firm.

Total length to 492 mm.

Caspian Sea, entering Volga and Ural. In the Volga as high as Nishni-Novgorod.

#### 10. *Clupeonella caspia* (Eichwald).

*Clupea caspia*, Eichwald, Bull. Soc. Nat. Moscou, xi. 1838, p. 134 (habitat in Caspio mari).

*Clupeonella caspia*, Berg, The Herrings of the Caspian Sea (in Russ.), 1913, p. 36, tab. i. fig. 1, tab. ii.-iv.

D. III-IV 13-15. A. III 16-20. Sc. 49-54. Gill-rakers long, slender, 101-135. Teeth weak, in lower jaw



usually absent. Body compressed, deep, its depth 25–30 % of the length of the fish (25–26 % = *morpha elongata*, 28–30 % = *morpha elata*).

Total length 200–260 mm., rarely 320 mm.

Caspian Sea, entering Volga Delta.

10 a. *Clupeonella caspia volgensis* (Meissner).

*Clupea caspia*, var. *volgensis*, Meissner, in litt.

*Clupeonella caspia volgensis*, Berg, The Herrings of the Caspian Sea (in Russ.), 1913, p. 34, tab. v.

D. IV 13–14 (15). A. III 15–19. Sq. 55. Ventral scutes 32–35. Differs from *Cl. caspia typica* in its elongate form (depth 23.2–25.5 % of the length of the fish), stronger teeth, and more acute snout. External shape very similar to *Cl. kessleri*, from which it differs by more numerous gill-rakers (100–140), &c. Scales deciduous.

Total length to 387 mm.

Caspian Sea, entering Volga.

11. *Clupeonella tanaica* (Grimm).

*Clupea tanaica*, Grimm, Viest. Rybopr. 1901, p. 67 (in Russ.) (Sea of Asov).

*Alosa tanaica*, Brauner, Trav. Soc. Nat. Bessarabie, ii. 1912, p. 217.

Allied to *Cl. caspia*.

Gill-rakers 58–77. Lower jaw toothless. Body deep.

Total length to 175 mm.

Sea of Asov, entering Don.

12. *Clupeonella nordmanni* (Antipa).

*Alosa nordmanni*, Antipa, Denkschr. Ak. Wien, lxxviii. 1905, p. 28, Taf. ii. figs. 6–10.

Replaces *Cl. tanaica* in the west part of the Black Sea.

Gill-rakers 76–90. Teeth in lower jaw present. Pelvics inserted under origin of dorsal.

Total length to 200 mm.

N.W. part of the Black Sea, entering Danube, Dniestr, Dniepr.

13. *Clupeonella grimmi*, Kessler.

*Clupeonella grimmi*, Kessler, Fishes of the Aralo-Caspio-Pontical Region, 1877, p. 187 (in Russ.), tab. vi. fig. 24.

Only young specimens, up to 45 mm., are known. Gill-rakers 17–30.

Middle part of the Caspian Sea.

Types in the Zool. Mus. of the Acad. Sc. St. Petersburg.

HARENGULA.

*Synopsis of the Caspian Species.*

I. Profile of back arched.

- Body deep, compressed, its depth more than 20 % of the length of the fish. Gill-rakers 44-56..... *delicatula*.  
 Body low, cylindrical, its depth not more than 19 % of the length of the fish. Gill-rakers 59-63..... *engrauliformis*.

- II. Back and head forming a straight line. Body compressed, deep. Gill-rakers 43..... *tscharchalensis*.

1. *Harengula cultriventris* (Nordmann).

*Clupea cultriventris*, Nordmann, Faune pontique, iii. 1840, p. 522 (Black Sea); Antipa, Denkschr. Ak. Wien, math.-nat. Kl. lxxviii. 1905, p. 32, Taf. ii. figs. 15-18.

Black Sea.

2. *Harengula delicatula* (Nordmann).

*Clupea delicatula*, Nordm. *t. c.* p. 524 (Odessa); Antipa, *t. c.* p. 32, Taf. ii. figs. 11-14 (near Danube Delta).  
*Harengula delicatula*, Berg, The Herrings of the Caspian Sea (in Russ.), 1913, p. 45, tab. i. fig. 2 (Caspian Sea).

Black and Caspian Seas, entering deltas of rivers. There are two forms, *elata* and *elongata*.

3. *Harengula tscharchalensis* (Borodin).

*Clupea cultriventris*, var. *tscharchalensis*, Borodin, Ann. Mus. Zool. Pétersb. i. 1896, pp. 82, 88, fig. (in Russ.) (Lake Charkhal).  
*Harengula tscharchalensis*, Berg, *t. c.* p. 45.

Lake Charkhal (tributary of the Ural River), middle Volga.

4. *Harengula engrauliformis* (Borodin).

*Clupea engrauliformis*, Borodin, Trudy, Casp. Exp. 1904, ii. 1908, p. 50.  
*Harengula engrauliformis*, Berg, *t. c.* p. 46, tab. i. fig. 3.

West coast of the Caspian Sea.

LVI.—On a Second Indian Species of the Genus  
*Termitodesmus* (*T. fletcheri*, sp. n.). By STANLEY HIRST.

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THE genus *Termitodesmus* was founded by Prof. F. Silvestri in 1911 for the reception of two interesting new millipedes found in termites' nests in Ceylon\*. An Indian species belonging to this genus (*T. lefroyi*) was briefly described by myself, in August of the same year, in this journal. Mr. T. Bainbrigge-Fletcher has very kindly sent me a second Indian species, which I describe below.

*Termitodesmus fletcheri*, sp. n.

Closely allied to *T. lefroyi*, Hirst, but easily distinguishable from that species by the presence of a transverse series of large granules on each of the tergites. This row of granules is situated at the posterior margin of the tergite, and is restricted to the middle part of it; towards the posterior end of the body the series of granules become weaker, and they are not present on the last tergites. This new species is larger than *T. lefroyi*, but the shape of its body is very similar. First tergite furnished with a distinct median groove, which is not very long and is situated a little in advance of the posterior margin; there is also an oblique lateral impression on each side of this tergite, and sometimes a second obsolete postero-lateral impression can be seen on each side. Scales very like those of *T. lefroyi*, most of them being circular or subcircular, but others ovate in shape; apparently they are not placed quite so close together as is the case in *T. lefroyi*. Shape of third segment of antenna very like that of *T. ceylonicus* (as figured by Silvestri). Colour pale cream (spirit-specimens).

*Measurements in mm.*—Length of body 5, its width 3·3. (Length of *T. lefroyi* 4·25, its width 2·8.)

*Material.*—Seven specimens found in the run-ways of a mound-building termite (*Odontotermes wallonensis*, Wasm.?) and of its inquiline (*Microtermes* sp., perhaps *M. obesus*, Holmgr.) at Siruguppa, in the Bellary District of the Madras Presidency. Other specimens captured at the same time are in Mr. T. Bainbrigge-Fletcher's collection. In his letter

\* See K. Escherich's 'Termitenleben auf Ceylon,' 1911, pp. 245-247, figs. 65-67; and also Zool. Jahrb. (Syst.) xxx, pp. 410-414, pls. ix.-xi.

accompanying the specimens he says:—"When the nest was opened up they retreated into the galleries, moving along fairly rapidly with a slug-like gliding motion."

The following is a key to the known species of *Termitodesmus*:—

- |   |                               |
|---|-------------------------------|
| a. Scales of tergites circular or subcircular in shape.   |                               |
| <i>a</i> <sup>1</sup> . A transverse series of granules on the tergites.  | <i>T. fletcheri</i> , sp. n.  |
| <i>b</i> <sup>1</sup> . No granules on the tergites . . . . .   | <i>T. lefroyi</i> , Hirst.    |
| b. Scales of tergites not circular.   |                               |
| <i>a</i> <sup>2</sup> . Body scarcely twice as long as wide. Scales setiform and bifurcated at the end or ending in 4-5 little prongs . . . . . | <i>T. escherichii</i> , Silv. |
| <i>b</i> <sup>2</sup> . Body considerably more than twice as long as wide. Scales broader, squamate . . . . .                                   | <i>T. ceylonicus</i> , Silv.  |

#### LVII.—*New African Epimys and Jaculus.*

By OLDFIELD THOMAS.

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##### *Epimys stannarius*, sp. n.

A small rat with the appearance of *E. hindei* and its allies, but much smaller and with smaller bullæ. Mammæ 1—2=6.

Size medium, decidedly smaller than in the *hindei* group, but much larger than any species that would be called "mice." Form rat-like. Fur long and loose, about as in the *hindei* group. General colour above wood-brown heavily lined with blackish, the posterior back more buffy. Under surface dull whitish, the bases of the hairs slaty; line of demarcation not very sharply defined. Ears of medium size, uniformly brown. Hands and feet dull white; fifth hind toe, without claw, reaching only to the base of the fourth toe; sole-pads 6, the last one elongated. Tail rather longer than head and body, closely scaled, the scales averaging ten to the centimetre, its hairs minute\*, barely one scale in length; dark brown above and below. Mammæ 1—2=6.

Skull, as compared with that of *E. hindei*, smaller and more delicate throughout. Upper profile rather more convex in the parietal region. Supraorbital edges with distinct but not strongly developed ridges. Palatal foramina to the level

\* The hairs may be longer and more numerous terminally, where the skin has been lost off the vertebræ.

of the main cusp of the first lamina of  $m^1$ . Bullæ quite small, conspicuously smaller than in any of the members of the *hindei* group.

Molars proportionally large, larger than those of *E. hindei* and equalling those of *E. noræ*; their form and structure quite as in those species.

Dimensions of the type (measured in the flesh):—

Head and body 126 mm.; tail 139; hind foot 28; ear 20.

Skull: greatest length 35; condylo-incisive length 31.7; zygomatic breadth 16.7; nasals 13.6; interorbital breadth 5; breadth of brain-case 14.2; palatilar length 15.1; palatal foramina 8.2; upper molar series 6.7.

*Hab.* Kabwir, Bauchi Province, Northern Nigeria. Alt. 2700'.

*Type.* Adult female. B.M. no. 13. 2. 5. 7. Original number 47. Collected 18th November, 1912, and presented by Mr. J. C. Fox.

No rats of this type have hitherto been found in any part of West Africa, and the present species can only be compared with *E. hindei* and its allies, natives of British East Africa southwards to Zambesia. From any of these it is at once distinguishable by its much smaller size and smaller bullæ, though the fact that its teeth are as large tends to show that it is really related to them.

#### *Jaculus jaculus favonicus*, subsp. n.

A western race of the smaller N.-African Jerboa.

Size slightly smaller than in Algerian specimens of *J. jaculus*, about equal to that of Egyptian examples. Colour more ochraceous than in *jaculus*, but this may be due to the preserving fluid out of which the specimen has been skinned—the tone between “pinkish buff” and “ochraceous buff.” Breadth of the dorsal colour less across the shoulders than in *jaculus*, the white of the flanks coming high up on each side, narrowing the dorsal buffy colour to about the width of the crown; on the hinder back, however, the breadth of the upper colour is as usual. A large white patch behind each ear. Tail buffy above, white below, a well-marked whitish ring preceding the usual subterminal black ring.

Skull smaller than that of specimens from Biskra and the Central Algerian Sahara, the bullæ noticeably smaller in all dimensions; skulls from Lower Egypt and Somaliland are, however, of similarly small size (see below).

Dimensions of the type (measured on a spirit-specimen):—

Head and body 98 mm.; tail 175; hind foot 58; ear 19.

Skull: greatest length (in middle line) 31; condylo-incisive length 28; back of bulla to front of incisors 32·7; zygomatic breadth 21; interorbital breadth 12·3; tympanic breadth 23; diameter of bulla from antero-inferior to postero-superior convexity 14·1; upper molar series 5.

*Hab.* Trarza Country, S.W. Mauritania.

*Type.* Adult female, skinned from preserving fluid. B.M. no. 13. 3. 7. 4. Collected by M. Audan.

This is a very great extension of the range of the *Dipodidæ*\*, as the Central Algerian Sahara, over 1200 miles off, is the nearest place from which any *Jerboa* has hitherto been recorded.

An examination of the *Jerboas* of this group, which extends from Senegambia to Somali, shows that they should all be looked upon as a single species, with several subspecies, between which the differences are size and general tone of colour. At the three extremities of the wide area referred to—Senegambia, Lower Egypt, and Somaliland—the size is decidedly less than in Algeria and the Soudan, as may be gathered from the following series of skull-measurements. The single dimension taken is from the front of the incisors to the back of the bullæ:—

Trarza: 32·7 mm.

Biskra: 34·5, 34·5, 35·2, 35·4.

Central Algerian Sahara: 35.

Egyptian Soudan: 35·2, 35·6, 36·3.

Cairo, Lower Egypt: 32·3, 32·7, 32·7, 33·5, 33·6.

Somali: 32·5.

It will be seen that the nearness together of these dimensions, and the geographical situation of the smaller forms at the most distant points round the larger, indicate the advisability of treating the whole as a single species. For to split them into two by size would leave the smaller species a conglomerate of three geographically isolated forms, between which in turn there are no characters to justify specific separation.

The five subspecies, however, may be provisionally indicated as follows:—

*J. jaculus deserti*, Loche.—Larger, paler. Algeria &c., down to Lake Chad.

---

\* The separation from each other of *Dipus* and *Jaculus* as distinct genera (*cf.* Ann. & Mag. Nat. Hist. (8) ii. p. 308, 1908) enables us to return to the well-known name *Dipodidæ* for the family, instead of the comparatively unfamiliar *Jaculidæ*.

*J. jaculus gordonii*, Thos.—Larger, browner. Egyptian Soudan.

*J. jaculus jaculus*, Linn.—Smaller, paler. Lower Egypt.

*J. jaculus favonicus*, Thos.—Smaller, more ochraceous. S.W. Mauritania.

*J. jaculus vulturinus*, Thos.—Smaller, browner. Somali.

Brief diagnosis of the last-named :—

*Jaculus jaculus vulturinus*, subsp. n.

*Jaculus*, Drake-Brockman, Mammals of Somaliland, p. 141 (1910).

Size about as in true *J. jaculus* of Lower Egypt. Ears rather longer. Colour comparatively brown, matching that of the Soudanese *gordonii*. Postauricular white patches large. Dark dorsal colour somewhat narrowed on posterior back.

Skull practically indistinguishable from that of *jaculus*.

Dimensions of the type (measured in the flesh) :—

Head and body 110 mm.; tail 170; hind foot 60; ear 23.

Skull: greatest length in middle line 30·7; condylo-incisive length 29; back of bulla to front of incisors 32·5; interorbital breadth 12·2; tympanic breadth 23; diameter of bulla 13·8; upper molar series 5·2.

*Hab.* Somaliland. Type from Berbera.

*Type.* Adult male. B.M. no. 5. 8. 7. 4. Original number 28. Collected 17th May, 1905, and presented by Dr. R. E. Drake-Brockman.

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LVIII.—*On the Skull and Part of the Skeleton of a Crocodile from the Middle Purbeck of Swanage, with a Description of a new Species* (*Pholidosaurus lævis*), and a Note on the Skull of *Hylæochampsä*. By C. W. ANDREWS, D.Sc., F.R.S. (British Museum, Natural History).

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[Plate VIII.]

THE following paper consists mainly of an account of an imperfect skull and skeleton of a crocodile preserved on a slab of Middle Purbeck limestone from Swanage. The specimen was discovered in Keat's Quarry, and was obtained for the British Museum by the late F. Hovenden, Esq., F.L.S., F.G.S.

The bones are much scattered, and in many cases overlie one another; the parts preserved are:—the skull, wanting

the extremity of the snout; the anterior part of the mandible; the atlas and axis and four other cervical vertebræ, with their ribs, behind which are two more cervical ribs in their natural position in the series, the vertebræ being wanting; two or three dorsal vertebræ; dorsal and sternal ribs; interclavicle; both coracoids; the left scapula; both humeri and ulnæ; left ilium; an ischium; right tibia; left fibula; numerous dorsal and ventral scutes, some of the latter still united with one another.

The skull (Pl. VIII. fig. 1) has been much crushed from above downwards, the palatal bores being especially badly broken. About 3-4 cm. of the end of the snout are wanting. In its general outline the skull is gavial-like, the snout being relatively long and slender. The supratemporal fossæ, though a little larger than the orbits, are much smaller than in the Teleosauridæ. Their upper rim is roughly quadrate in outline, but below this level they are rounded off at the anterior and posterior angles by projections of the frontal and parietal. The bony platform surrounding these openings is wide posteriorly and externally, and the upper surface of the bar between them is also of considerable width. The orbits, which looked upwards, outwards, and forwards, are oval in outline, being somewhat narrowed in front by an overhanging prominence on the prefrontal.

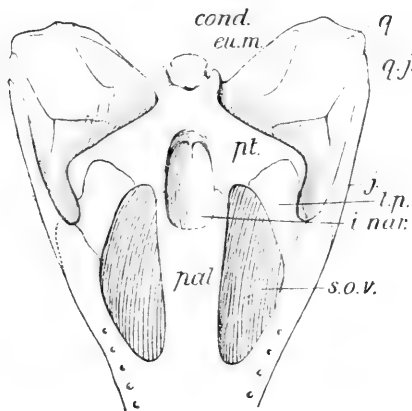
In front of the temporal fossæ the frontal (*fr.*) sends out broad lateral branches to join the postfrontals. Anteriorly they form the hinder part of the orbital border; in front of this the frontal first joins the prefrontal, then terminates anteriorly in a broad wedge-like point, thrust in between the hinder ends of the nasals and extending forward to about 2 cm. in front of the orbit. The prefrontals (*pr.f.*) are separated from the frontals posteriorly by a short suture running inwards from the orbital border nearly at right angles to the long axis of the skull, while their inner border is nearly parallel with it; anteriorly they widen out a little and bear a prominence which projects over the front of the orbit. In this region they overlap the lachrymal, which unites below with the maxilla and forms the actual anterior angle of the orbit. The nasals (*n.*) terminate posteriorly in points which are thrust in between the frontal and postfrontals to a little behind the level of the anterior angle of the orbit. Anteriorly they diminish in width very gradually, and their anterior ends probably just reach the facial processes of the premaxillæ (*p.mæ.*), which were long and slender, though, owing to the loss of the anterior part of the snout, the form of the premaxillæ as a whole cannot be determined. The



maxillæ (*mx.*) bear numerous teeth, the edges of the sockets for which form slight prominences on the alveolar border. The teeth themselves have sharp, pointed, slightly curved crowns, which are circular in section; the enamel is raised into numerous well-defined vertical ridges, but there seems to have been no carina. About nine teeth occur in a length of 10 cm. of the alveolar border.

The palate (text-fig. 1) is badly preserved. It can be seen that the pterygoids (*pt.*) united beneath the basisphenoid and send forwards and outwards broad wings which unite externally with the transpalatine (*t.p.*), an L-shaped bone,

Fig. 1.



*Pholidosaurus decipiens*, Watson. Diagram of the palate.  
About  $\frac{1}{3}$  nat. size.

*cond.*, occipital condyle; *eu.m.*, median Eustachian opening; *i.nar.*, internal nares; *j.*, jugal; *pal.*, palatine; *pt.*, pterygoid; *s.o.v.*, suborbital vacuity; *t.p.*, transpalatine.

the outer end of which joins the maxilla and probably the jugal (*j.*). Anteriorly the pterygoids appear to unite with the palatines (*pal.*) at about the level of the anterior angle of the internal nares (*i.nar.*). These openings seem to be bounded below by the palatines only, though the pterygoids must form most of their roof; their anterior angle is about as far forward as the anterior border of the temporal fossa. The suborbital vacuities (*s.o.v.*) are large, their posterior angle extending some distance behind the anterior border of the narial opening. The median Eustachian opening (*eu.m.*)

is immediately in front of the ventral prominence of the basi-occipital. The bones of the back of the skull are much crushed, but it can be seen that the paroccipital process of the exoccipital is very large, widening towards its outer end, where it terminates in a thickened rounded border; the quadrate region does not seem to present any peculiarities. The bones of the skull-roof show a feeble sculpturing of pits, for the most part irregularly arranged, but on the frontal radiating from the middle of the bone. On the snout the pits are replaced by short, irregular, but for the most part longitudinal, grooves.

The skull just noticed agrees very closely with that described by Owen (Foss. Rept. Weald. and Purbeck Form. Suppl. viii. (1878) p. 10, pl. vi. figs. 1, 2) under the name *Petrosuchus laevidens*. Mr. D. M. S. Watson (Mem. and Proc. Manchester Lit. and Phil. Soc. vol. lv. (1910-11), Mem. xviii. p. 9) has, however, pointed out that this specific name can only apply to the mandible of a short-snouted crocodile which Owen wrongly regarded as associated with the skull, so that it is this mandible which must be regarded as the type of *Petrosuchus laevidens*. The skull agrees very closely with that of *Macrorhynchus schaumbergensis* as described by Koken (Palæont. Abhandl. vol. iii. (1887) p. 334), and may no doubt be referred to the same genus, the name for which should be *Pholidosaurus* (von Meyer), which antedated *Macrorhynchus* by some years. The name *Pholidosaurus decipiens* has been suggested by Mr. Watson (*loc. cit.*) for the skull described by Owen, and that name is here adopted for the specimen under discussion.

The mandible had a very long symphysis into which the splenial seems to have entered for a short distance only, a circumstance which distinguishes it from *Pholidosaurus schaumbergensis*, H. v. Meyer, in which, according to Koken, the splenial extends nearly half the whole length of the symphysis. Anteriorly there is a slight expansion, showing that a premaxillary expansion was also present.

The atlas is all preserved, but the parts composing it are scattered. The odontoid remains attached to the centrum of the axis; its postero-inferior angles bear facets which probably helped to support the large first rib, which is a flattened bar of bone, pointed posteriorly and showing no trace of a tubercular process. The first subvertebral wedge-bone (hypocentrum of atlas) is closely similar to that found in the young alligator; it is notched posteriorly and bore a pair of facets which helped to form the surface for the support of the first rib. The two halves of the neural arch are

massive, the thickened ventral portion bearing two facets, one for union with the odontoid, the other forming the supero-lateral part of the cup for the occipital condyle; the base of the neural arch is deeply notched in front; this element is likewise very similar to that seen in the young alligator.

The axis is a moderately elongated vertebra fused anteriorly with the odontoid; the neural spine is long and low, rising somewhat towards its hinder end; the rib articulated mainly by its capitulum, but has a small tubercular process, which was no doubt connected with a diapophysis on the centrum; this second rib seems to have been almost entirely concealed beneath the first. The remaining cervical vertebrae present no peculiarities; their centra were slightly concave at each end; the neural spines are broad and rather low, the upper end being rounded; they increase a little in height and decrease in breadth as they are followed back on the series. The cervical ribs are of the normal Crocodilian form. The last two cervicals are represented by the ribs only which lie in their natural position with regard to one another and the rest of the series.

The dorsal vertebrae are represented by two or three incomplete specimens. One of these shows that the ends of the centrum were circular in outline and slightly concave in the middle, the edges being gently rounded. The neural arch and zygapophyses were proportionately large and the neural spine moderately high.

A number of dorsal ribs are preserved, but present no striking peculiarities. In addition to these there are several elongated flattened elements which do not appear to consist of true bone, but of calcified cartilage: these are sternal ribs. Some of these have their opposite sides parallel and are about three times as long as broad, others have one of the long sides straight, the other convex. So far as I am aware, the presence of calcified sternal ribs in a fossil crocodile has not been previously noted.

The shoulder-girdle is represented by the scapula, coracoid, and a well-preserved interclavicle. The upper end of the coracoid is similar to that seen in *Tomistoma*, but the bone is shorter and broader, particularly in the neck. The scapula is of modern type. The interclavicle is a long straight bar of bone terminating anteriorly in a blunt lance-shaped head; behind this it first narrows and becomes thicker from above downwards, then flattens out and widens to a point about 7 cm. from its anterior end; the expansion marks the point near which the lower ends of the coracoids were attached. Behind this the bone again narrows, and probably terminates

posteriorly in a thickened point; but this region is hidden by overlying bones. An interclavicle of somewhat similar shape, though probably having a shorter extension in front of the coracoids, has been described (as sternum) in *Mystriosaurus* by d'Alton and Burmeister\*, but I am not aware that it has been noticed in later Mesozoic forms.

The humerus is closely similar to that of modern crocodiles, except that the distal condyles are more nearly equal in size. In this respect the present species also differs widely from *Steneosaurus* and *Metriorhynchus*, in which the ulnar condyle tends to undergo extreme reduction. The ulnæ are not well enough preserved to show any characters.

Of the pelvis an ilium and an ischium are preserved. The ilium, of which the upper part of the inner face is exposed, does not seem to differ from the modern type. The ischium is nearly concealed by other bones.

Of the hind limb only a right tibia and a left fibula are preserved. The tibia is somewhat incomplete distally and is crushed at its upper end. So far as can be seen it is like that of recent crocodiles, and the same may be said of the uncrushed and perfect fibula, except that the distal facets for the astragalus and calcaneum seem to be more sharply marked off from one another.

Both dorsal (Pl. VIII. fig. 2) and ventral scutes are preserved. Of the former there were no doubt two rows meeting in the middle line. Each dorsal scute (Pl. VIII. fig. 2) is much broader transversely than longitudinally, the ratio being about 11 to 4. The anterior border (*a.b.*) is smooth and separated from the posterior portion by a groove; this smooth portion is overlapped by the hinder border of the scute in front; the outer anterior angle is produced into a blunt process (*p.*), which also underlies the scute in front. The greater portion of the surface is covered with an irregular sculpture of scattered pits, which become most numerous and deepest towards the outer border, near which there is a blunt longitudinal keel. The posterior border of the under surface is bevelled off to fit against the corresponding facet or the scute behind.

The ventral scutes united to form a plastron; they are polygonal, those in the middle of the plastron having six irregular sides. The sculpture of pits is much more strongly developed than on the dorsal scutes.

\* 'Der Fossile Gavial von Boll' (1854), p. 55, pl. ix. (in the lettering of the plate this bone is wrongly marked "coracoid"). Also probably the bone marked *c* in pl. vii.

Some dimensions of this specimen are:—

Skull (Pl. VIII. fig. 1):	cm.
Length . . . . . (approx.)	37
Width between orbits . . . . .	4·0
"    at postfrontals . . . . .	10·4
"    of the middle of the snout . . . . . (approx.)	3·0
Mandible:	
Length . . . . . (approx.)	42·5
"    of symphysis . . . . .	20·5
Length of the fused centra of atlas and axis . . . . .	4·2
Dorsal vertebra:	
Width of centrum . . . . .	2·5
Height of centrum . . . . .	2·5
"    to top of neural spine . . . . .	7·0
Length of humerus . . . . .	12·5
"    ulna . . . . .	8·3
"    tibia . . . . .	11·1
"    fibula . . . . .	10·9
Width of a dorsal scute (Pl. VIII. fig. 2) . . . . .	11·7
Length of a dorsal scute . . . . .	4·1

The collection also includes the posterior portion of a skull (Pl. VIII. fig. 3) of a *Pholidosaurus* apparently specifically different from *P. decipiens*. The chief points of difference are: (1) the complete absence of sculpture, and (2) the form of the anterior region of the frontal (*fr.*), which, instead of forming a broad wedge thrust between the hinder ends of the nasals, seems to have extended as a narrow strip between these bones, which furthermore ran a little further back than in *P. decipiens*. This species, which is from the same horizon and locality, may be called *Pholidosaurus laevis*, sp. n.

The form of the skull and position of the sutures will be best understood from the figure of the type specimen (Pl. VIII. fig. 3).

Some dimensions (in centimetres) of this specimen are:—

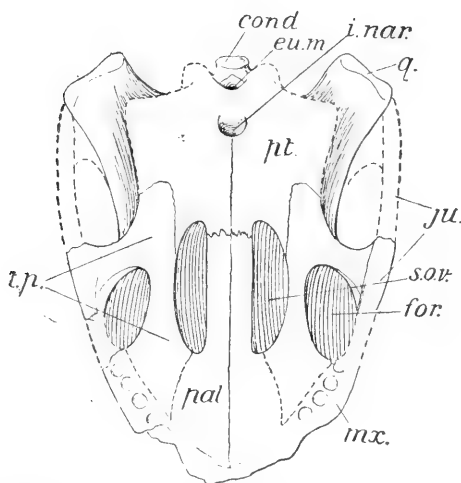
Length from supraoccipital to top of frontal . . . . .	15·4
"    of temporal fossa . . . . .	3·9
Width at postfrontals . . . . .	11·2
Least width between orbits . . . . .	4·0

From the above account it will be seen that *Pholidosaurus* is distinguished by the relatively small size of the supratemporal fossa, which are little larger than the orbits, the long narrow snout on which the nasals meet the facial processes of the premaxillæ, the internal nares far back, but still closed below by the palatines only. The vertebræ are amphicæloous. The fore limb is relatively large, and was

no doubt ambulatory. This genus has been rightly referred to a distinct family—the *Macrorhynchidæ*—by various writers; but since the name *Macrorhynchus* is merely a synonym of *Pholidosaurus*, it seems preferable to call the family the *Pholidosauridæ*. It is distinguished from the *Teleosauridæ* by the relatively small size of the temporal fossæ, the extension forwards of the nasals to meet the premaxillæ, the more posterior position of the internal nares, and the relatively larger size of the fore limb.

The remarkable and little-known crocodile *Hylæochampsia vectiana* of Owen\* has also been referred to this family, but

Fig. 2.



*Hylæochampsia vectiana*, Owen. Diagram of the palate of the type skull (R. 177). About  $\frac{1}{2}$  nat. size.

*cond.*, occipital condyle; *eu.m.*, median Eustachian opening; *for.*, foramen in transpalatine; *i.nar.*, internal nares; *ju.*, jugal; *mx.*, maxilla; *pal.*, palatine; *pt.*, pterygoid; *q.*, quadrate; *s.o.v.*, suborbital vacuity; *t.p.*, transpalatine.

the structure of the palate is so remarkable, and differs so widely from that found in the other Mesozoic crocodiles, and in some respects from the typical Eusuchia also, that it should certainly be placed in a distinct family, the *Hylæochampsidæ*. Owen's description of the upper and occipital surfaces of the skull is accurate and should be referred to,

\* Foss. Rept. Wealden and Purbeck Form. Suppl. vi. (Mon. Pal. Soc. 1874). Figured in Suppl. v. pl. ii, figs. 23-25.

but his account of the palatal surface is obscure. The most remarkable point about the palate (text-fig. 2) is that the pterygoids (*pt.*) meet beneath the nasal passage and carry back the internal narial opening (*i.nar.*) exactly as in modern crocodiles; the median Eustachian opening (*eu.m.*) is only separated from the nares by a ridge of bone, probably mainly formed by the basisphenoid. The palatal (suborbital) vacuities (*s.o.v.*) are very narrow and are separated, as usual, by the nasal tube formed by the palatines. Externally to these openings the palate is perforated by another pair of vacuities (*for.*), not seen in other crocodiles. They are large oval apertures, which Owen was inclined to take for the true suborbital vacuities, regarding the median pair as the internal nares. This, however, is clearly not the case, the nares (*i.nar.*), as already noted, being situate as in the Eusuchia. It becomes necessary, therefore, to account for the outer pair of openings, and a careful examination of the specimen shows that they are the result of the bifurcation of the outer portion of the very large transverse bone (*t.p.*), the posterior branch running outwards and forwards to join the jugal, the anterior nearly directly forwards to the maxilla (*mx.*); the opening included between the branches of the transverse line was no doubt closed externally by the union of the maxilla and jugal, but the specimen is unfortunately incomplete at this point. This opening has not been observed in any other crocodile; but it is significant that in the transverse bone of all modern forms there is, about opposite the point of union of the maxilla and jugal, a small foramen, which completely perforates the bone and is probably not a nutritive opening. It may be suggested that this small opening is a remnant of the vacuity now described on *Hyloechampsia*,

Another remarkable point about the skull is that the series of dental alveoli, of which two or three are preserved in each maxilla, converge very rapidly towards one another in front, as if the skull were very short; but from the large size of the nasals, so far as preserved, and from the peculiar pinching-in of the skull in front of the orbits, it seems more probable that this convergence of the alveolar borders is merely a rapid narrowing to pass into a slender rostrum of unknown length.

Of the remainder of the skeleton nothing is definitely known; but it is very probable that a series of procœlous Crocodilian vertebræ described by Seeley (Quart. Journ. Geol. Soc. xliii. (1887) p. 212, pl. xii. figs. 7-8), under the name *Heterosuchus valdensis*, actually belong to *Hyloechampsia*. If this is so, it adds another striking feature of resemblance to the Eusuchia.

The occurrence in Wealden deposits of a crocodile which in many respects, notably in the position of its internal nares, and probably in the possession of procœlous vertebræ, is quite similar to the recent forms, while at the same time its transverse bone differs widely from that of the earlier Mesosuchia at present known, seems to make it doubtful whether any of the latter are ancestral to the Eusuchia. No doubt the condition of the internal nares found in them represents a stage passed through by the ancestors of the Eusuchia; but it seems quite likely that those ancestors were forms still unknown which lived in rivers and swamps. *Goniopholis* and *Bernissartia*, contemporaries of *Hylæochampsä*, possessed amphicœlous vertebræ, and I am informed by Professor Dollo their transverse bones are not bifurcated or perforated by any foramen. These genera therefore may represent fresh-water or swamp-haunting types derived from the earlier amphicœlous Mesosuchia, but not ancestral to the modern crocodiles. The same may also apply to *Pholidosaurus*. The discovery in the Jurassic of remains of crocodiles other than the more or less pelagic types, such as *Metriorhynchus* and *Stenoeosaurus*, is necessary before the question can be settled.

## EXPLANATION OF PLATE VIII.

*Fig. 1.* *Pholidosaurus decipiens*, Watson. Skull from above. (R. 3956.)

About  $\frac{2}{3}$  nat. size.

*Fig. 2.* Ditto. Dorsal scute from above. (R. 3956.) About  $\frac{2}{3}$  nat. size.

*Fig. 3.* *Pholidosaurus lævis*, sp. n. Skull from above. (Type specimen, R. 3414.) About  $\frac{2}{3}$  nat. size.

<i>a.b.</i> Anterior border of scute.	<i>p.</i> Process on antero-external angle of scute.
<i>ex.o.</i> Exoccipital.	<i>pa.</i> Parietal.
<i>fr.</i> Frontal.	<i>pm.x.</i> Premaxilla.
<i>j.</i> Jugal.	<i>po.f.</i> Postfrontal.
<i>l.</i> Lachrymal.	<i>pr.f.</i> Prefrontal.
<i>mx.</i> Maxilla.	<i>q.</i> Quadrate.
<i>n.</i> Nasal.	<i>qj.</i> Quadrato-jugal.
<i>oc.c.</i> Occipital condyle.	<i>sq.</i> Squamosal.

LIX.—*New African Antelopes of the Waterbuck Group.*  
By ERNST SCHWARZ.

FURTHER study of the Ungulata brought home by the Duke of Mecklenburg's expedition has resulted in the discovery of the following new forms:—

*Kobus defassa annectens*, subsp. n.

*Type locality.* Badingua, Upper Shari River.



*Type.* ♀. Senckenberg Museum, Frankfurt-a.-M. Journal no. 324. Original no. 78. Collected in December 1910 by Dr. H. Schubotz.

Aliied to *K. defassa tschadensis*\*, but much darker and with shorter neck-mane.

Anterior portion of back, withers, and upper parts of shoulders brownish red (between fawn nos. 2 and 3, Rép. de Coul.), strongly suffused with black and less contrasted with the colour of the neck, as in *tschadensis*. Colour of neck similar, but with much less black suffusion, owing to the much shorter blackish tips of the hairs. Crown and forehead brownish red (fawn no. 2); middle portion of face similar, but some hairs with black tips, which increase towards the muzzle, thus producing an almost black effect in the foremost portion of the face; muzzle surrounded by the usual white band. Cheeks greyish red; the whitish throat-band rather conspicuous. Back of ears reddish brown in the basal two-thirds, apical third black, whereas in *K. d. tschadensis* only the extreme tip and in *K. d. schubotzi* the apical fourth is blackish. Buttocks white, sharply contrasted with the indistinct brownish-red area which margins the dark colour of the rump, and which is continued down the posterior side of the legs and to the tail. Hind legs from hocks, fore legs from below shoulders, and tail-tip brownish black (reddish black no. 4, Rép.). Light bands round false hoofs dirty white, those round hoofs brownish. Underside of body sooty brown except the inguinal region, which is white like the buttocks and the inner side of the thighs.

*Skull.* As in *K. d. tschadensis*; in the only male specimen, unfortunately not full-grown, the horns appear to be slightly thinner than in *tschadensis*.

The waterbuck of the Upper Shari Valley is intermediate between the Chad and Ubangi races. Although the general style of marking, the texture of the fur, and the skull are very much as in *K. d. tschadensis*, the dark colour, shorter mane, and brown hoof-bands strongly recall the race which is now described as

*Kobus defassa schubotzi*, subsp. n.

*Type locality.* Duma, near Libenge, Ubangi River.

*Type.* ♂. Senckenberg Museum, Frankfurt-a.-M. Journal nos. 223 (skull), 214 (skin). Original no. 21. Collected in October 1910 by Dr. H. Schubotz.

\* When describing the Lake Chad race, I have, by some mistake, used *K. unctuosus* instead of *K. defassa*, which is the oldest name for a form of this group.

Allied to *K. d. annectens*, but distinguished by its shorter coat, more brownish colour, blackened face, and more slender horns.

Back, withers, and shoulders distinctly speckled brownish (dead-leaf nos. 1-2, Rép.) and black, gradually passing into the colour of the neck, which is similar, but less speckled with black. Crown and forehead rich rusty brown (fawn nos. 2-3), rather sharply set off from the black central portion of face. Cheeks also strongly speckled with black. The whitish band round the muzzle strongly suffused with rusty and margined on either side by a distinct greyish spot. White throat-band very conspicuous. White supraorbital stripe very distinct and accompanied above by a narrow black streak. Back of ears pale reddish brown, with the apical fourth black. Buttocks yellowish white, not sharply contrasted with the reddish-brown band which margins the dark colour of the rump, but is not continued to the thighs as in *K. d. annectens*. Upperside of tail blackish. Hind legs from hocks and fore legs from below shoulders deep black (dark neutral tint no. 4). An indistinct blackish-brown stripe runs from the hocks to the inguinal region. Light bands round false hoofs yellowish white, those round hoofs rusty. Underside of body dark sooty, except the inguinal region, which is white like the inner side of the thighs.

*Skull.* Distinctly smaller than in the two Shari races; horns thinner and with the rings much closer together.

*Dimensions of type skull.* Basal length 328 mm.; upper length 360; palatal length 195; palatal width inside  $m_2$  52; postorbital width 151; zygomatic width 142; mastoid width 129; nasals, length 153, greatest breadth 37; breadth of rostrum across premaxillæ 45; length of upper tooth-row (alv.) 101; horns, length along curve 710, greatest diameter at base 62.

The pale *K. d. tschadensis*, with its long fur and indistinct markings, and the dark *K. d. schubotzi*, with its bright markings and short coat, seem at first to represent different species rather than local forms of the same species; but both are connected by *K. d. annectens*, which combines the long fur of *K. d. tschadensis* with the dark colour of the present form.

*Adenota kob adolfi-friderici*, subsp. n.

*Type locality.* Mouth of the Shari River, German side, Bornu.

*Type.* Adult ♂. Senckenberg Museum, Frankfurt-a.-M. Journal nos. 1009 (skin), 789 (skull). Original no. 121. Collected February 2nd, 1911.

A very large form of the "grass-antelope," characterized by the pale colour of the "intermediate" zone\* of the flanks and the unusually strong horns.

Colour of "mantle" fulvous (bistre, Rép.), darker (no. 3) posteriorly, lighter on the shoulders and neck (no. 1) and face (no. 2). "Intermediate" zone yellowish buff (maize-yellow no. 2, Rép.), darkening on the thighs (no. 4). Limbs like neck (bistre no. 1). Muzzle, lips, an indistinct ring round eye, chin, chest, belly, and inner side of forearms and thighs white. Front of fore legs from below shoulders with a sharply defined brownish-black band; hind legs with a similar brownish-black band, but only reaching up from the hoofs halfway towards the hocks. A rather broad band round hoofs and very narrow ones round false hoofs yellowish to fulvous white. Tail above like back, below white, tip black. Back of ears pale yellowish fulvous, with short blackish tip and a large white patch at base.

*Skull.* Much larger than in *A. k. kob*, and comparatively narrower. Horns of the same general shape, but more curved in the basal portion and with longer tips.

*Dimensions of type skull.* Basal length 281 mm.; upper length 312; palatal length 162; palatal width inside  $m_2$  39; postorbital width 113, zygomatic width 104; mastoid width 98; nasals, length 121, greatest breadth 25; breadth of rostrum across premaxillæ 43.5; length of upper tooth-row (alv.) 74; horns, length along curve 530, greatest diameter at base 63.7.

*Adenota kob bahr-keetae*, subsp. n.

*Type locality.* Bahr Keeta, N.E. of Fort Archambault, Upper Shari district.

*Type.* Adult ♂. Senckenberg Museum, Frankfurt-a.-M. Journal nos. 158 (skin), 204 (skull). Original no. 143. Collected in February 1911 by Dr. H. Schubotz.

Distinguished from *A. k. adolphi-friderici* by its somewhat smaller size, darker "intermediate" zone, and weaker somewhat deflected horns.

Colour of "mantle" deep fulvous (brownish terra-cotta, Rép.), darker (between nos. 2-3) posteriorly, lighter on shoulders, neck, and face (no. 1). "Intermediate" zone light fulvous (near pitchpin no. 2, but duller, perhaps with a slight admixture of chamois), darkening on the thighs (buff no. 1). Black markings and distribution of white exactly as

\* The dark colour of the back, here spoken of as the "mantle," is margined by a paler "intermediate" zone, which separates it from the white of the belly.

in *A. k. adolfi-friderici*, except that the white of the chin and throat is more conspicuous.

*Skull.* Much as in *A. k. adolfi-friderici*, but smaller. Horns thinner at base and distinctly more curved in their basal portion.

*Dimensions of type skull.* Basal length 255; upper length 287; palatal length 149; palatal width inside  $m_2$  39.5; postorbital width 114; zygomatic width 102.5; mastoid width 93; nasals, length 109, greatest breadth 23.9; breadth of rostrum across premaxillæ 39.5; length of upper tooth-row (alv.) 72.4; horns, length along curve 510, greatest diameter at base 54.8.

*Adenota kob ubangiensis*, subsp. nov.

*Type locality.* Duma, near Libenge, Ubangi River.

*Type.* ♂. Senckenberg Museum, Frankfurt-a.-M. Journal no. 215. Original number 18. Collected September 25th, 1910, by Dr. H. Schubotz (no skull).

Nearly allied to *Adenota k. bahr-keetæ*, but still darker, and with a distinct suffusion of black.

Colour of "mantle" much like the "ru ochre" of the 'Rép. de Couleurs,' but somewhat more brownish, and distinctly but finely speckled with black, especially posteriorly. No speckling on legs, neck, shoulders, and face. "Intermediate" zone near "cinnamon" no. 1, thighs only slightly darker. Black markings and distribution of white as in *A. k. bahr-keetæ*.

Only the skull of a young specimen has been examined.

A specimen from Crampel, Gribingi (Upper Shari) River, combines the slightly larger size of *A. k. bahr-keetæ* with the dark fulvous colour of *A. k. ubangiensis*. As a matter of fact, the three forms of *Adenota* just described are very closely allied; more material from intermediate localities will most certainly show them to intergrade, but the extremes at hand are different enough from each other to deserve subspecific rank.

LX.—*A Synopsis of the Cichlid Fishes of the Genus Crenicichla.* By C. TATE REGAN, M.A.

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IN 1905 (Proc. Zool. Soc. pp. 152-168) I published a revision of the genera *Crenacara*, *Batrachops*, and *Crenicichla*. Since then Haseman has described *Crenacara altispinosa* from the

Rio Guaporé (Ann. Carnegie Mus. vii. 1911, p. 344, pl. lviii.) and also *Crenicichla simoni* from the Paraguay (t. c. p. 345); the latter is a synonym of *Batrachops ocellatus*, Perugia. Several new species of *Crenicichla* have been described, and those that I regard as valid, together with two described below as new, bring up the number from sixteen to twenty-two.

*Synopsis of the Species.*

- I. Scales on sides ctenoid; nostril not nearer to end of snout than to eye.
- A. 38 to 72 scales in a longitudinal series below lateral line.
1. Maxillary extending beyond vertical from anterior margin of eye.
- a. D. XVI-XX 13-16. Interorbital width  $\frac{1}{3}$  (adult) or  $\frac{1}{4}$  (young) the length of head. Often a dark spot or ocellus between pectoral fin and lateral line.
- Less than 50 scales in a lateral longitudinal series . . . . . 1. *lepidota*, Heck., 1840.
- 50 to 62 scales in a lateral longitudinal series . . . . . 2. *saxatilis*, Linn.
- b. D. XVIII-XXI 13-15. Interorbital width  $\frac{1}{4}$  (adult) or  $\frac{1}{5}$  or less (young) the length of head. An ocellus on lateral line above pectoral fin.
- D. XVIII-XIX 13-15;  $3\frac{1}{2}$  or 4 scales between last dorsal spine and lateral line . . . . . 3. *alta*, Eigenm., 1912.
- D. XIX-XXI 13-14;  $4\frac{1}{2}$  to 6 scales between last dorsal spine and lateral line. . . . . 4. *lucius*, Cope, 1871.
- c. D. XX-XXII 11-13; no ocellus above the pectoral.
- Maxillary extending to below middle of eye; no ocellus on dorsal fin. . . . . 5. *gayi*, Pellegr., 1903.
- Maxillary extending to below anterior  $\frac{1}{3}$  of eye; a large ocellated spot on posterior part of spinous dorsal . . . . . 6. *dorsocellata*, Haseman, [1911.
2. Maxillary extending to vertical from anterior margin of eye; 63 to 70 scales in a lateral longitudinal series, 8 to 12 from first and 3 to 6 from last dorsal spine to lateral line.
- D. XX-XXIII 12-13. A. III 8-10. Diameter of eye 4 to 7 in length of head (in specimens of 90 to 300 mm.) . . . . . 7. *lacustris*, Casteln., 1855.
- D. XX-XXII 10-11. A. III 7-8. Diameter of eye  $3\frac{1}{2}$  to 4 in length of head (in specimens of 98 to 225 mm.) . . . . . [1840.
8. *macrophthalmus*, Heck.,
3. Maxillary not extending to vertical from anterior margin of eye; 57 to 65 scales in a lateral longitudinal series, 6 from first and 2 (rarely 3) from last dorsal spine to lateral line. D. (XVIII) XX-XXI 10-11 (13). A. III 7-9.
- a. Anterior teeth in 5 or 6 series; no ocellus on dorsal fin.
- Last dorsal spine  $\frac{1}{2}$  length of head . . . . . 9. *wallacii*, Regan, 1905.

- Last dorsal spine scarcely more than  $\frac{1}{3}$  length of head . . . . . 10. *nanus*, sp. n.
- b. Anterior teeth in 3 or 4 series; a large ocellus near posterior end of spinous dorsal . . . . . 11. *notophthalmus*, sp. n.
- B. 72 to 130 scales in a longitudinal series below lateral line.
1. Maxillary not extending to below eye; snout more than  $\frac{1}{2}$  length of head.
- a. Interorbital width  $4\frac{1}{2}$  to 5 in length of head.
- D. XXIII 13-14. A. III 9-10. 84 to 95 scales in a lateral longitudinal series . . . . . 12. *vittata*, Heck., 1840.
- D. XXIV 14. A. III 11. 113 scales in a lateral longitudinal series . . . . . 13. *acutirostris*, Günth., [1862.]
- b. Interorbital width about 3 in length of head.
- D. XX-XXII 11-12. A. III 9. 72 to 76 scales in a lateral longitudinal series . . . . . 14. *cametana*, Steind., [1911.]
- D. XXIV-XXV 13-14. A. III 9-10. 102 scales in a lateral longitudinal series . . . . . 15. *multispinosa*, Pellegr., [1903.]
2. Maxillary extending to below anterior margin of eye or a little beyond; snout  $\frac{1}{3}$  the length of head or less.
- a. Scales above upper lateral line ctenoid, except anteriorly.
- D. XXII-XXIV 15-17. A. III 10-12.
- 93 to 108 scales in a lateral longitudinal series, 14 to 16 between first dorsal spine and lateral line; snout  $3\frac{1}{3}$  to  $3\frac{2}{3}$  in length of head; two dark lateral stripes ending in a spot on base of caudal, a third along lateral line, a fourth connecting a series of rings on each side of the back . . . . . 16. *strigata*, Günth., 1862.
- 116 scales in a lateral longitudinal series, 15 between first dorsal spine and lateral line; snout  $3\frac{1}{2}$  in length of head; an irregular brownish band along middle of side, another above the lateral line. . . . . 17. *marmorata*, Pellegr., [1903.]
- 106 to 113 scales in a lateral longitudinal series, 16 or 17 between first dorsal spine and lateral line; snout 3 to  $3\frac{1}{4}$  in length of head; brownish, with a dark spot above pectoral and another at base of caudal . . . . . 18. *lugubris*, Heck., 1840.
- 120 scales in a lateral longitudinal series, 20 between first dorsal spine and lateral line; body with dark cross-bars. . . . . 19. *cineta*, Regan, 1905.
- b. Scales above upper lateral line nearly all cycloid; 112 to 130 in a longitudinal series below it. D. XXI-XXIII 17-19. A. III 11-12. Blackish spots on head and chest.
- Pectoral fin rather less than  $\frac{2}{3}$ , postorbital part of head more than  $\frac{1}{2}$  length of head. A stripe on head behind eye; a series of spots on spinous dorsal fin; a series of narrow vertical bars above lateral line . . . . . 20. *ornata*, Regan, 1905.

Pectoral fin rather more than  $\frac{3}{8}$ , postorbital part of head less than  $\frac{1}{2}$  length of head. No stripes on head; no series of spots on spinous dorsal; usually a series of broad blotches below lateral line . . . . 21. *lenticulata*, Heck., 1840.

II. Scales cycloid, small; nostril nearer to end of snout than to eye. 22. *johanna*, Heck., 1840.

1. *Crenicichla lepidota*, Heck., 1840.

Haseman, Ann. Carnegie Mus. vii. 1911, p. 347.

Formerly known from the La Plata and Rio Grande do Sul, this species occurs, according to Haseman, in the Rio Guaporé and also in the rivers of Eastern Brazil northward to the Rio San Francisco.

2. *Crenicichla savatilis*, Linn.

? *Crenicichla jaguarensis*, Haseman, Ann. Carnegie Mus. vii. 1911, p. 351, pl. lx.

Haseman's type is a specimen of 65 mm. from the Parana; comparing a specimen of *C. savatilis* of this size with his figure, I cannot see any differences. Examples of this species from Uruhuasi and the Rio Mambari, Peru, have recently been added to the British Museum collection.

3. *Crenicichla alta*, Eigenm., 1912.

Mem. Carnegie Mus. v. p. 516, pl. lxxviii. fig. 3.

Examples of this form in the British Museum collection are from the Essequibo (*Ehrhardt*), Upper Potaro R. (*Bovallius*), and Rockstone, Nickafaroo, and Gluck Island, British Guiana (*Eigenmann*).

6. *Crenicichla dorsocellata*, Haseman, 1911.

Ann. Carnegie Mus. vii. p. 355, pl. lxiii.

This species is known from a specimen of 180 mm. from the Rio Parahyba.

7. *Crenicichla lacustris*, Casteln., 1855.

*Batrachops scottii*, Eigenm. Proc. Washington Acad. viii. 1907, p. 455, pl. xxiii. fig. 8.

*Crenicichla iguassuensis*, Haseman, Ann. Carnegie Mus. vii. 1911, p. 352, pl. lxi.

The dark bar below the eye shown in the figures of Eigen-

mann and Haseman is absent or but faintly indicated in the specimens I described, but is well marked in three from Santa Catharina (*Ehrhardt*) received in 1910.

#### 8. *Crenicichla macrophthalmus*, Heck., 1840.

*Crenicichla santaremensis*, Haseman, Ann. Carnegie Mus. vii. 1911, p. 354, pl. lxii. fig. 1.

The slight differences from *C. macrophthalmus* noted by Haseman are due to the small size of his specimens as compared with Heckel's type.

#### 9. *Crenicichla wallacii*, Regan, 1905.

? *Crenicichla macrophthalma*, Haseman, Ann. Carnegie Mus. vii. 1911, p. 353.

#### 10. *Crenicichla nanus*, sp. n.

Depth of body  $5\frac{1}{2}$  in the length, length of head  $3\frac{1}{4}$ . Snout a little shorter than diameter of eye, which is  $3\frac{1}{3}$  in the length of head; interorbital width 5. Nostril nearly equidistant from eye and end of snout. Maxillary not extending to below eye; anterior teeth forming 5 or 6 series in both jaws. 10 gill-rakers on lower part of anterior arch. 65 scales in a longitudinal series below lateral line, 6 from first and 2 from last dorsal spine to lateral line, 3 between upper and lower lateral lines. Lateral line 19-23+10-11. Dorsal XX-XXI 11; last spine a little more than  $\frac{1}{3}$  the length of head. Anal III 8. Pectorals  $\frac{3}{5}$ , pelvics  $\frac{1}{2}$  the length of head. Caudal peduncle longer than deep. A dark lateral band from snout through eye to end of caudal fin; a small ocellus on upper part of base of caudal.

Two specimens, 40 and 45 mm., from British Guiana, received from Prof. Eigenmann as *C. wallacii*, from which they differ especially in the lower dorsal spines. It is doubtful whether all the specimens recorded by Eigenmann as *C. wallacii* (Mem. Carnegie Mus. v. 1912, p. 517) belong to this species.

#### 11. *Crenicichla notophthalmus*, sp. n.

Depth of body 5 to 6 in the length, length of head  $3\frac{1}{3}$ . Snout as long as or a little shorter than diameter of eye, which is  $3\frac{3}{4}$  in the length of head; interorbital width 5 to 6. Nostril nearly equidistant from eye and end of snout. Maxillary not extending to below eye; anterior teeth forming 4 series in the upper jaw, 3 in the lower. 9 gill-rakers on



lower part of anterior arch. 65 scales in a longitudinal series below lateral line, 6 from first dorsal spine, and 2 or 3 from last dorsal spine to lateral line, 3 between upper and lower lateral lines. Lateral line 20-23 + 9-11. Dorsal XX 10; last spine less than  $\frac{2}{3}$  length of head. Anal III 8. Pectorals  $\frac{3}{5}$ , pelvics  $\frac{1}{2}$  length of head. Caudal peduncle longer than deep. A dark band through eye to operculum; a large black ocellus on dorsal fin between the sixteenth and twentieth spines; a small dark spot on upper part of base of caudal; 2 or 3 oblique bars near upper edge of caudal.

Two specimens, 60 and 65 mm. in total length, from the Amazon at Manaos, presented by Herr A. Rachow.

This species differs from *C. wallacii*, Regan, in the fewer teeth, smaller eye, lower dorsal spines, and ocellus on the dorsal fin.

No doubt this is the species recorded by Haseman from Santarem as *C. dorsocellata* (Ann. Carnegie Mus. vii. 1911, p. 355).

#### 14. *Crenicichla cametana*, Steind., 1911.

Anz. Akad. Wien, 1911, p. 369.

This species was described from three examples, 130 to 209 mm. in total length, from the Rio Tocantins.

#### 17. *Crenicichla marmorata*, Pellegr., 1903.

*Crenicichla brasiliensis*, var. *marmorata*, Pellegr. Mém. Soc. Zool. France, xvi. 1903, p. 383, fig.

*Crenicichla marmorata*, Pellegr. Bull. Soc. Zool. xxx. 1906, p. 167.

? *Crenicichla strigata*, Haseman, Ann. Carnegie Mus. vii. 1911, p. 355.

Known from a single specimen, 320 mm. in total length, without locality. Haseman's examples from Para may be this species.

#### 20. *Crenicichla ornata*, Regan, 1906.

*Crenicichla lenticulata* (part.), Haseman, Ann. Carnegie Mus. vii. 1911, p. 356.

#### 21. *Crenicichla lenticulata*, Heck., 1840.

Depth of body 5 in the length, length of head  $3\frac{2}{5}$ . Diameter of eye  $5\frac{1}{3}$  in length of head, length of snout  $3\frac{1}{4}$ , inter-orbital width  $3\frac{1}{5}$ . Nostril nearly equidistant from eye and tip of snout. Maxillary extending to below anterior margin of eye; depth of præorbital  $\frac{1}{2}$  diameter of eye. Anterior

teeth forming 6 series in upper jaw, 5 in lower. 10 gill-rakers on lower part of anterior arch. Scales above upper lateral line mostly cycloid, but some ctenoid ones quite posteriorly; 120 in a longitudinal series below lateral line, 18 from first dorsal spine to lateral line. Lateral line 28 + 16. Dorsal XXII 18; last spine nearly  $\frac{1}{3}$  length of head. Anal III 12. Pectoral more than  $\frac{2}{3}$ , pelvics  $\frac{2}{3}$  length of head. Caudal peduncle much longer than deep. Head and thorax with blackish spots; a series of 9 dark blotches from operculum to base of caudal, confluent below to form an irregular lateral band; a blackish spot in axil of pectoral; some dark spots on soft dorsal and caudal; vertical fins indistinctly dark-edged.

A specimen of 270 mm. from Manaos, presented in 1911 by E. Stanley Sutton, Esq.

Probably if specimens of the same size were compared, this species would have a larger eye than *C. ornata*. Compared with the types of the latter the head has a different appearance; the posterior edge of the eye is equidistant from the end of the snout and of the opercular flap (nearer end of snout in *C. ornata*) and the pectoral fin is longer, as long as the distance from end of bony operculum to anterior edge of eye (to middle of eye in *C. ornata*). The depth of the caudal peduncle is less than the distance from end of dorsal to base of caudal (more in *C. ornata*). The coloration of the two forms is notably different.

## 22. *Crenicichla johanna*, Heck., 1840.

*Crenicichla johanna*, var. *carsevennensis*, Pellegr. Bull. Soc. Zool. France, xxx. 1906, p. 168.

Pellegrin describes the variety *carsevennensis* as differing from typical *johanna* only in having two dark lateral bands.

LXI.—On some Mammals from Bali and Mysol, collected by Mr. E. Stresemann during the "Freiburger Molukken-Expedition." By OLDFIELD THOMAS, F.R.S.

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THANKS to the kindness of Mr. E. Stresemann I have had the opportunity of working out the mammals which he obtained during his recent exploring expedition to the Moluccas, and now give descriptions of such of them as seem

to be new. These are mainly from Bali, an island whence but few mammals have come to Europe. As might be expected, they are all closely allied to Javan forms, but are in each case subspecifically separable.

The Mysol kangaroo proves also to need a special name.

A full list of Mr. Stresemann's collections will be given later in connection with the general account of the expedition.

All the specimens referred to have been most generously presented to the British Museum by Mr. Stresemann.

*Tupaia javanica balina*, subsp. n.

Similar in essential characters to true *javanica*, but smaller, and the colour—in January—of the comparatively warmer browner tone of August *javanica*, the latter being in January clearer olive-grey.

General colour above grizzled brown, nearest to "mummy-brown"; under surface clay-colour on belly, the hairs slaty basally, buffy on throat and axillæ. Shoulder-streak and orbital rings well marked. Hands and feet brown, not so grey as in *javanica*; inner side of hind limbs washed with buffy whitish. Tail like body, the middle of the under surface suffused with cinnamon.

Dimensions of the type (measured in the flesh):—

Head and body 117 mm.; tail 153; hind foot 34; ear 15.  
(Skull lost.)

*Hab.* Gunong Bratan, Bali. Alt. 4000'.

*Type.* Adult female. B.M. no. 13. 3. 6. 12. Original number 10. Collected 27th January, 1911.

This *Tupaia*, collected in January, is strikingly different from any of the long series from Java obtained in that same month by Mr. Shortridge and presented to the Museum by Mr. Balston. Curiously enough, however, it is not unlike one killed in August at Buitenzorg, but what the Bali form turns to in August we have as yet no evidence to show. In size the Bali *Tupaia* has a hind foot from 2-4 mm. shorter than that of true *javanica*.

*Sciurus notatus stresemanni*, subsp. n.

Most nearly allied to *S. n. maduræ*, Thos., but the colour throughout much more buffy.

General colour above approaching "clay-colour," less grey than in *maduræ*, paler and more buffy than in true *notatus*. Under surface rather more strongly ochraceous than in *maduræ*, much more so than in *notatus*. Head everywhere more warmly suffused with buffy or clay-colour, so that the

narrow orbital rings are little conspicuous, very different to the broad and conspicuously contrasted rings of *balstoni*. Ears dark behind, their inner surface and the area round their bases dark clay-colour. Hands and feet grizzled grey. Tail throughout much more suffused with dark buffy than in *maduræ*, the under surface, instead of being only buffy at its base, dark buffy for its whole length, while even on the upper surface a strong suffusion of the same colour is perceptible, the hairs being ringed with black and buffy instead of black and grey as in the allied form.

Dimensions of the type (measured in the flesh):—

Head and body 198 mm.; tail 187; hind foot 43; ear 91.

Skull: greatest length 47.3; condylo-incisive length 43;  $p^4$  to  $m^3$  9.

*Hab.* Bolleleng, Bali. Coast-level.

*Type.* Adult male. B.M. no. 13. 3, 6. 15. Original number 8. Collected 12th January, 1911.

Considering the local plasticity of *S. notatus*, it is quite natural to find the Bali representative of the group distinguishable from the Maduran and from both the Javan forms of the species. Curiously enough, this animal is almost more similar to the typical *S. notatus* of Buitenzorg than to the geographically nearer subspecies *maduræ*, but is readily distinguishable by its more buffy colour and especially its more ochraceous under surface.

Mr. Stresemann tells me that he found this squirrel very common in Bali.

*Ratufa bicolor baliensis*, subsp. n.

Like true Javan *bicolor*, with the following exceptions:— Dark colour of the forearms not passing up on to the shoulders, the blackish shoulders being a very marked character in all the specimens seen of *bicolor*. Back drabby cream-colour, paler than in any *bicolor*, but how much this colour is the result of bleaching cannot be stated; it is, however, paler than the most bleached part of the back of *bicolor*, and matches the pale colour of the crown. Under surface more brightly buffy than in most *R. bicolor*. Feet with the buffy metapodial markings at a minimum. Tail-hairs with their buffy ends hardly more than one-third the length of their dark basal portion, while in *bicolor* the two portions approach equality.

Skull as in true *bicolor*, its size much less than in *R. bicolor major*, Miller.

Dimensions of the type:—

Hind foot 70 mm.; ear 23.

Skull: greatest length 70; condylo-incisive length 64; zygomatic breadth 43·6; upper tooth-series 13·7.

*Hab.* Bali. Type from Tjetoekambawang; coast-level.

*Type.* Adult male. B.M. no. 13. 3. 6. 18. Original number 12. Collected 31st March, 1911.

Should the pale colour of the fore back, nearly matching the crown, be not due entirely to bleaching (and the hairs mostly have their points perfect, showing that they are not very worn), this Bali Ratufa is even more distinct from the Javan one than I am now able positively to state. But in any case it is distinguishable by the absence of the prominent blackening of the shoulders and by the reduction in length of the yellow ends to the tail-hairs. In working it out, I have been able to examine more than a score of excellent specimens of *R. bicolor*, presented to the Museum by Mr. W. E. Balston; these covering the time of year at which the Bali specimen was killed.

*Dorcopsis mysolia*, sp. n.

*Dorcopsis mülleri*, Thos. Cat. Mars. B. M. p. 87 \* (1888), nec Schlegel.

Like *D. veterum*, Less.†, in all essential respects, but markedly smaller, the skull of an old male only 121 mm. in greatest length, as compared with 145 mm. in the specimen of the New Guinea form described by Schlegel.

Other dimensions and details as in the Catalogue (*l. c.*).

*Type.* Old male. B.M. no. 61. 12. 11. 22. Collected by Dr. A. R. Wallace. Specimen *b* of the Catalogue.

A comparison of Schlegel's figures and dimensions of the *Dorcopsis veterum* of the mainland of New Guinea with Wallace's and Mr. Stresemann's examples of the Mysol form shows that the latter is so much smaller than the former as to constitute a distinct insular species. A detailed description of it has already been given in the 'Catalogue of Marsupials,' and need not be repeated here.

Mr. Stresemann's collection contains a skull of this kangaroo from Mysol, and in determining it my attention has been drawn to the above facts.

\* Exclusive of the synonymy, the external dimensions of the male, and of specimen *a*.

† According to modern ideas on nomenclature, there would seem to be no justification for the supersession of *veterum* in favour of Schlegel's name *mülleri*. However erroneous Lesson's reasons were for selecting the name *veterum*, his description was based on a living specimen obtained at Dorey, N.W. New Guinea, and his name must stand, with that place as type locality. Schlegel's examples of "*Dorcopsis mülleri*" were collected at Lobo Bay.

## BIBLIOGRAPHICAL NOTICE.

*Catalogue of the Chiroptera in the Collection of the British Museum.*  
(Second Edition.) By KNUD ANDERSEN. Vol. I. *Megachiroptera.*  
London: the Trustees of the British Museum. 1912.

DR. KNUD ANDERSEN in this volume has set a new standard of perfection in the preparation of catalogues of zoological specimens. The British Museum long since showed the way in which this most necessary but arduous work should be done, but Dr. Andersen has introduced features which add immensely to the value of such publications.

Hitherto such catalogues have been purely systematic in their scope. Dr. Andersen has introduced the leaven of evolution, and substitutes phylogeny for taxonomy, or, rather, his taxonomy is determined by the revelations of phylogeny, so far as these can be traced. In selecting a basis for classification he has—and rightly—discriminated between “fixed” and “plastic” characters, which last, of course, include secondary sexual characters.

He devotes a section to the discussion of the inter-relations of genera, which will prove exceedingly valuable to future workers, and another to geographical distribution. This last will appeal to many who are not directly interested in the bats from a taxonomic point of view; and the same is true of the exceedingly valuable facts which he has brought together under the heading of life-histories. Since these last are not appended to every species, we take it that where they are omitted nothing is known on this head. It should be the aim of every student of this group of bats to fill up these gaps.

Nominally, this is a second edition of Dobson's ‘*Catalogue of the Chiroptera in the British Museum*,’ 1878: in reality, it is an independent work. Nothing remains, indeed, save the title. How great an advance in our knowledge of these animals has been made during the last thirty-five years may be gathered from the fact that in Dobson's volume only 425 species were known, to-day the number reaches 1470.

The illustrations furnish another striking feature of this volume, for they are both numerous and of quite exceptional excellence—a result due in part to Dr. Andersen's fine discrimination and in part to Mr. Terzi's masterly draughtsmanship.

In this bulky volume Dr. Andersen includes only the Macrochiroptera. We look forward to the issue of further volumes.

# THE ANNALS

AND

## MAGAZINE OF NATURAL HISTORY.

[EIGHTH SERIES.]

No. 66. JUNE 1913.

LXII.—*Descriptions of new Species of Pyralidæ of the Subfamily Pyraustinæ.* By Sir GEORGE F. HAMPSON, Bart., F.Z.S., &c.

[Continued from p. 342.]

### Genus PASCHIODES, nov.

Proboscis fully developed ; palpi rostriform, downcurved, extending about twice the length of head, the third joint hidden in hair ; maxillary palpi filiform ; frons flat and oblique ; antennæ of male slightly annulate and nearly simple ; legs and tibial spurs rather long. Fore wing rather elongate triangular ; veins 3 and 5 from near angle of cell ; 6 from well below angle ; 7 from angle, straight and well separated from 8, 9 which are stalked ; 10, 11 from cell. Hind wing with vein 3 from angle of cell ; 4, 5 moderately stalked ; 6, 7 from upper angle, 8 anastomosing with 7 to two-thirds of wing.

#### *Paschiodes mesoleucalis*, sp. n.

Head, thorax, and abdomen white, the head and base of tegulæ tinged with brown ; palpi blackish, white at base ; tarsi ringed with fuscous. Fore wing white tinged with pale reddish brown, especially on basal half of costal area and postmedial area, the medial area whiter ; slight blackish subbasal streaks below costa and in cell, followed by some blackish irroration ; the first line almost medial, black, erect, angled outwards on median nervure and vein 1 ; blackish bars in end of cell and on discocellulars, expanding

into slight streaks at upper and lower extremities; post-medial line black, forming a spot on costa, irregularly waved, incurved at discal fold, below vein 3 bent upwards to lower angle of cell, retracted to origin of vein 2 and at vein 1 angled inwards almost to the first line; subterminal line indistinct, blackish, diffused, angled outwards below costa and inwards in discal and submedian folds; a terminal series of small black spots; cilia with series of slight fuscous striæ at middle. Hind wing white with faint diffused fuscous subterminal band except towards tornus; a black terminal line.

*Hab.* TRANSVAAL (*Cholmley*), 2 ♂, 1 ♀, Johannesburg (*Ross*), 1 ♀; C. COLONY, Transkei (*Miss F. Barrett*), 1 ♀ type. *Exp.* 24 mm.

(3) *Parbattia æthiopolis*, sp. n.

♀. Head and tegulæ ochreous mixed with black; palpi whitish at base; thorax white and black mixed; abdomen whitish slightly tinged with fuscous and with lateral series of blackish spots. Fore wing silvery white slightly tinged with ochreous and thickly irrorated with black; a small wedge-shaped black mark below base of cell; a subbasal whitish mark from cell to inner margin; the first line nearly medial, black defined by white on inner side, angled outwards on median nervure and vein 1; a diffused black spot in end of cell and discoidal bar; postmedial line black slightly defined by whitish on outer side, somewhat dentate, strongly incurved at discal fold, at vein 2 retracted to cell and obsolescent, then incurved; subterminal line whitish defined on inner side by fuscous suffusion, angled inwards at discal fold, excurved at middle and in submedian interspace incurved to below postmedial line; a terminal series of blackish spots; cilia white with a diffused fuscous line through them. Hind wing silvery white, the terminal area very faintly tinged with brown; a dark terminal line; the underside with faint discoidal spot and curved postmedial line from costa to vein 2.

*Hab.* BR. E. AFRICA, Uganda Ry., Mile 478 (*Betton*), 1 ♀ type. *Exp.* 40 mm.

(1 a) *Nomophila albisignalis*, sp. n.

♀. Head, thorax, and abdomen red-brown; tibiæ and tarsi with slight blackish rings. Fore wing red-brown slightly irrorated with black; a slight blackish subbasal line angled outwards in cell; antemedial line almost obsolete



except a blackish bar from vein 1 to inner margin; an oblique white bar defined on each side by black lines across upper part of extremity of cell expanding into an obscure spot with minute white spots at sides in lower part of cell; postmedial line very indistinct, blackish, angled outwards below costa, below vein 5 incurved to lower edge of spot in cell, then almost obsolete; subterminal line whitish slightly defined by blackish on inner side, angled outwards at vein 7, incurved at discal fold, then excurved, strongly incurved and almost obsolete below vein 3; a terminal series of black points. Hind wing pale red-brown; slight diffused fuscous spots at angles of cell; an oblique postmedial black striga on vein 2; postmedial line indistinct, fuscous, sinuous, from costa to termen at vein 1; cilia pale rufous with fuscous spot at vein 2 and blackish line through them and blackish tips towards tornus; the underside irrorated with black.

*Hab.* BR. E. AFRICA, Udumu (*Betton*), 1 ♀ type. *Exp.* 40 mm.

(3) *Nomophila squalidalis*, sp. n.

♀. Head and thorax dull brown; palpi white at base; abdomen greyish brown; pectus, legs, and ventral surface of abdomen whitish. Fore wing dull yellowish brown sparsely irrorated with black; traces of an obliquely curved antemedial line formed by a few black scales; a whitish discoidal spot defined by some black scales on inner side and by an obscure fuscous bar on outer; a postmedial black point on costa; traces of a postmedial line excurved between veins 5 and 2, then retracted to near origin of vein 2 and erect to inner margin; the area between upper angle of cell and apex irrorated with black and white scales forming very obscure streaks; two black points on costa towards apex and a terminal series; cilia brownish white with a dark line near base. Hind wing semihyaline brownish white, the terminal area tinged with brown towards apex; a slight black terminal line; cilia brownish white.

*Hab.* ARGENTINA, Gran Chaco, Florenzia (*Wagner*), 1 ♀ type. *Exp.* 20 mm.

(1 a) *Pachyzancla albicilia*, sp. n.

Fore femora of male fringed above with long hair towards base and with curled tuft of hair towards extremity.

♂. Head, thorax, and abdomen glossy brown; palpi at base, pectus, legs, and ventral surface of abdomen white, the fore tibiae with brown patch at extremity. Fore wing

glossy brown; traces of an oblique antemedial line; post-medial line indistinct, dark, excurved from costa to vein 2 where it is retracted, then erect; cilia paler at tips. Hind wing glossy brown; a slight dark terminal line; cilia pure white at tips; the underside whitish tinged with brown.

*Hab.* Peru, Pozuzo, 1 ♂ type. *Exp.* 26 mm.

(12 a) *Pachyzancla aprepi*, sp. n.

Head and thorax brown; palpi at base, pectus, and legs white, the fore tibiae with brown band at extremity; abdomen white dorsally tinged with brown and with sub-dorsal blackish points on second segment. Fore wing pale brown; a somewhat oblique dark antemedial line defined on inner side by whitish; a blackish point in middle of cell and discoidal bar; postmedial line dark defined on outer side by whitish, incurved to vein 5, then bent outwards to vein 2, then retracted to below end of cell and excurved above inner margin. Hind wing pale brown; a dark discoidal striga; postmedial line dark defined on outer side by whitish, bent outwards between veins 5 and 2, then retracted to below end of cell and oblique to inner margin; a dark terminal line; the underside whitish.

*Hab.* GAZALAND, Chirinda Forest (*Marshall*), 1 ♂, 2 ♀; MAURITIUS, 1 ♂ type. *Exp.* 28 mm.

(12 c) *Pachyzancla albivitta*, sp. n.

♂. Head, thorax, and abdomen grey-brown; palpi black, white below; pectus, legs, and ventral surface of abdomen white, the fore tibiae with fuscous band at extremity, the genital tufts rufous. Fore wing pale grey-brown; an indistinct sinuous antemedial line with diffused white fascia from it to postmedial line below the cell; a small blackish discoidal spot; postmedial line dark, at vein 3 bent inwards to vein 2 below end of cell, then erect; a fine dark line near base of cilia. Hind wing whitish suffused with brown; postmedial line indistinct, slightly bent outwards between veins 5 and 2, then retracted to below end of cell; cilia whitish with a fine brown line near base; the underside white.

*Hab.* PERU, La Oroya (*Ockenden*), 1 ♂ type. *Exp.* 32 mm.

(17 a) *Pachyzancla brunnealis*, sp. n.

Pale red-brown; palpi and frons fuscous, the former white at base. Fore wing with the costal area tinged with

fuscous to the postmedial line; a black antemedial line bent inwards to costa; a point in middle of cell and discoidal lunule; the postmedial line bent outwards and minutely dentate between veins 5 and 2, then retracted to below end of cell and slightly excurved again; the terminal area broadly fuscous brown. Hind wing with black discoidal point; the postmedial line bent outwards and minutely dentate between veins 5 and 2; the terminal area tinged with fuscous, broadly at costa, narrowing to tornus.

*Hab.* GOLD COAST, Accra (*Carter*), 1 ♀; S. NIGERIA, Sapele (*Sampson*), 1 ♂ type, Warri (*Roth*), 1 ♀, 1 ♀; Comoro Is., Mayotta (*Meade-Waldo*), 1 ♂. *Exp.* 20 mm.

(18 c) *Pachyzancla pallidalis*, sp. n.

Whitish slightly tinged with ochreous; head, tegulæ, and patagia and prothorax in front fuscous brown; abdomen with subdorsal black points at base of third segment, the extremity dorsally tinged with brown. Fore wing with the costal and terminal areas broadly brown; a curved brown antemedial line; a spot in middle of cell and discoidal lunule; the postmedial line bent outwards and sometimes minutely dentate between veins 5 and 2, then retracted to below end of cell and slightly excurved again. Hind wing with discoidal point; the postmedial line strongly bent outwards and minutely dentate between veins 5 and 2; a terminal brown band wide at costa and narrowing to tornus.

The African specimens have rather less brown on prothorax and costal area of fore wing.

*Hab.* GOLD COAST, Kumasi (*Whiteside*), 1 ♀; S. NIGERIA, Lagos (*Dudgeon*), 1 ♀, Old Calabar (*Sampson*), 1 ♀, Sapele (*Sampson*), 1 ♀, Warri (*Roth*), 1 ♂; CAMEROONS (*Sjostedt*), 1 ♀; UGANDA, Kampala (*Ansorge*), 1 ♂; NATAL (*Gooch*), 2 ♀; AMBOINA (*Doherty*), 1 ♂; BATCHIAN (*Doherty*), 1 ♀; TENIMBER (*Doherty*), 1 ♂ type; WOODLARK I. (*Meek*), 1 ♀; LOUISIADES, Fergusson I. (*Meek*), 2 ♀, St. Aignan (*Meek*), 1 ♀. *Exp.* 18-24 mm.

(18 d) \**Pachyzancla geminalis*, sp. n.

Reddish ochreous; palpi, frons, and shoulders brown, the first white below; pectus, legs, and ventral surface of abdomen white. Fore wing with the costal area tinged with fuscous to beyond middle; an indistinct blackish antemedial line from cell to inner margin; a prominent black point in cell and two on discocellulars; the postmedial

line minutely waved, indistinct, curved from costa to vein 3, then retracted to below angle of cell and oblique to inner margin; termen tinged with fuscous. Hind wing with deep black discoidal point; the postmedial line indistinct, bent outwards and minutely waved between veins 5 and 2; the termen suffused with fuscous except towards tornus, and with a fine black terminal line.

*Hab.* QUEENSLAND (*Mackay*). *Exp.* 26 mm. Type in Coll. Rothschild.

(18 e) *Pachyzancla atritermina*, sp. n.

Head, thorax, and abdomen ochreous with a slight rufous tinge, the vertex of head whiter; palpi black above, white below; third segment of abdomen with small subdorsal black spots. Fore wing ochreous slightly tinged with rufous; a black point on inner margin near base; antemedial line blackish with black bar from costa, oblique to submedian fold; a small black spot in middle of cell and larger discoidal spot; postmedial line blackish with small black spot at costa, bent outwards and slightly waved between veins 4 and 2, then retracted to below end of cell; a distinct black terminal line. Hind wing ochreous faintly tinged with rufous; a black discoidal spot; postmedial line blackish, slightly incurved at discal fold, bent outwards between veins 4 and 2, then retracted to below end of cell; a distinct black terminal line.

*Hab.* BR. E. AFRICA, Taveta (*Rogers*), 2 ♀ type; BOMBAY, 1 ♂. *Exp.* 20 mm.

(20 d) *Pachyzancla simillima*, sp. n.

Head and thorax greyish ochreous tinged with fuscous brown; palpi fuscous above, white below; pectus and legs pale ochreous; abdomen greyish ochreous with subdorsal fuscous points on third segment, the ventral surface white. Fore wings greyish ochreous tinged with fuscous brown, the terminal area darker, the costal edge fuscous to beyond middle; antemedial line indistinct, fuscous, oblique from costa to submedian fold; a small blackish spot in middle of cell and larger discoidal spot; postmedial line fuscous, incurved from costa to vein 5, bent outwards and minutely waved to vein 2, then retracted to below end of cell and oblique to inner margin. Hind wing greyish ochreous tinged with fuscous brown; a blackish discoidal point; postmedial line fuscous, incurved to discal fold, bent outwards and minutely waved between veins 5 and 2, then

retracted to below end of cell and oblique to above tornus ; a faint subterminal shade ; cilia with a fine pale line at base.

*Hab.* D'ENTRECASTEAUX Is., Fergusson I. (*Meek*), 2 ♂, 1 ♀ type. *Exp.* 22 mm.

Extremely like *P. licarsisalis* except in structure.

(26) *Pachyzancla xanthomela*, sp. n.

*Filodes hesusalis*, Druce, Biol. Centr.-Am., Het. ii. p. 263 (nec Wlk.).

Head and thorax orange ; palpi white at base ; pectus and legs brown, the tarsi banded with white ; abdomen with the three basal segments orange, the other segments black with orange segmental lines, the ventral surface wholly black. Fore wing orange, the terminal area from just beyond the cell black with a purplish tinge, its inner edge angled outwards beyond lower angle of cell ; cilia black chequered with whitish at tips. Hind wing orange, the terminal half black with a purplish tinge, its inner edge slightly angled at submedian fold ; cilia black mixed with whitish at tips.

*Hab.* GUATEMALA, San Gerónimo (*Champion*), 2 ♂, 1 ♀, Dueñas (*Champion*), 2 ♂, Purula (*Champion*), 1 ♂ type ; COSTA RICA, Candalaria Mts. (*Underwood*), 1 ♀, Godman-Salvin Coll. ; PANAMA. *Exp.* 18-20 mm.

(27) *Pachyzancla aurea*, sp. n.

*Lygropia unicoloralis*, Druce, Biol. Centr.-Am., Het. ii. p. 254 (part.), nec Guen.

Orange ; palpi white at base ; legs whitish. Fore wing with faint oblique antemedial line ; a slight discoidal striga ; postmedial line faint, excurved from discal fold to vein 3, then bent inwards to below end of cell and erect to inner margin. Hind wing with faint oblique line from beyond lower angle of cell to near termen at submedian fold.

*Hab.* MEXICO, Presidio (*Forrer*), 1 ♂ type ; GUATEMALA, S. Gerónimo (*Champion*), 1 ♀, Godman-Salvin Coll. *Exp.*, ♂ 18, ♀ 20 mm.

(28) *Pachyzancla holochrysis*, sp. n.

*Lygropia unicoloralis*, Druce, Biol. Centr.-Am., Het. ii. p. 254 (part.), nec Guen.

♀. Orange : palpi white at base ; fore femora above, the tibiæ and tarsi blackish. Wings without markings, the hind wing slightly paler.

*Hab.* MEXICO, Guerrero, Amula (*H. H. Smith*), 1 ♀ type, Godman-Salvin Coll. *Exp.* 22 mm.

(29) *Pachyzancla nigripalpis*, sp. n.

*Lygropia unicoloralis*, Druce, Biol. Centr.-Am., Het. ii. p. 254 (part.), nec Guen.

♂. Orange; palpi black; legs black; abdomen with the ventral surface black except at extremity. Wings without markings, the hind wing somewhat paler and semihyaline.

♀. Deeper orange, the fore legs only black, the ventral surface of abdomen white.

*Hab.* MEXICO, Milpas (*Forrer*), 1 ♂ type; GUATEMALA, Zapote (*Champion*), 1 ♀, Godman-Salvin Coll. *Exp.*, ♂ 28, ♀ 26 mm.

(30) *Pachyzancla straminea*, sp. n.

*Lygropia unicoloralis*, Druce, Biol. Centr.-Am., Het. ii. p. 254 (part.), nec Guen.

♂. Orange-yellow; palpi with the third joint black; fore femora above and the fore and mid tibiae and tarsi black. Wings without markings; fore wing with the costal edge black towards base; hind wing somewhat paler and slightly semihyaline.

*Hab.* MEXICO, Guerrero, Omilteme (*H. H. Smith*), 1 ♂ type, Godman-Salvin Coll. *Exp.* 32 mm.

(3) *Rhectosomia perelongata*, sp. n.

♂. Head and thorax rufous; frons and tarsi whitish; abdomen dark reddish brown; the two basal segments ochreous and rufous. Fore wing very narrow and elongate; rufous mixed with greyish; a very indistinct blackish ante-medial line, excurved in cell, then oblique, a triangular greyish mark beyond it in cell; a greyish bar across end of cell with oblique band from it to inner margin, some black irroration before it; postmedial line slight, dark, bent outwards below costa, acutely dentate to vein 6, sharply angled inwards in discal fold, bent outwards between vein 5 and submedian fold to near termen, then bent inwards, some yellow streaks beyond it below costa and above and below vein 5, and three spots beyond the excurved portion; a fine whitish terminal line; cilia blackish with whitish line at middle. Hind wing semihyaline whitish, the terminal area suffused with red-brown; a wavy fuscous postmedial line; a minutely wavy fuscous subterminal line, sharply angled inwards at discal fold, bent outwards from vein 5 to submedian fold, then incurved; cilia whitish at base, dark at tips.

*Hab.* PERU, Oconeque (*Ockenden*), 1 ♂ type. *Exp.* 32 mm.

(4) *Rhectosomia tumidicosta*, sp. n.

♂. Head and thorax red-brown mixed with grey-white and some black; abdomen brownish grey with black segmental bands. Fore wing with the costa highly arched towards apex, brownish grey suffused in parts with red-brown and irrorated with black; an indistinct black ante-medial line defined on outer side by grey, bent outwards below costa, then waved, and bent inwards above inner margin to near base; an oblique pale mark in middle of cell and a narrow ochreous discoidal lunule defined at sides by black; medial part of costa ochreous with a red-brown spot above end of cell; a black line defined on inner side by ochreous and excurred from lower angle of cell to submedian fold, then bent inwards and defined on outer side by ochreous to inner margin; postmedial line defined on outer side by ochreous and with a slight black streak before it above vein 6, red-brown and oblique towards costa, then blackish, inwardly oblique and crenulate; some red-brown suffusion on terminal area below apex and at submedian fold; a terminal series of black points. Hind wing creamy white, some brown suffusion and dark irroration on termen extending as a streak below vein 2 halfway to the cell; the underside with the costal and inner areas tinged with brown and irrorated with blackish.

*Hab.* W. COLOMBIA, San Antonio (*Palmer*), 1 ♂ type.  
*Exp.* 38 mm.

(1 a) *Phlyctænodes uniformis*, sp. n.

Hind tibiæ of male with the outer spurs minute; fore wing with a large fovea below the cell covered by a fan of scales on underside and a large fovea beyond upper angle of cell.

♂. Head and thorax red-brown; palpi white at base; legs red-brown; pectus and abdomen brownish white. Fore wing uniform red-brown. Hind wing brownish white.

*Hab.* JAPAN, Sakata (*Leech*), 1 ♂ type. *Exp.* 22 mm.

(5 a) *Phlyctænodes conisphora*, sp. n.

*Spilodes helvialis*, Druce, Biol. Centr.-Am., Het. ii. p. 267 (part.).

*Pachyzancla detritalis*, Druce, Biol. Centr.-Am., Het. ii. p. 222 (part.).

*Pachyzancla grisealis*, Druce, Biol. Centr.-Am., Het. ii. p. 222 (part.).

Head, thorax, and abdomen ochreous tinged with rufous; palpi blackish at sides, white below towards base. Fore wing ochreous more or less irrorated with fuscous; ante-medial line fuscous, arising at subcostal nervure and oblique

to vein 1; a black point in middle of cell and slight discoidal lunule; postmedial line fuscous, oblique to vein 6, then dentate and excurved to vein 3, at vein 2 angled inwards to below end of cell and again angled outwards at submedian fold; an indistinct dentate fuscous subterminal line; a fuscous terminal line; cilia brown with an ochreous line at base. Hind wing pale ochreous; a slight dark mark at lower angle of cell; postmedial line fuscous, minutely dentate to submedian fold and obsolescent on inner area; an indistinct dark dentate subterminal line with brownish suffusion beyond it; a dark terminal line from apex to submedian fold; cilia with a brown line near base except towards tornus.

*Hab.* MEXICO, Tabasco, Teapa (*H. H. Smith*), 1 ♂; GUATEMALA, Irazu (*Rogers*), 1 ♂, 1 ♀, Duenas (*Champion*), 2 ♂ type, Calderas (*Champion*), 1 ♂, Godman-Salvin Coll. *Exp.* 22-24 mm.

(8*b*) *Phlyctænodes microdentalis*, sp. n.

♀. Head and thorax yellowish suffused with rufous; palpi white at base; pectus and legs whitish, the fore legs rufous in front; abdomen yellowish, dorsally tinged with fulvous. Fore wing pale yellow, the costal half tinged with rufous; traces of a discoidal lunule; postmedial line pale brownish, very minutely dentate, excurved from costa to vein 4, then oblique. Hind wing pale yellow with traces of a curved postmedial line from costa to vein 4.

*Hab.* BR. E. AFRICA, Taveta (*Rogers*), 1 ♀; C. COLONY, Annshaw (*Miss F. Barrett*), 1 ♀ type. *Exp.* 32 mm.

(16*b*) *Phlyctænodes bifilalis*, sp. n.

Fore wing with the termen slightly excised below apex and excurved at middle.

Head and thorax bright rufous; palpi white at base; pectus and legs white, the fore femora and tibiae tinged with rufous; abdomen white dorsally suffused with rufous. Fore wing yellowish suffused with rufous; the veins streaked with rufous; a slight oblique rufous subbasal line; antemedial line rufous, oblique from costa to median nerve, then inwardly oblique; a slight discoidal lunule; postmedial line obliquely excurved from costa to vein 2, then oblique; an indistinct waved subterminal line; a terminal series of slight black points; cilia dark brown. Hind wing yellowish white, the termen tinged with rufous; a dark brown terminal line from apex to vein 2; cilia whitish, with brown



line through them from apex to middle, where there is a brown patch.

*Hab.* BR. GUIANA, Potaro R. (*Kaye*), 2 ♂ type. *Exp.* 24 mm.

(28 a) *Phlyctænodes nigrivenalis*, sp. n.

♀. Head and thorax greyish tinged with brown; palpi white below; pectus and legs white, the fore legs brownish in front; abdomen white dorsally tinged with brown, leaving slight white segmental lines. Fore wing whitish tinged with brown; an antemedial black spot below cell, with point obliquely placed above it in cell; a black discoidal lunule; postmedial line dentate, bent outwards between veins 6 and 3, then retracted to below angle of cell and oblique to inner margin; the terminal area suffused with blackish, expanding inwards to the postmedial line at vein 6; a terminal series of black points; cilia fuscous. Hind wing whitish tinged with brown especially towards termen; cilia whitish with a dark line near base.

*Hab.* N. Australia, Baudin I. (*J. J. Walker*), 1 ♀ type. *Exp.* 22 mm.

(29 a) *Phlyctænodes distictalis*, sp. n.

♀. Head and thorax ochreous yellow; palpi rufous, white below; pectus and legs white, the fore tibiæ with fuscous band at extremity; abdomen white, dorsally tinged with yellow except at base. Fore wing ochreous yellow, the costal area slightly tinged with rufous; a black point in middle of cell and another at lower angle; faint traces of a curved postmedial line. Hind wing white tinged with yellow; the underside with indistinct curved dark postmedial line from costa to vein 2 and terminal series of minute points from apex to vein 2.

*Hab.* BASUTOLAND, Mohalishoek (*Crawshay*), 1 ♀ type. *Exp.* 26 mm.

(37 a) \**Phlyctænodes phæopteralis*, sp. n.

♀. Fuscous brown; palpi below, pectus, legs, and ventral surface of abdomen white. Fore wing with slightly oblique black antemedial line, very slightly bent inwards to costa and defined on inner side by yellowish white; black points in middle of cell and on discocellulars, with a quadrate yellowish-white spot between them; the postmedial black line minutely dentate, strongly excurved between veins 5

and 2, then retracted to below end of cell, defined by yellowish white on outer side, expanding into patches towards costa and in the sinus below vein 2. Hind wing with discoidal black point; the postmedial line indistinct, strongly excurved between veins 5 and 2, then oblique to above tornus, and slightly defined by whitish on outer side; a fine pale line at base of cilia, which have their tips whitish between veins 2 and 1.

*Hab.* ROX I. (*Doherty*). *Exp.* 30 mm. Type in Coll. Rothschild.

(43 b) *Phlyctænodes flavivenalis*, sp. n.

♂. Head, thorax, and abdomen red-brown mixed with yellow; palpi white at base. Fore wing pale olive-brown mixed with red-brown; the veins rather paler, becoming pale yellow on terminal area; a fine black streak in submedian fold to below origin of vein 2; a faint dark subbasal streak below vein 1 and streak above middle of inner margin; the cell pale, with elongate brown orbicular stigma defined by black and discoidal lunule also defined by black; slight wedge-shaped black marks above bases of veins beyond the cell; a narrow yellow band before the fine dark terminal line; cilia pale yellow, with fine dark line near base and slight dark tips. Hind wing fulvous yellow, the veins slightly tinged with brown; a brown discoidal spot; a curved, minutely dentate, postmedial line angled inwards at vein 2; a diffused brown subterminal line and black terminal line; cilia pale, with blackish line at base, the tips tinged with brown; the underside fulvous yellow, the veins tinged with brown, traces of discoidal spot, curved postmedial line, and diffused subterminal line.

*Hab.* BAGHDAD (*Loftus*), 1 ♂ type. *Exp.* 38 mm.

(43 c) *Phlyctænodes cræsusalis*, sp. n.

Head and thorax yellow tinged with rufous; palpi dark brown, white below; frons dark brown, with lateral white streaks; pectus whitish; legs fuscous streaked with whitish; abdomen yellow. Fore wing yellow suffused with rufous to postmedial line, deepest on costal area; a diffused blackish discoidal spot; postmedial line fuscous, diffused and confluent with a triangular brown patch on apical part of costa, slightly excurved towards costa, then very oblique to middle of inner margin; a fine black terminal line with a rufous tinge on inner side; cilia grey tinged with fuscous. Hind

wing golden yellow, with rather diffused, curved, fuscous postmedial line from costa to submedian fold; some fuscous suffusion at apex; a slight blackish terminal line; cilia fuscous at base, whitish at tips; the underside with the costal area tinged with rufous.

*Hab.* NATAL, Estcourt (*Hutchinson*), 1 ♀; CAPE COLONY, Transkei (*Miss F. Barrett*), 1 ♂, Kokstad (*Mrs. Pringle*), 1 ♂ type. *Exp.* ♂ 28 mm.

(50 a) *Phlyctænodes pictalis*, sp. n.

♂. Head and thorax pale yellow; tegulæ and patagia with blood-red fascia on outer edge; palpi blackish, white at base; pectus and legs fuscous mixed with whitish; abdomen whitish suffused with fuscous. Fore wing pale sulphur-yellow; the costal area with blood-red fascia to beyond middle, expanding into a patch beyond cell, the costal edge blackish; a slight blood-red streak in cell from middle to extremity, with an elongate black and silvery spot on it at middle of cell and small black and silvery discoidal lunule; a blood-red streak below the cell from before middle to extremity; an oblique incurved black and silvery medial line from below cell to inner margin, defined on each side by blood-red; postmedial line black and silvery, very oblique, from costa near apex to inner margin, with blood-red band on its outer edge, irrorated with black towards apex; a fine black terminal line; cilia blood-red. Hind wing yellowish white tinged with brown; a curved fuscous postmedial line from costa to vein 1, with the area beyond it brown; a fine black terminal line; cilia whitish tinged with red. Underside of fore wing with the costal half suffused with fuscous brown, a diffused fuscous-brown subterminal band.

*Hab.* C. COLONY, Rosmead (*Juby*), 1 ♂ type. *Exp.* 22 mm.

(50 b) *Phlyctænodes euprepialis*, sp. n.

Head and thorax sulphur-yellow; palpi at tips, a bar across frons, and antennæ black; thorax with blackish dorsal fascia; pectus blackish; fore legs white in front, black behind; mid and hind legs fuscous at base, the tibiæ and tarsi whitish; abdomen white slightly tinged with rufous and with black segmental bands, the ventral surface blackish. Fore wing sulphur-yellow; a red costal fascia to beyond middle; antemedial line black and silvery, from submedian fold to inner margin dentate; black and silvery points at middle of cell and on discocellulars; postmedial line black

and silvery, very oblique, from just below costa towards apex to inner margin, with a red band on its outer edge irrorated with black scales towards apex; a fine black terminal line; cilia pale red. Hind wing fuscous, whitish at base; cilia whitish tinged with pale red. Underside of both wings fuscous.

*Hab.* MASHONALAND, Salisbury (*Marshall*), 1 ♀ type; TRANSVAAL, Piet Retief (*Crawshay*), 1 ♂, White R. (*Cooke*), 1 ♀, Bultfontein (*Janse*), 2 ♂, 3 ♀. *Exp.* 24 mm.

(55 a) *Phlyctenodes chrysalis*, sp. n.

♂. Head, thorax, and abdomen pale yellow; palpi black at tips; fore coxæ in front, and the femora, tibiæ, and tarsi black. Fore wing golden yellow; a brownish costal fascia to beyond middle irrorated with white scales; a slight whitish and brown medial line from cell to inner margin; a brownish band irrorated with white scales from the costal fascia round end of cell to near origin of vein 2; a brownish terminal band suffused with white and with dark line on its inner edge. Hind wing fuscous brown slightly suffused with white, the costal area whitish to near apex; cilia whitish. Underside of both wings fuscous brown.

*Hab.* S. AUSTRALIA (*Dohrn*), 1 ♂ type. *Exp.* 20 mm.

(3 a) *Diasemia trigonalis*, sp. n.

Head, thorax, and abdomen black-brown mixed with whitish; palpi white in front towards base; head with white streaks at sides; abdomen with dorsal whitish segmental lines. Fore wing ochreous white suffused with red-brown, the costal area dark brown mixed with whitish; an oblique triangular black-brown antemedial patch from above vein 1 to inner margin, with a whitish band between it and a similar medial patch extending to median nervure; a rather triangular whitish discoidal spot defined at sides by a few black scales; a triangular black-brown postmedial patch from vein 5 to inner margin, with a rather Y-shaped band between it and the medial patch; a whitish postmedial band, expanding on inner side at discal fold and defined on each side by some black scales, then oblique and defining the outer edge of the postmedial patch, met at inner margin by a diffused whitish subterminal band arising from apex; the terminal area dark, with a series of obscure triangular black spots; cilia blackish, with a fine white line at base. Hind wing black-brown; the costal area whitish to beyond middle,

with a whitish discoidal spot conjoined to it; an irregular oblique whitish medial band; postmedial line white, oblique to discal fold, then bent outwards to termen at vein 2; cilia whitish, with a blackish line near base.

*Hab.* NATAL, Weenen, 1 ♂ type, Durban (*Leigh*), 1 ♀; ORANGE R. COLONY, Bloemfontein (*Eckersley*), 1 ♂; BASUTOLAND, Moletsani (*Crawshay*), 1 ♂. *Exp.* 18 mm.

(6 a) *Diasemia monostigma*, sp. n.

♂. Head, thorax, and abdomen grey suffused with red-brown. Fore wing grey suffused with red-brown; the costal edge black to middle and with three black points on post-medial area; an indistinct black antemedial line from cell to inner margin, defined on inner side by a faint greyish band; a slight blackish line from lower angle of cell to inner margin; postmedial line blackish, defined on outer side by grey, oblique to discal fold, where it is slightly bent outwards, then again oblique to inner margin, an oblique wedge-shaped black patch before it between veins 5 and 2 and slight blackish marks in the interspaces beyond the grey band; a terminal series of small black spots; cilia with a fine pale line at base. Hind wing grey-brown; an indistinct dark postmedial line defined on outer side by grey, oblique, bent outwards between veins 5 and 2; the termen blackish on apical half, with blackish spots on inner half.

♀. Fore wing with the postmedial line angled outwards in submedian fold to near tornus, then retracted to below angle of cell and oblique to middle of inner margin, the black patch before it triangular.

*Hab.* TRANSVAAL, Lemana (*Janse*), 1 ♀; NATAL, Karkloof (*Marshall*), 2 ♀, Estcourt (*Hutchinson*), 1 ♀, Pietermaritzburg (*Bowker*), 1 ♀, Durban (*Leigh*), 1 ♂ type; CAPE COLONY, Annshaw (*Miss F. Barrett*), 2 ♂, Zuurberg (*Baird*), 1 ♂, 2 ♀. *Exp.*, ♂ 24, ♀ 20 mm.

(1 b) *Liopasia rufalis*, sp. n.

♀. Head and thorax rufous; palpi white at base; maxillary palpi white; slight white streaks above the eyes; pectus and legs white, the fore tibiae tinged with rufous; abdomen pale rufous, with slightly darker subdorsal rufous marks on two basal segments and dorsal and subdorsal marks on the other segments, the ventral surface white. Fore wing rufous irrorated with blackish; a very indistinct blackish antemedial line, oblique from costa to submedian fold; traces

of dark annuli at middle and end of cell and of an oblique shade from lower angle of cell to inner margin; a very indistinct dark line, oblique from costa to vein 5 beyond the cell, then inwardly oblique; a curved postmedial series of black points in the interspaces; a terminal series of obscure spots. Hind wing semihyaline white, the terminal area and cilia suffused with rufous from apex to submedian fold; a slight dark postmedial line from costa to vein 5; the underside with the costal area white.

*Hab.* TRINIDAD, Cuparo (*Kaye*), 2 ♀ type; BR. GUIANA (*Rodway*), 1 ♀. *Exp.* 44 mm.

(1 a) *Anarmodia obliqualis*, sp. n.

♂. Head and thorax fiery red; palpi whitish at base; fore tarsi and mid and hind tibiae and tarsi pale; abdomen red suffused with brown. Fore wing fiery red, with darker streaks on the veins, the costal area deep red, brownish towards base; a very oblique dark brown antemedial line; a dark point in middle of cell; a very oblique dark discoidal bar confluent with the stronger streak on vein 3; postmedial line very oblique from costa to vein 5, excurved and less distinct to vein 3, then obsolete; a deep red terminal line. Hind wing yellow, the terminal area tinged with red from vein 5 to tornus, the veins of terminal area slightly streaked with red; a deep red terminal line; cilia reddish, with a slight dark line near base; the underside yellow suffused with red, a dark spot at upper angle of cell and point at lower angle.

*Hab.* PERU, Huancabamba, 1 ♂ type. *Exp.* 40 mm.

(8 a) *Anarmodia croceiproctis*, sp. n.

♂. Head, thorax, and abdomen cupreous brown; palpi white at base; antennæ with the basal joint whitish; some white below base of wings; coxæ and tibial spurs white; abdomen with the anal tuft orange, the ventral surface white irrorated with brown. Fore wing cupreous brown; a slight dark discoidal spot; postmedial line indistinct, brown, excurved to vein 4, then incurved; cilia pure white at tips. Hind wing whitish tinged with brown, the veins and terminal area brown; a curved brown postmedial line; cilia white mixed with brown to vein 2, then white with brown striæ at base; the underside with brown discoidal spot, the postmedial line minutely dentate.

*Hab.* S.E. PERU, Oconeque (*Ockenden*), 2 ♂ type. *Exp.* 52 mm.

(10) *Anarmodia polystriata*, sp. n.

♂. Head and thorax grey-brown; palpi red-brown, white at base; tegulæ red-brown; pectus white; legs brownish; abdomen reddish brown, whitish at base, the ventral surface white irrorated with brown. Fore wing red-brown, the costal area grey-brown, the interspaces white, with numerous black striæ except on terminal area, a wedge-shaped whitish patch on apical part of costa; traces of an oblique blackish antemedial line; obscure dark brown spots in middle of cell and on discocellulars; postmedial line blackish, oblique from costa to vein 6, slightly excurved to vein 2, then oblique; cilia black mixed with white. Hind wing white, the termen reddish brown and fuscous; a small blackish discoidal spot; a postmedial series of minute black streaks on veins 7 to 2, with series of slight fuscous spots beyond them in the interspaces between discal and submedian folds; cilia white, with series of black spots, the cilia of inner margin black-brown; the underside irrorated with brown, a black discoidal bar with some blackish above it on costa, and postmedial series of black spots.

*Hab.* S.E. PERU, Aqualani (*Ockenden*), 2 ♂ type. *Exp.* 50 mm.

(4 a) *Noorda albiplaga*, sp. n.

Head and thorax fuscous brown mixed with some whitish, the vertex of head and dorsum of tegulæ white; palpi white below towards base; pectus and legs white, the fore tibiæ banded with black, the mid tibiæ streaked with black above, the tarsi black ringed with white; abdomen white with dorsal brownish bands. Fore wing fuscous brown to just beyond middle, mixed with some whitish; a slight white spot at middle of costa, with faint oblique dark line from it to inner margin; the terminal area white; postmedial line black, excurved below costa and at middle and incurved at discal fold and below vein 4, a sinuous fuscous-brown maculate band beyond it from vein 7 to inner margin; a terminal fuscous-brown band; cilia white tinged with rufous and with a dark line at middle. Hind wing semihyaline white, the terminal area fuscous brown, rather broadly at costa, narrowing to a point at vein 1 and with slightly waved inner edge; cilia white, with a faint brownish line near base; the underside with the costal area faintly tinged with brown.

*Hab.* TRANSVAAL, White R. (*Cooke*), 1 ♂, Pretoria (*Janse*), 1 ♀ type. *Exp.* 16 mm.

(8) *Noorda ecthæmata*, sp. n.

♀. Head and thorax very pale yellow; abdomen white; palpi and shoulders crimson-red at sides; pectus and legs white, the fore femora at extremity and tibiæ above red, the mid tibiæ streaked with red above. Fore wing very pale yellow, the basal half of costa crimson-red, with a few black scales below it; the terminal area crimson-red, broad at costa and narrowing to tornus, defined on inner side by a slightly sinuous black line excurved at middle. Hind wing white; the terminal area crimson-red from apex to vein 2, defined on inner side by a very minutely waved black line.

*Hab.* BR. E. AFRICA, Taveta (*Rogers*), 1 ♀ type. *Exp.* 18 mm.

(10) *Noorda distigmalis*, sp. n.

♀. Pale ochreous; palpi black-brown, white at base; sides of frons, a ring round neck, and stripes on shoulders black-brown; fore tibiæ with black band at extremity. Fore wing with a silvery gloss; the costal area brown suffused with silvery purple; a black point in middle of cell and another on discocellulars; the terminal area purplish brown, defined on inner side by a black line very slightly excurved between veins 7 and 2. Hind wing with terminal purple-brown band from costa to a point at vein 2, defined on inner side by a black line from vein 7 to 2.

*Hab.* NIGERIA, Old Calabar (*Crompton*), 1 ♀ type. *Exp.* 2½ mm.

(14) *Noorda flavidalis*, sp. n.

♂. Head and thorax orange-yellow; palpi fuscous brown, white at base; frons fuscous brown, white at sides; antennæ blackish; tibiæ and tarsi fuscous brown; abdomen fuscous brown, the three basal segments orange-yellow dorsally, the genital tufts white. Fore wing orange-yellow, the costal edge and cilia fuscous brown. Hind wing orange-yellow, the cilia brownish at base, white at tips.

*Hab.* PERU, Huancabamba, 1 ♂ type. *Exp.* 26 mm.

(15) *Noorda dichocrocis*, sp. n.

Head, thorax, and abdomen yellow; palpi black, the labial palpi white at base; tegulæ, shoulders, and metathorax with black spots; fore and mid femora black towards extremities, the fore tibiæ and tarsi banded with black; abdomen with



dorsal and lateral series of black spots except towards extremity. Fore wing yellow, the costal edge black; two black spots at base; three subbasal spots; four antemedial spots, the spot below the cell displaced outwards; a medial spot in cell, bar below the cell, and spot above inner margin; a discoidal bar and three spots beyond lower angle of cell; a postmedial series of nine spots, the spots below costa and above inner margin displaced outwards and the spot at discal fold inwards; a subterminal series of six small spots ending above vein 2, the spot in discal fold displaced inwards; cilia silvery at tips. Hind wing yellow; a black spot in middle of cell and bar below the cell; a discoidal spot and three spots beyond lower angle of cell; a subterminal series of five spots, the spot in discal fold displaced inwards and an oblique bar in submedian interspace; cilia silvery at tips.

*Hab.* GOLD COAST, Kumasi (*Whiteside*), 1 ♂ type; UGANDA, Gondokora (*Reynes-Cole*), 1 ♀. *Exp.* 24 mm.

. (4a) *Bæotarcha albotermina*, sp. n.

♀. Head and thorax reddish brown; palpi white at base; sides of frons and tips of maxillary palpi white; antennæ blackish; pectus white in front; fore tarsi ringed with white, the mid tibiæ above and the mid and hind tarsi white; abdomen white, dorsally suffused with red-brown. Fore wing opalescent white irrorated with red-brown, the base and terminal area suffused with red-brown; a strong black antemedial line and discoidal bar; postmedial line strong, black, excurved between veins 4 and 2; the termen with a series of white bars and rather lunulate black terminal line. Hind wing white, semihyaline; an oblique black bar from vein 3 to termen at vein 2 which is brownish towards extremity; a fine brown terminal line.

*Hab.* DUTCH N. GUINEA, Fak-fak (*Pratt*), 1 ♀ type. *Exp.* 24 mm.

(4b) *Bæotarcha hyalina*, sp. n.

♂. Head and thorax whitish suffused with fuscous brown; tarsi ringed with white; abdomen whitish with dorsal fuscous segmental lines. Fore wing semihyaline brownish white irrorated with blackish; the costal edge blackish towards base; a diffused rather inwardly oblique black antemedial line; a black discoidal lunule; postmedial line black, oblique to vein 4, slightly excurved below vein 7 and at middle and incurved below vein 4; the termen whitish, with a series of fuscous-brown spots. Hind wing hyaline white;

some black irroration along vein 2 except near the cell; an oblique black line from vein 5 to termen at submedian fold; a terminal series of blackish points.

*Hab.* DUTCH N. GUINEA, Mimika R. (*Wollaston*), 2 ♂ type. *Exp.* 18 mm.

(11) *Calamochrous flavimarginalis*, sp. n.

♂. Head and thorax reddish brown tinged with grey; palpi white at base; pectus and legs whitish suffused with brown; abdomen brown with slight white segmental lines, the anal tuft ochreous, the ventral surface whitish. Fore wing yellowish suffused with reddish brown and in parts with fiery red, the terminal area yellow; a faint oblique brown antemedial line; postmedial line very indistinct, brown, somewhat oblique to vein 6, then inwardly oblique, a triangular yellow patch beyond it on costal area; an oblique rather diffused brown subterminal band defining the dark area. Hind wing yellowish white; a minute brown discoidal spot, traces of a rather diffused postmedial line, a narrow brown subterminal band, and terminal series of black points.

*Hab.* BR. E. AFRICA, Nairobi (*Anderson*), 1 ♂ type. *Exp.* 20 mm.

(4a) *Cybolomia leucatalis*, sp. n.

♀. White. Fore wing with the costal area towards apex and the terminal area faintly tinged with brown; a few large rough rufous scales below and beyond lower angle of cell. Hind wing faintly tinged with brown towards apex.

*Hab.* PERSIAN GULF, Bushire (*Swinhoe*), 1 ♀ type. *Exp.* 22 mm.

(5a) *Cybolomia arenalis*, sp. n.

♀. Head and thorax white irrorated with fuscous; abdomen white tinged with fuscous. Fore wing white irrorated with black; some ochreous-brown suffusion before and beyond the antemedial line, which is black, oblique from costa to median nervure, then waved; slight black marks on costa above end of cell and on extremity of median nervure; some yellow-brown suffusion beyond end of cell before the postmedial line, which is black, excurved from below costa to vein 4, then incurved, a diffused yellow-brown line beyond it; a narrow blackish terminal band; cilia blackish with white tips and intersected by three white streaks at middle.

Hind wing white tinged with brown; a slight brown post-medial line; cilia very long, brown at base, then white, with diffused brown line near tips; the underside white irrorated with brown.

*Hab.* ALGERIA, Biskra (*Walsingham*), 2 ♀ type. *Exp.* 14 mm.

(7 a) *Cybolomia pulverealis*, sp. n.

♀. Head and thorax grey tinged with yellow-brown and irrorated with black; palpi at base, pectus, and legs whiter; abdomen grey-brown. Fore wing grey tinged with yellow-brown and thickly irrorated with large black scales; traces of a waved dark antemedial line; some blackish points on medial part of costa; two minute discoidal points; an indistinct, fine, dark, minutely waved postmedial line, excurved from costa to vein 5, then very oblique; traces of a curved subterminal line; a narrow brown terminal band; cilia brown. Hind wing grey-brown; traces of a curved post-medial line; cilia brown at base, whitish at tips; the underside whitish thickly irrorated with black-brown, the post-medial line more distinct.

*Hab.* SPAIN, Granada (*Walsingham*), 1 ♀ type. *Exp.* 14 mm.

(12) *Cybolomia apicalis*, sp. n.

♀. Head and thorax red-brown mixed with white; palpi with white line above; frons with white streaks at sides; pectus, legs, and abdomen white, the last slightly tinged with brown above. Fore wing bright rufous mixed with whitish; a slight white streak on basal half of inner margin; a white fascia on medial part of costa; a triangular white patch on apical part of costa; traces of a subterminal line excurved from costa to vein 4, then oblique, the area beyond it pinkish; traces of a line just before termen; cilia white, with faint brown line through them. Hind wing white, with traces of a faint medial line; a slight brown terminal band from apex to vein 2; the underside slightly tinged with brown; a diffused discoidal spot sometimes confluent with the medial band.

*Hab.* MASHONALAND, Salisbury (*Marshall*), 3 ♀ type; TRANSVAAL, White R. (*Cooke*), 1 ♀. *Exp.* 20-22 mm.

(13) \**Cybolomia cataclystalis*, sp. n.

Whitish; head, thorax, and abdomen except the first segment and a band on second dorsally suffused with brown.

Fore wing with the basal area and an oblique patch from middle of costa to termen suffused with brown; a curved black line just before middle; the postmedial line obliquely curved from costa to vein 2, where it is retracted to lower angle of cell and very strongly angled outwards on vein 1; the termen silvery from vein 4 to below 2, where it runs inwards for some way; a wedge-shaped subterminal brown band from costa to the silvery mark; cilia brown. Hind wing with curved medial black line, with spots before it below cell and on vein 1; the apical area with a subterminal brown line and apical patch; a medial black patch on terminal area traversed by an obliquely sinuous orange line with ill-defined silvery ocelli beyond it.

*Hab.* LOUISIADES, St. Aignan (*Meek*). *Exp.* 14 mm. Type in Coll. Rothschild.

[To be continued.]

LXIII.—*Descriptions and Records of Bees.*—LII.

By T. D. A. COCKERELL, University of Colorado.

*Megachile fortis*, Cresson, var. *vestali*, var. nov.

♂.—Runs exactly to *M. fortis* in Friese's table ('Das Tierreich'), and agrees with Cresson's description except as follows:—Pubescence, except on under part of cheeks, fulvous, becoming a very rich fox-red dorsally; hair of thorax above not concealing the densely granular-punctate surface; tegulae piceous, with a tuft of red hair in front; a large patch of deep red hair above each spine on anterior coxae; anterior femora broadly blackened in front and behind, but honey-coloured above and below, the entire apical part above black; keel of sixth abdominal segment very broadly truncate at apex; middle of apex (beneath the keel) merely obtusely rounded, not forming a subacute tooth.

*Hab.* Halsey, Nebraska, on the sand-hills, Aug. 27, 1911 (*A. G. Vestal*).

This is possibly a distinct species, but more probably a variety of *M. fortis*. It is a very handsome insect. *M. fortis* was described from Texas, but a very large collection of Texas *Megachile* now before me does not contain the species.

I formerly had quite a wrong idea of *M. fortis*, Mr. Fox having determined for me as *fortis* a red-haired variety of

*M. comata* from the Gila River. In Ann. & Mag. Nat. Hist., July 1900, p. 10, I give a long list of localities for *fortis* in New Mexico, remarking that *comata* is not a distinct species. As a matter of fact, the insect I had was *M. comata*, and I did not know the real *fortis*. Friese, in 'Das Tierreich,' remarks that a *fortis* I sent him had the middle coxæ armed; this was really *comata*.

*Megachile gemula albula* (Lovell and Cockerell).

On examining a paratype male *M. gemula*, Cresson, from Georgia, I find that it is so closely related to *M. albula* from Maine that I believe the latter must rank as a subspecies. The true *gemula* has the outer side of the hind tibiæ and tarsi and middle tibiæ covered with black hair; in *albula* it is especially noticeable that the hair of the middle tarsi is shining pale reddish, while the hind tibiæ are more or less pale-haired on the outer side. In true *gemula* the second abdominal segment is black-haired at the sides and along the posterior margin, in *albula* this hair is mainly pale.

*M. gemula albula* is also found at Beulah, New Mexico, and I have collected it in the Harvard Botanical Garden, Cambridge, Mass.

*Megachile vancouverensis*, Provancher.

This species is to be added to the fauna of the United States, having been collected at Olympia, Washington State, 1896 (*Trevor Kincaid*). It is closely related to *M. gemula* and *albula*, so much so that I had considered it a variety or race of the latter. It is, however, distinguished by the prevailing pale hair of the abdomen, that on the third segment black only at sides. The hair fringing the hind tarsi behind is pale orange, whereas in *gemula* it is black. It is, however, orange-fulvous in *albula*, which is really intermediate between *gemula* and *vancouverensis*, though readily separated from both.

*Megachile chrysorrhœa*, Gerstaecker.

Tegwani (Dec. 30, 1908) and Lion's Stead (Feb. 6, 1909), S. Africa (*C. K. Brain*); Langenburg, L. Nyassa, Feb. 1898 (*Fülleborn*).

*Megachile ferox*, Smith.

This has hitherto been known only from the male. A female before me (Ararat, Australia, *C. E. P. Hill*; Nat.

Mus. Victoria, 20) is in general like the male, but the legs are black, with red claws and creamy-white spurs. The lower edge of the clypeus is straight and without tubercles, a character separating it from the very similar *M. derelicta*, Ckll. Ventral scopa white, fuscous at extreme apex; dorsal orange-ferruginous hair-patch covering fifth and sixth segments, except at sides, and extreme base of fifth.

This is also very like *M. heliophila*, Ckll. ined., from Brisbane, but *heliophila* is about 12 mm. long and has the mandibles coarsely strigate and sparsely punctured, while those of *ferox* show three shining longitudinal ridges, with channels between. The abdominal hair-patch of *heliophila* is brownish golden rather than red.

*Megachile frugalis*, Cresson.

Cresson described this form from a single male collected in Texas. I have since received it from Southern California; a new locality is San Gabriel Mts., near Pasadena, 1750 ft., July 15 (*F. Grinnell*). Thirteen males and ten females come from Cotulla, Texas, nearly all May 11 and 12, 1906 (*Crawford and Pratt*); six females and one male are from flowers of *Parkinsonia*, three females and nine males from *Monarda punctata*, one female was on *Verbesina encelioides*.

A male was taken at Cotulla, March 27 (*Jones and Pratt*). Seven females are from Devil's River, Texas, May 3 and 6, at *Monarda citriodora*, collected by F. C. Pratt. One female is from Atoka, Indian Territory, at *Asclepias tuberosa*, collected by F. C. Bishopp.

The female is a comparatively narrow parallel-sided form like the male; it differs from *M. inimica* and *heterodonta* by the minutely punctured rugulose clypeus, which has the anterior margin, except at sides, thickened and shining. The clypeus carries much erect black hair. The ventral scopa is white, with a faint creamy tint, black on the last segment. In Friese's table ('Das Tierreich') the female runs to 15, but is quite distinct from *M. addenda* and *pollicaris*. Superficially the female is very like *M. verbesinæ*, Ckll., but the sculpture of the clypeus is entirely different. See also 'Canadian Entomologist,' Aug. 1903, p. 215.

*Megachile decipiens*, Lovell and Cockerell.

This species was described from two males collected in Maine. I have before me two females from New Hampshire (Littleton, *C. M. Weed*; Hanover, *C. M. Weed*) which are,

I am confident, the same species. They were in Dr. W. H. Ashmead's collection, and were named by him *M. addenda*, Cresson, a species to which they have little resemblance. They are very close to the Rocky Mountain *M. sapellonis*, Ckll., differing principally by the smaller size (length about 15 mm.). The vertex, mesothorax (except in front), and scutellum have much black hair; middle of clypeus and supraclypeal area very smooth and sparsely punctured; lower margin of clypeus dentate, as in *sapellonis*; ventral scopa entirely dilute orange or yellowish white; wings dusky. The abdomen is conspicuously shiny. The male is readily known from that of *sapellonis* by the fuscous hair on thorax above and the smaller size.

*Megachile indianorum*, sp. n.

♂.—Length 14 mm., width of abdomen 5½.

Black, with red legs; wings pale brown; face covered with creamy-white hair; eyes green; antennæ black, not broadened at apex; tegulæ ferruginous, finely punctured; mesothorax dullish, strongly and closely punctured, with extremely scanty pale hair, no white hair-lines in front; scutello-mesothoracic suture with a moderate amount of white hair; pleura densely covered with white hair; legs bright ferruginous except the coxæ and trochanters, the middle and hind femora somewhat suffused with blackish; anterior coxæ with short, stout, flattened spines; anterior tarsi simple, but with a thick fringe of white hair behind on the first four joints; hair on inner side of tarsi pale orange; middle tarsi also with a white hair-fringe behind; hind margins of abdominal segments with narrow entire white hair-bands; keel of sixth segment (apparent apex) rounded, entire, bent downwards; hind margin of sixth segment with four short triangular teeth, the middle ones further apart than either from a lateral one; venter dark reddish.

*Hab.* Andmore, Indian Territory, July 11, 2 ♂ (*C. R. Jones*). Type in U.S. National Museum.

Very close to *M. deflexa*, Cresson, described from a single male collected in Kansas, and perhaps only a subspecies, but *deflexa* has the hair of the face yellow, that of mesothorax black, the tegulæ piceous, and the middle and hind femora black. Another closely related species is *M. mucorosa*, Ckll., which is much smaller, and has very much larger teeth on the apical margin of the sixth abdominal segment.

*Megachile recisa*, sp. n.

♂.—Length 10 mm.

Rather robust, black, with the hair mostly rather dull white; head and thorax above very densely and finely punctured, but shining; head seen from in front rounded, a little broader than long; face covered with long white hair, vertex with fuscous hair; antennæ simple, not especially long, dark, the fourth joint red beneath; mandibles hairy; hair of disc of mesothorax (which is scanty) and of scutellum fuscous, of rest of thorax white; tegulæ rufo-piceous, densely punctured. Wings rather dilute fuliginous. Legs with white hair; femora black, the anterior ones beneath with two conspicuous lines of white hair, the surface between them shining; tibiæ black, red at apex, the anterior pair also red in front and behind, but only apically on outer side; tarsi light red, the anterior ones slightly broadened, the third joint beneath with an intense black oval spot; anterior coxæ with rather short stout spines in the midst of long white hair. Abdomen shining, the hind margins of the segments with pale hair-bands, that on first reduced to a large white patch on each side, that on the third, and especially that on the fourth, suffused with ochreous; fifth segment covered with very pale appressed ochreous hair, sixth with white hair except the keel; keel (apparent apex) of sixth segment reddish, shining, broadly and squarely truncate, but with a rounded median emargination; at each extreme side of the segment is a sharp red tooth; in the middle, beneath the keel, are two prominent red spines, curving laterad; venter covered with white hair.

*Hab.* Kewell, Australia (Nat. Mus. Victoria, 14).

Related to *M. modesta*, Smith, but that has the two basal joints of the two anterior tarsi "white, flattened and expanded." Another example of *M. recisa* is from Brisbane (*H. Hacker*, Queensland Mus. 74); collected Sept. 24, 1912.

*Megachile ramulipes*, sp. n.

♂.—Length about 10 mm.

Of the parallel-sided type, but not slender; black, with the pubescence mostly white, that on the face dense and shining clear white; head and thorax above strongly extremely densely punctured, the punctures on the vertex larger than those on the thorax; antennæ very long and slender, the short third joint red beneath, the flagellum very faintly brownish beneath, the scape very short; mandibles



tridentate, the inner tooth prominent, no basal tooth below; tegulae piccous, stained with rufous. Wings hyaline, faintly dusky. Legs black, the tarsi ferruginous apically; anterior coxæ unarmed; anterior tarsi slender, greatly elongated (more than twice as long as the tibiae), their length being 1 mm. Abdomen short, the hind margins of the segments shining brown; first segment and bases of second and third with pale hair; second segment very densely and quite strongly punctured, contrasting with the third, which is shining, with fine weaker punctures; fourth segment (except partly at base, especially laterally), fifth and sixth covered with light orange-fulvous hair; apical margin of fourth segment and all of fifth and sixth with the tegument red; keel of fourth segment obtuse, hardly salient, obscurely bilobed; no apical spines.

*Hab.* Kewell, Australia (Nat. Mus. Victoria, 15).

Perhaps nearest, on the whole, to *M. rhodogastra*, Ckll., but easily separated by the long, slender, anterior tarsi and other characters.

*Megachile fultoni*, sp. n.

♀.—Length about 7 mm.

Narrow, *Heriades*-like, black, the apical segment of the abdomen (above and below) bright ferruginous red; ventral scopa white; wings dusky hyaline.

So close to *M. hackeri*, Ckll., that I at first thought it identical, but it is readily separated by the following characters:—Flagellum red beneath; the broad clypeus tridentate, one tooth in the middle, the others at the extreme sides; mandibles fringed with orange hair beneath; fifth and sixth abdominal segments much less hairy, and the little hair present not distinctly yellowish.

♂.—Like that of *M. hackeri*, but first r. n. meeting first t.-c. (which is not true of the female *fultoni*); lobes of sixth abdominal segment not so close together; flagellum red beneath.

*Hab.* Purnong, Australia (*S. W. Fulton*; Nat. Mus. Victoria, 59); female = type. The male is from W. Australia (Nat. Mus. Victoria, 58).

On account of the locality and the different venation the male is perhaps a distinct species, but, if so, this cannot at present be satisfactorily demonstrated.

*Megachile generosa cleomis* (Cockerell).

*Megachile cleomis*, described from New Mexico, is a

western subspecies of *M. generosa*, Cresson, described from North Carolina and Georgia. *M. pruinosa*, Friese (a pre-occupied name), agrees very well with *cleomis*, and must be regarded as a synonym. The females resembling *cleomis* may be separated as follows:—

- |   |                                  |
|---|----------------------------------|
| Only the last two abdominal segments, seen from above, with black hair at sides . . . . .   | <i>lippie</i> (Ckll.).           |
| Abdominal segments 2-6, seen from above, with black hair at sides . . . . .   | 1.                               |
| 1. Last abdominal segment above without depressed whitish hair, but with much black hair; mesothorax shining, punctures well separated (from a paratype, collected in New Jersey) . . . . . | <i>addenda</i> , Cresson.        |
| Last abdominal segment above with depressed whitish hair . . . . .  | 2.                               |
| 2. Hair of mesothorax except at sides, and of scutellum except behind, black . . . . .  | <i>generosa</i> , Cresson.       |
| Hair of thorax above pale, with black intermixed . . . . .  | <i>generosa cleomis</i> (Ckll.). |

#### *Megachile parallela*, Smith.

A specimen which I examined in the British Museum, supposed to be *parallela*, had the hair of vertex and disc of mesothorax dark brown. I now believe it is not genuine *parallela*, of which Smith says that the hair on disc of thorax is slightly ochraceous. Smith's description seems to be accurate, as it agrees very well with *M. facunda*, Cresson, which is no doubt a synonym. *M. sexdentata*, Rob., also appears to be the same species. On the other hand, the female of *parallela* is not *pruina*, Smith, but is correctly described by Robertson under *sexdentata*. The males of this species are very variable in size and the colour of the pubescence, which may be greyish white or strongly ochraceous. The female is known by the fine, pruinose, pallid tomentum on the last dorsal abdominal segment, and the joints of the middle tarsi greatly produced and ciliated at their apical corners.

#### *Megachile rufolobata*, sp. n.

♂.—Length about 14 mm.

Robust, with parallel-sided abdomen; black, with the fifth and sixth abdominal segments bright ferruginous red; face covered with shining golden hair, but all the other pale hair clear white; vertex, a large discal patch on mesothorax, and anterior part of scutellum with fuscous hair; mandibles broad, black, with two strong apical teeth and a long very

oblique inner cutting-edge; vertex and thorax above extremely densely punctured; antennæ black; tegulæ piceous. Wings strongly smoky, brown; second s.m. very long. Legs black, the tarsi with long white fringes; anterior coxæ with short, stout, sharp spines; anterior tarsi simple but rather thick, the apical part of the basitarsus and the second joint whitish, the two apical joints ferruginous; the other tarsi black. Keel of sixth abdominal segment (apparent apex) with two large rounded lobes; much long white hair on under side of abdomen. Hair on inner side of hind tarsi brownish ferruginous.

*Hab.* 60 miles N. of Perth, W. Australia (Victoria Nat. Museum, 2; received from C. French).

Closely allied to *M. ignita*, Smith, but that species, as described by Smith, has the hair of the cheeks pale fulvous, and that of "the thorax beneath and on the sides, and also on the legs," pale bright yellow. Smith also says that the anterior coxæ are unarmed, and this is not a mistake, as it is repeated by Meade-Waldo in *Ann. & Mag. Nat. Hist.*, Nov. 1912, p. 477. Meade-Waldo says abdomen not coarsely punctured in *ignita*; I should call that of *M. rufolobata* rather coarsely punctured, but this may not be significant.

I have a female from F. Smith's collection, determined by him as *M. ignita*, and it is certainly not the female of *rufolobata*, but it is perhaps really Smith's female *erythropyga*.

#### *Megachile victoriae*, Cockerell.

A male taken by S. W. Fulton at Purnong (Nat. Mus. Victoria, 106) shows that when fresh the fifth abdominal segment is clothed, except at sides, with pale fulvous hair; the patch is relatively inconspicuous, not like the bright red dense patch of some species.

#### *Megachile simplex*, Smith.

The female varies greatly in size. Meade-Waldo states that the type is 10 mm. long. One from Brisbane (*H. Hacker*) is about 8½ mm.; one from Ararat (*Hill*; Nat. Mus. Victoria, 19) is 12 mm. I cannot see any difference except that of size.

#### *Megachile cetera*, Cockerell.

A variety of the female (var. *a*) from S. Australia (*Waterhouse*; Nat. Mus. Victoria, 111) has the hair of head (except lower part of cheeks), thorax (except sternal region), and

abdominal bands a lively yellowish fulvous. Structurally it agrees with *cetera*.

*Megachile relictæ*, sp. n.

♀.—Length 10 mm.

Parallel-sided, black, with white pubescence, giving the whole insect a hoary appearance. Head ordinary; eyes brown; face rather broad, with much white hair; flagellum bright ferruginous beneath; vertex well punctured; clypeus transversely swollen or obtusely ridged, coarsely punctate above, below, where it slopes inward, shining and scarcely punctured, the lower margin with two large, widely separated, triangular teeth; mandibles broad, not greatly elongated, slightly reddish near apex, with a narrow band of yellowish hair parallel with the cutting-edge; labrum long, with a pair of subapical teeth; thorax above densely rugoso-punctate; tegulæ reddish, stained with piceous. Wings clear. Legs black, the tarsi red at apex, inner side of tarsi with pale fulvous hair; hind tarsi not broad. Abdomen punctured, with greyish-white hair all over, giving it a dusty appearance; faint linear bands can be seen on the hind margins of the first three segments, but the abdomen can hardly be called banded; a dense patch of white hair on each side of first segment; ventral scopa entirely white.

*Hab.* Tennants Creek, S. Australia (*Field*; Nat. Mus. Victoria, 37).

A peculiar species, without near relatives. By the pruinose abdomen it resembles *M. fulvomarginata*, Ckll.; by the clypeal structure it resembles *M. clypeata*, Smith.

*Megachile vestitor*, Cockerell.

A male from W. Australia (*Duboulay*; Nat. Mus. Victoria, 11) is only about  $9\frac{1}{2}$  mm. long, breaking down the distinction of size between *vestitor* and Smith's *fabricator*. I now think that the two are probably identical, but, if so, Smith's account of the anterior tarsi is ambiguous and insufficient.

*Megachile remeata*, sp. n.

♀.—Length a little over 12 mm.

Parallel-sided; wings dilute brownish, the apical half of the anterior wings more strongly so; ventral scopa white, with a few hardly noticeable dark hairs at extreme apex; first abdominal segment covered above and at sides with long white hair; second and third with dense white apical

hair-bands, broadly interrupted in the middle, the other segments without any pale bands or spots; eyes converging above; clypeus low and very broad, subcarinate in middle, with a tooth on middle of lower margin; mandibles very long, parallel-sided, bidentate at end, the inner margin with orange hairs; anterior tibiæ in front with a long (lanceolate), smooth, shining, hairless area, the inner side of these tibiæ densely covered with silver-white hair; flagellum obscurely marked with red beneath; mesothorax closely and minutely punctured, but shining between the punctures.

*Hab.* W. Australia (*Duboulay*; Nat. Mus. Victoria, 5).

Closely resembles *M. semiluctuosa*, but differs in the bidentate mandibles, the slightly instead of strongly arched margin of clypeus, the much more finely and minutely punctured mesothorax, and the shining finely punctured abdomen.

*Megachile revicta*, sp. n.

♀.—Length 15 mm.

Parallel-sided; wings with the apical half brown, the basal hyaline, in the manner of *M. fabricator*, but the third abdominal segment without hair-bands or spots, and the mandibles are different. This is another species superficially like *M. semiluctuosa*, from which it differs thus:—Head seen from in front round, the vertex rounded (not flattened), its scattered black hairs short, very minute; antennæ, in one plane, broadly rounded (not expanded) and obtuse at tip; vertex shining, with large, partly confluent punctures; hair of middle of face yellowish, of sides of face creamy white, of clypeus very pale yellowish mixed with dark brown; clypeus low and very broad, coarsely rugoso-punctate, the lower edge practically straight, with a median nodule; mandibles extremely broad and massive, quadridentate, but the innermost tooth feeble, a line of ochreous hair running parallel with the cutting-edge; labial palpi shorter; mesothorax densely and coarsely rugoso-punctate, almost like a *Lithurgus*; ventral scopa wholly creamy white; white band at apex of second abdominal segment only about half as broad, very clear white, as also the hair covering first segment; no lateral spots of hair on third segment; abdomen shining, with very large irregularly placed punctures; tegulæ shining black, with a curious fringe of pale hairs curling over the base and ends, covering more than half the surface; hair on inner side of hind tarsi dark fuscous, on the others more reddish.

*Hab.* 60 miles north of Perth, W. Australia; received from C. French (Nat. Mus. Victoria, 1).

The following key separates several similar-looking females :—

Lower edge of clypeus with conspicuous teeth; mandibles very broad .....	<i>lucidiventris</i> , Sm.
Clypeus not so, though there is usually a median denticle or tooth .....	1.
1. Mandibles very long .....	2.
Mandibles broad, relatively short .....	3.
2. Mandibles bidentate .....	<i>remeata</i> , Ckll.
Mandibles tridentate .....	<i>semiluchuosa</i> , Sm.
3. First abdominal segment with white hair right across .....	<i>revicta</i> , Ckll.
First abdominal segment with lateral patches of white hair .....	<i>suffuspennis</i> , Ckll.

*Halictus musicus*, sp. n.

♀.—Length about 10 mm.

Rather robust, the abdomen large; black, the abdomen with a faint green tint, especially on the first two segments; head broad; inner orbits strongly, evenly concave; front finely punctured, the punctures running into striæ, the shining surface visible between; supraclypeal area and clypeus convex, shining, with sparse distinct punctures; clypeus with a median groove; tongue broad dagger-shape; maxillary palpi red apically; flagellum obscurely reddish beneath; head and thorax with thin dark fuscous hair, but pale ochreous at sides of metathorax, extending up to sides of scutellum; postscutellum with a large patch of dense orange tomentum, and the same sort of tomentum covers the anterior corners of mesothorax, adjacent parts of prothorax, and region of the tubercles, making a large elongate patch on each side of the thorax in front; mesothorax in middle smooth and subglaucous, sparsely punctured, but densely punctured at sides; pleura finely and densely striate; area of metathorax large, bounded by a strong sharp rim, its surface with strong but obtuse irregular rugæ. Legs black, with coarse black hair; hind femora with a curled soot-coloured scopa; hind spurs simple; tegulæ black, shining, the anterior part finely roughened and with piliferous punctures, the anterior margin testaceous. Wings dilute fuscous, nervures and the large stigma reddish; third s.m. short; first r. n. reaching extreme basal corner of third s.m. Abdomen very finely punctured, without hair-bands or patches; at apex and beneath with coarse black hair.

*Hab.* Tambourine Mountain, Australia, Oct. 27, 1912 (*H. Hacker*; Queensland Museum, 82).

In the patch of orange tomentum on the postscutellum this agrees with *H. peraustralis*, Ckll., but that species has the legs mainly red and the metathoracic area quite different. Except for the orange tomentum, there is a very close superficial resemblance to *H. davidis*, Ckll., but the metathorax is entirely different.

*Chelostomoides pratti*, sp. n.

♂.—Length 10–11½ mm.

Black, with the small joints of tarsi clear ferruginous; form elongate, parallel-sided, narrow; pubescence in general white, but fuscous on vertex, and more or less so on discs of mesothorax and scutellum, short and black on the discs of the fourth and fifth abdominal segments, very pale yellowish on inner side of tarsi. Head rather large, round seen from in front; face densely covered with white hair, sparsely mixed with black on clypeus; cheeks with long white hair beneath; mandibles black, tridentate, without any large basal tooth below; labrum very broad and relatively short, sparsely punctured; vertex and front shining, but well punctured; antennæ long, the flagellum very faintly reddish beneath; mesothorax and scutellum shining but strongly punctured; two short white hair-bands on mesothorax anteriorly, pointing toward middle; white hair in scutello-mesothoracic suture, and a tuft of white hair behind each tegula; postscutellum shining, with sparse minute punctures; area of metathorax dull and granular; tegulæ dark brown, finely punctured. Wings clear hyaline, nervures piceous. Anterior coxæ and tarsi simple. Abdomen shining, but strongly punctured, the hind margins of the segments narrowly testaceous; conspicuous white hair-bands on apical margins of first three segments at sides, and rather weakly (especially so on third) continued across the middle; basal hair-bands are also developed, strong and continuous on segments 4–6; keel of sixth segment with two strong, triangular, sharp, widely separated teeth; apical margin (beneath) undulate, shining, without distinct lobes or teeth; fourth ventral segment (almost hidden by third) with a light reddish margin.

*Hab.* San Diego, Texas (*Jones and Pratt*). Thirty-eight specimens were collected, March 25, 1908.

Related to *C. rufimanus* (Rob), from which it is known by the darker legs and clear wings. There is a superficial

resemblance to *Megachile frugalis*, Cresson, which, however, has long spines on the anterior coxæ, though these are not mentioned by Cresson.

A male of *C. pratti* was taken by Mr. J. C. Crawford at Cotulla, Texas, May 11, 1906, at flowers of *Parkinsonia*. Three females, two from Cotulla (March 27, 1908, *Jones and Pratt*; May 5, 1905, *Crawford*) and one from San Diego (March 25, 1908, at flowers of *Marrubium vulgare*, collected by Jones and Pratt) can only belong to *C. pratti*. They have the following special characters:—Clypeus very deeply incised or emarginate, the incision bounded by large, shining, pointed teeth directed outward; upper part of clypeus with a prominence; flagellum bright ferruginous beneath except at base; labrum long, truncate at apex, with a prominent tubercle some distance from apex, bearing orange hairs directed upwards; mandibles long and stout, with three short teeth at apex; wings a little dusky (brownish); the erect pale hair of mesothorax not mixed with black; ventral scopa entirely white, with a faint yellowish tint. There is a strong superficial resemblance to the female of *Megachile occidentalis*, Fox.

*Chelostomoides* appears to be related to the Australian Heriadiform group of *Megachile*.

#### LXIV.—New Species of Tabanidæ from the Oriental Region.

By GERTRUDE RICARDO.

THESE species have been sent to me for determination by the Indian Museum. The types or paratypes are preserved in the British Museum Collection.

#### *Chrysops pettigrewi*, sp. n.

Type and four other females from Ukul, Manipur, 6400 feet, lat. 25° N., long. 94°–95° E. (*Rev. W. Pettigrew*).

A species allied to *Chrysops designata*, Ricardo, but the markings of the abdomen distinguish it. Wings with a dark transverse band and apical spot, a hyaline sinus present in the fifth posterior cell. Abdomen yellow at base, blackish on apical half, marked with yellowish spots. Antennæ and legs black.

Length  $8\frac{1}{2}$ – $9\frac{1}{2}$  mm.

Face black, covered with bright yellow tomentum; the



facial tubercles black, shining, very protuberant, round, not reaching the oral opening; cheeks with yellow hairs. *Palpi* black, with a few black hairs. *Antennæ* long, cylindrical, black, the first joint longer than the second, the third not quite so long as the first two together. *Forehead* same colour as face; the frontal callus black, shining, transverse, not reaching the eyes; a black spot on vertex bears the ocelli. *Thorax* black, covered with appressed golden pubescence; breast and sides covered with greyish tomentum and with golden and paler yellow hairs. *Scutellum* similar. *Abdomen* yellow at base, the first segment with a median black spot, the second wholly yellow, the third blackish, dull yellow at sides, and with three roundish yellow spots, also present on the third segment, but rather smaller; a faint greyish median spot is perceptible on the fourth, which, together with the remaining segments, is black; the black part of abdomen with the same appressed pubescence as thorax, thickest on the last three segments; underside chiefly yellow, only the extreme apex black. *Legs* black, with black pubescence, thickest on the hind femora. *Wings* with a narrow brown fore border and brown at base, the transverse band wide, somewhat irregular on both borders, the hyaline sinus faint; the clear space between the band and the apical spot is distinctive of this species, as it reaches the fore border, breaking the brown border; the apical spot large, reaching and extending over the anterior branch of fork of third vein.

*Tabanus excelsus*, sp. n.

A long series of females from Mashobra, Simla Hills, 7000 feet (*Col. Pease*), in Indian Museum.

Many of the specimens are in a very bad state, and almost all have lost their antennæ; but five are fairly well preserved, which I have marked as paratypes.

A species very nearly allied to *Tabanus cordiger*, Meig., but distinguished from it by the presence of three bands on the eyes and by the shape of the frontal callus, which does not reach the eyes, and the forehead is more than three times as long as it is wide. *Palpi* are also different in shape and reddish yellow, not white.

Length 10–12 mm.

*Face* covered with ashy-grey tomentum and with a few white hairs. *Beard* white. *Palpi* yellow, with black pubescence, stout, ending in an obtuse point. *Antennæ* reddish, the third joint very wide and short, the tooth represented by an angle only. *Forehead* about five times as long as it is

broad, narrower anteriorly; the frontal callus reddish brown, large, almost square, not reaching the eyes; the middle callus a little narrower, but longer, separated from it; the vertex appears blackish; forehead same colour as face, with a few short black hairs. *Thorax* black, with three narrow grey tomentose stripes and sides grey; a few scattered whitish hairs on dorsum and longer blackish hairs at sides; breast and sides covered with grey tomentum and with long greyish-white hairs. *Scutellum* black, with grey tomentum. *Abdomen* blackish, reddish on sides of second segment, with round grey lateral spots on each segment and long narrow median ones, these last not always distinct beyond the third segment, the segmentations with short yellow or white hairs on a grey tomentose ground; dorsum with grey tomentum and with black short pubescence; underside hoary, with reddish segmentations. *Legs* blackish, with grey tomentum; the tibiae reddish yellow; middle and posterior tarsi almost wholly reddish yellow. *Wings* clear, stigma yellow, veins brown.

*Tabanus fuscomaculatus*, subsp. *altermaculatus*.

Type and another female from Ukul, Manipur, 6400 feet (Rev. W. Pettigrew).

A species from the same locality as *T. fuscomaculatus*, Ricardo, only differing in the colour of the tibiae, which, together with the tarsi, are a very distinct reddish yellow, the extreme apices of femora the same colour. The markings of abdomen differ slightly, the black spot on second segment being very faint, and a black spot is present on the third segment; the last three segments are only partly black, the posterior borders and sides being reddish yellow, with some yellow hairs intermixed with the black pubescence. *Antennae* and palpi reddish, the latter with some grey tomentum and black pubescence.

Length 22 mm.

*Tabanus manipurensis*, sp. n.

Type and two other females from Ukul, Manipur, 6400 feet (Rev. W. Pettigrew).

A species nearly allied to *Tabanus explicatus*, Walker, but distinguished from it by the lighter-coloured tomentum of thorax and scutellum and by the absence of narrow fulvous segmentations on abdomen. The abdomen is densely black; the thorax and scutellum reddish brown, covered with yellowish pubescence, which extends to the first segment of

abdomen. Legs black, tibiæ white. Wings tinged yellow at base and on fore border.

Length 19–20 mm.

Face covered with bright yellow tomentum and with golden-yellow hairs in centre and on base of cheeks. Beard same colour. Palpi reddish, but appearing black, being covered above with grey tomentum and black pubescence, stout at base, ending in a long point. Antennæ bright red, the first two joints dusker, with black pubescence, the third joint with a distinct tooth, long and slender. Forehead about eight times as long as it is broad and a third narrower anteriorly; frontal callus long and narrow, not touching eyes, with a thick lineal extension not quite reaching vertex, which latter is dark, with black pubescence. Thorax reddish brown, with fulvous appressed pubescence, posteriorly and at sides with longer yellow hairs; breast-sides yellow, with bright yellow hairs. Scutellum covered with grey tomentum and with pale yellowish hairs. Abdomen black, covered with short black pubescence, with the exception of the first segment, which is yellowish grey, covered with yellow pubescence; a few black hairs are visible in the middle; the second is yellowish grey at sides, with, however, black pubescence, its posterior border with yellowish-white hairs, which form a median triangular spot; the next three segments with traces of a similar spot; underside black, with white-haired segmentations, a little yellowish at base, pubescence elsewhere black. Legs black; tibiæ on their basal two-thirds white, with white hairs; fore coxæ with yellow tomentum and pubescence; the pubescence of legs elsewhere black. Wings tinged pale brown, yellowish at base and on fore border; veins yellow at base, then brown. First posterior cell a little narrowed at border.

*Tabanus provincialis*, sp. n.

Type (female) and a series in Indian Museum from Arian-kava, Travancore, E. Himalayas, and Kurseong, E. Himalayas.

A species resembling *Tabanus orientis*, Wied., in general appearance, but at once distinguished from it by the shining brown subcallus and by the stouter more pointed palpi.

Length 12–14 mm.

Face covered with greyish-white tomentum and rather thick pubescence. Beard dirty white. Palpi reddish yellow, stout at point, ending in a fine point, with short black and some white pubescence. Antennæ slender, reddish, the first

two joints pale yellow, with some black hairs, the third with a very slight tooth. Subcallus brown, shining, rather protuberant. *Forehead* almost parallel, covered with brown tomentum; the frontal callus large, nearly square, brown, not reaching eyes, with another spindle-shaped callus beyond, not always united to it. *Thorax* blackish (denuded), with pale yellow short pubescence and some grey tomentum. *Scutellum* reddish, with grey tomentum. *Abdomen* reddish yellow, with narrow lighter-coloured segmentations covered with pale yellowish hairs; pubescence elsewhere on dorsum black; underside reddish yellow, not blackish at apex as on dorsum, the second segment almost wholly covered with pale hairs, similar to those on the segmentations. *Legs* blackish, tibiæ reddish yellow. *Wings* clear, veins brown.

*Hæmatopota litoralis*, sp. n.

A long series from the Indian Museum, collected and sent for identification by Mr. Annandale, from Puri, Orissa Coast, males and females, with note: "Very common on cactus hedges during daytime."

A species allied to *H. annandalei* and *validicornis*, Ricardo, but distinguished from them both by the apical band of wing, which is double, but narrow. Antennæ the same in form, dark reddish or blackish. Face with a black band. Frontal callus black, narrow. Abdomen black, in well-preserved specimens with very distinct grey spots and median stripe. Legs black, the pale rings on middle and posterior tibiæ small.

Length  $8\frac{1}{2}$ -11 mm.

*Female*.—*Face* greyish white, with a deep black band below antennæ, hairs on face white. *Palpi* yellowish, at base covered with grey tomentum and pale pubescence, beyond with black pubescence. *Antennæ* reddish or blackish, usually darker above and paler below, the first joint abnormally large and stout, almost as broad as the third joint at its widest, longer than the third one, with black pubescence; the second very small, with thick black pubescence; the third with a broad first annulation, halfway from its base wide, then becoming a little narrower; the last four joints forming a small narrow apex. *Frontal callus* black, narrow, reaching the eyes, becoming wider at the sides, a small black spot between antennæ. Paired spots large, touching the eyes, the unpaired one very small; forehead dark, with yellowish-brown tomentum, greyer at sides, some short black hairs at vertex. *Thorax* brownish, with pale appressed

pubescence, in well-preserved specimens with pale stripes and spots. *Scutellum* identical in colour and pubescence. *Abdomen* blackish, with a broad greyish stripe at each side, or sides greyish, the grey median stripe and spots at sides usually distinct. *Legs* blackish, the fore tibiæ pale at base only, the middle and posterior tarsi with the first joint almost wholly whitish. *Wings* with four well-marked rosettes, the apical band double, beginning as a broad spot from the apex of second longitudinal vein, proceeding with its lower branch as a narrow wavy line to the middle of the second submarginal cell; its upper branch crosses the apex of wing in a straight line, but is usually broken up into two or three large spots, which are often very faint and sometimes obliterated; below the lower branch small half-moon white spots begin, one in the second submarginal cell and two in the other cells as far as the apical cell, almost touching the pale markings at border in all the cells; veins brown, stigma a darker brown.

*Male* is identical, but smaller, the *abdomen* more reddish brown, the spots not distinct. *Eyes* copper-coloured, the large facets take up two-thirds of the eye. *Forehead* covered with grey tomentum; a black spot between the antennæ, the first joint of which is stout, but shorter than the third, blackish, with grey tomentum, the third reddish. *Palpi* yellow, with black hairs.

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LXV. — A Synopsis of the Siluroid Fishes of the Genus *Liocassis*, with Descriptions of new Species. By C. TATE REGAN, M.A.

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OF twenty-four species of *Liocassis*\* all but five, *L. naso*, *fuscus*, *mahakamensis*, *vaillanti*, and *liacanthus*, are represented in the British Museum collection. Of the last-named I have seen one of the types, kindly sent to me for examination

\* *Pimelodus rama*, Ham. Buch., from Bengal and Assam, is placed by Day in *Liocassis* (Fish India, p. 451, pl. cxv. fig. 2); it seems improbable that this little fish really belongs to the genus; but, if it does, the large eye and minute mandibular barbels distinguish it from all the other species. *Liocassis torosilabris*, Sauvage (Ann. Sci. Nat. (6) i. 1874, no. 5, p. 7), from China, is described as having movable labial teeth, and is doubtless a *Bagrichthys*, whilst Mlle. Popta has shown that *Liocassis macropterus*, Vaillant, is a *Bagroides* (Notes Leyden Mus. xxvii. p. 228).

by Prof. Max Weber. The species may be distinguished by means of the following synopsis:—

*Species from Siam, Malay Peninsula and Archipelago.*

I. Head covered with smooth skin.

A. Dorsal spine less than  $\frac{1}{3}$  length of head; maxillary barbel reaching pectoral.

Depth of body 5 in the length ..... 1. *fuscus*, Popta, 1904.  
 Depth of body 6 in the length ..... 2. *mahakamensis*, Vaill.,  
 [1902.]

B. Dorsal spine at least  $\frac{2}{3}$  length of head.

1. Maxillary barbel reaching pectoral; head nearly as broad as long ..... 3. *stenomus*, Cuv. & Val.  
 2. Maxillary barbel not extending beyond head, which is longer than broad.

a. Occipital process reaching basal shield of dorsal spine.

Head  $1\frac{1}{3}$  to  $1\frac{1}{2}$  as long as broad ..... 4. *pæcilopterus*, Cuv. & Val.  
 Head  $1\frac{1}{3}$  as long as broad ..... 5. *siamensis*, sp. n.

b. Occipital process not reaching basal shield of dorsal spine.

a. Vomerine band of teeth without or with a very short and blunt median posterior process.

\* Caudal peduncle about twice as long as deep.

Occipital process not longer than eye, less than its distance from basal bone of dorsal spine ..... 6. *micropogon*, Cuv. & Val.

Occipital process a little longer than eye, as long as its distance from basal bone of dorsal spine ..... [1894.]  
 7. *saravacensis*, Bouleng.,

Occipital process  $1\frac{1}{3}$  to 2 as long as eye, 2 to  $2\frac{1}{2}$  as long as its distance from basal bone of dorsal spine; head  $1\frac{1}{3}$  as long as broad ..... [1906.]  
 8. *baramensis*, Regan,

Occipital process more than twice as long as eye, 4 times as long as its distance from basal bone of dorsal spine; head  $1\frac{2}{3}$  as long as broad ..... 9. *merabensis*, sp. n.

β. Caudal peduncle  $2\frac{1}{2}$  to  $2\frac{3}{4}$  as long as deep.  
 10. *hosi*, Regan, 1906.

b. Vomerine band of teeth with a strong median posterior projection ..... 11. *doriae*, sp. n.

II. Upper surface of postorbital part of head naked, rugose; occipital process meeting basal shield of dorsal spine; snout scarcely projecting beyond mouth; teeth on palate forming a curved band without median posterior projection.

A. Supraclavicular plate small, not produced backwards, its lower edge in contact with basal part of clavicular process.

1. Head nearly as broad as long; pectoral spine as long as head.  
 12. *breviceps*, sp. n.

2. Head longer than broad ; pectoral spine shorter than head.

a. Depth of body  $5\frac{1}{2}$  to 7 in the length ; caudal peduncle  $2\frac{1}{2}$  as long as deep.

Bony area of upper surface of head with straight anterior edge ; occipital process longer than broad ; pelvics reaching anal ; fins immaculate ..... [1894.  
13. *inornatus*, Bouleng.,

Bony area of upper surface of head with emarginate anterior edge ; occipital process broader than long ; pelvics not nearly reaching anal ; dorsal and anal with dark bars. .... 14. *vallanti*, sp. n.\*

b. Depth of body  $4\frac{1}{2}$  in the length ; caudal peduncle  $1\frac{3}{4}$  as long as deep ..... 15. *rugosus*, sp. n.

B. Supraclavicular plate produced backwards into a pointed process.

Supraclavicular process small, not extending so far back as clavicular process ..... [Beaufort, 1912.  
16. *liacanthus*, Weber &

Supraclavicular process strong, extending as far back as clavicular process .... [1890.  
17. *moeschii*, Bouleng.,

*Species from China and Japan.*

I. Snout strongly projecting beyond mouth ; caudal deeply forked ; occipital process rugose ; dorsal spine long, serrated. [1864.  
18. *longirostris*, Günth.,

II. Snout obliquely truncated, projecting beyond mouth ; caudal forked, the middle rays about  $\frac{1}{2}$  as long as the longest ; occipital process covered by skin.

A. Band of teeth on palate continuous.

Dorsal spine serrated, about  $\frac{3}{4}$  length of head ; pectoral spine  $\frac{2}{3}$  length of head. [1864.  
19. *crassilabris*, Günth.,

Dorsal spine smooth or slightly serrated,  $\frac{1}{2}$  to  $\frac{2}{3}$  length of head ; pectoral spine  $\frac{2}{3}$  length of head ..... 20. *crassirostris*, sp. n.

B. Band of teeth on palate divided in middle.

21. *naso*, Garm., 1912.

III. Mouth subterminal.

A. Caudal fin moderately emarginate, the middle rays about  $\frac{2}{3}$  as long as the longest ..... 22. *emarginatus*, sp. n.

B. Caudal fin truncate or slightly emarginate.

Occipital process slender, subcutaneous ; length of head 4 to  $4\frac{1}{3}$  in length of fish ; caudal peduncle  $1\frac{2}{3}$  to  $1\frac{3}{4}$  as long as deep ..... 23. *truncatus*, sp. n.

Occipital process broad, rugose ; length of head 5 in length of fish ; caudal peduncle  $2\frac{1}{4}$  as long as deep ..... 24. *tenuatus*, Günth., 1873.

\* *L. moeschii* (non Bouleng.), Vaillant, Notes Leyden Mus. xxiv. no. 1, 1902, p. 61, figs. 8 & 9.

*Liocassis siamensis*, sp. n.

Depth of body  $4\frac{2}{3}$  in the length, length of head  $3\frac{3}{4}$ . Breadth of head  $1\frac{1}{2}$  in its length, length of snout  $3\frac{1}{2}$ , diameter of eye  $5\frac{1}{4}$ , interorbital width  $3\frac{2}{3}$ . Head covered with skin; occipital process nearly three times as long as broad, extending to basal bone of dorsal spine; snout blunt; nasal barbel extending to posterior edge of eye; maxillary barbel  $1\frac{1}{2}$  as long as outer mandibulary,  $2\frac{1}{2}$  as long as inner, extending to operculum; mouth subterminal; teeth on palate in a curved band as broad as that of the præmaxillaries, without median process. Dorsal I 7; spine strong, feebly serrated behind,  $\frac{3}{4}$  as long as head; adipose fin as long as its distance from dorsal spine. Anal 15. Pectoral spine  $\frac{4}{5}$  length of head; inner edge serrated. Pelvics reaching anal. Caudal forked. Caudal peduncle  $1\frac{3}{4}$  as long as deep. Yellowish, with brownish cross-bands, which are much broader than the interspaces, one on head, a second from dorsal to pectoral and pelvic fins, a third from adipose fin to anal, a fourth on the caudal peduncle and base of the caudal fin; rest of caudal pale except for a brownish bar on each lobe.

A single specimen, 90 mm. in length, from the Bangpakong River, Siam, received in 1897 from the Royal Siamese Museum.

*Liocassis merabensis*, sp. n.

Depth of body  $4\frac{2}{3}$  to 5 in the length, length of head  $3\frac{2}{3}$  to  $3\frac{3}{8}$ . Breadth of head  $1\frac{2}{3}$  in its length, diameter of eye 8 or 9, interorbital width  $5\frac{1}{2}$ . Head covered with smooth skin. Snout moderately broad, rounded, projecting a little beyond the mouth; nasal barbel nearer eye than end of snout, when laid back nearly reaching eye; maxillary barbel extending to middle or posterior edge of eye; occipital process three times as long as broad, separated by a space equal to  $\frac{1}{4}$  its own length from basal shield of dorsal spine; clavicular process not extending beyond middle of pectoral spine. Vomerine teeth in a curved uninterrupted band, nearly as broad as that of the præmaxillaries, without or with a very short and blunt median posterior process. Dorsal I 7; spine very feebly serrated behind, about  $\frac{1}{2}$  the length of head; adipose fin  $1\frac{2}{3}$  or  $1\frac{3}{4}$  as long as dorsal, longer than its distance from latter. Anal 14. Pectoral spine from a little more than  $\frac{1}{2}$  to  $\frac{3}{5}$  the length of head; inner edge strongly serrated. Pelvics not quite reaching anal. Caudal forked. Caudal peduncle twice as long as deep. Brownish; head with small dark spots; above the lateral line two elongate



oval pale yellow areas, the anterior extending to below the adipose fin, the posterior commencing near end of that fin; larger pale areas below lateral line are confluent below; fins with blackish basal and intramarginal bands.

Two specimens, 145 and 150 mm. in total length, from Merabeh, North Borneo, collected by Mr. A. Everett.

*Liocassis doriae*, sp. n.

Depth of body  $4\frac{1}{5}$  in the length, length of head  $3\frac{1}{2}$ . Breadth of head  $1\frac{2}{3}$  in its length, diameter of eye 8, interorbital width 5. Head covered with smooth skin. Snout moderately broad, obtusely pointed,  $\frac{1}{3}$  the length of head, projecting beyond the mouth; nasal barbel a little nearer to eye than to tip of snout, when laid back not quite reaching the eye; maxillary barbel extending to below the eye; occipital process three times as long as broad, separated by an interspace a little less than its own length from the basal shield of the dorsal spine; clavicular process extending to the middle of the pectoral spine. Vomerine teeth in a curved uninterrupted band, with a pointed median posterior projection, extending back nearly as far as the lateral horns. Dorsal I 7; spine very feebly serrated behind, nearly  $\frac{1}{2}$  the length of head. Adipose fin  $1\frac{2}{3}$  as long as the base of the dorsal and equal to its distance from the latter. Anal 14. Pectoral spine a little more than  $\frac{1}{2}$  the length of head; inner edge strongly serrated. Pelvics not quite reaching the origin of anal. Caudal forked. Caudal peduncle  $2\frac{1}{4}$  as long as deep. Brownish, with two oblong pale areas, which may be confluent, on each side of the posterior part of the body above the lateral line; similar pale areas below the lateral line, confluent and meeting in the mid-ventral line; fins with blackish basal and intramarginal bands.

A single specimen, 190 mm. in total length, from Borneo, presented in 1868 by the Marquis G. Doria.

*Liocassis breviceps*, sp. n.

Depth of body  $4\frac{2}{3}$ – $5\frac{1}{3}$  in the length, length of head  $4\frac{2}{5}$ – $4\frac{4}{5}$ . Head nearly as broad as long. Diameter of eye  $4\frac{1}{2}$ –5 in the length of head. Snout broad, obtuse,  $\frac{1}{3}$  the length of head, scarcely projecting beyond the mouth; nasal barbel a little nearer to eye than to tip of snout, when laid back extending to the operculum; the maxillary barbel extending to the middle of pectoral; upper surface of head, behind the orbits, naked, rugose, this bony area with straight transverse anterior edge; occipital process as long as broad, meeting the

basal shield of the dorsal spine; supraclavicular plate small, not produced backwards. Teeth on the palate in a curved uninterrupted band, without posterior median process. Dorsal I 6; spine weakly serrated behind,  $\frac{2}{3}$  or  $\frac{3}{4}$  the length of head. Adipose fin longer than the base of dorsal, but shorter than its distance from the latter. Anal 14–15. Pectoral spine as long as the head, with strongly serrated inner edge. Pelvics not extending to the anal. Caudal deeply forked. Caudal peduncle twice as long as deep. Greyish; dorsal with dark basal and intramarginal bands.

Two specimens, 75 and 90 mm. in total length, from Deli, Sumatra, collected by Herr Moesch.

*Liocassis rugosus*, sp. n.

Depth of body  $4\frac{1}{2}$  in the length, length of head 4. Head  $1\frac{1}{3}$  as long as broad. Diameter of eye 8 in the length of head, interorbital width  $3\frac{3}{5}$ . Snout broad, rounded,  $\frac{1}{3}$  the length of head, scarcely projecting beyond the mouth; nasal barbel equidistant from eye and tip of snout, when laid back extending a little beyond the eye; maxillary barbel nearly reaching the base of pectoral; upper surface of head, behind the orbits, naked, rugose, this bony area with the anterior edge deeply emarginate; occipital process as long as broad, meeting the basal shield of the dorsal spine; supraclavicular plate small, not produced backwards. Teeth on the palate in a curved uninterrupted band, without posterior median process. Dorsal I 7; spine feebly serrated behind,  $\frac{2}{3}$  the length of head. Adipose fin  $1\frac{3}{4}$  as long as the base of dorsal and longer than its distance from the latter. Anal 15. Pectoral spine  $\frac{4}{5}$  the length of head, with strongly serrated inner edge. Pelvics extending to the anal. Caudal forked. Caudal peduncle  $1\frac{3}{4}$  as long as deep. Yellowish, with very broad brown cross-bands, the first ending posteriorly at the origin of the pelvics, the second above the anal fin, the third on the caudal peduncle; fins greyish.

A single specimen, 120 mm. in total length, from Poeh, Sarawak, collected by Mr. A. Everett.

*Liocassis crassirostris*, sp. n.

Depth of body  $5\frac{1}{2}$  in the length, length of head 4 to  $4\frac{1}{4}$ . Breadth of head  $1\frac{1}{3}$  in its length, length of snout  $2\frac{3}{4}$  to 3, diameter of eye  $5\frac{1}{2}$  to  $6\frac{1}{2}$ , interorbital width  $3\frac{3}{5}$ . Head covered with skin; occipital process narrow, as long as snout, extending beneath skin to basal bone of dorsal spine.

Snout obtuse, projecting beyond the mouth; nasal barbel, when laid back, reaching middle of eye; outer mandibular barbel much longer than inner, but shorter than maxillary barbel, which nearly reaches the operculum. Teeth on palate in a curved band. Dorsal I 7; spine not serrated,  $\frac{1}{2}$  to  $\frac{3}{5}$  length of head; adipose fin longer than its distance from the dorsal. Anal 18. Pectoral spine  $\frac{3}{5}$  length of head; inner edge serrated. Pelvics reaching anal. Caudal forked, the middle rays about  $\frac{1}{2}$  as long as the longest. Caudal peduncle  $2\frac{1}{5}$  to  $2\frac{1}{3}$  as long as deep. Brownish, with irregular and discontinuous paler longitudinal stripes; fins dusky towards the margin.

Kia-tiang-fu, Sze Chuen, China.

Two specimens, 70 and 140 mm. in total length, collected by Mr. Pratt.

*Liocassis emarginatus*, sp. n.

Depth of body 6 to  $6\frac{1}{2}$  in the length, length of head 4 to  $4\frac{1}{3}$ . Breadth of head  $1\frac{1}{3}$  in its length, diameter of eye  $5\frac{1}{2}$  to 6, interorbital width 4 to 5, length of snout 3. Head covered with skin; occipital process a little longer than eye, separated by an interspace not more than  $\frac{1}{2}$  its own length from basal bone of dorsal spine. Snout obtuse, projecting somewhat beyond mouth; teeth on palate in a curved band, narrowest in the middle; nasal barbel, when laid back, reaching posterior part of eye; inner mandibular barbel shorter than outer, which is shorter than maxillary barbel, which reaches operculum. Dorsal I 7; spine not serrated,  $\frac{1}{2}$  length of head or a little less; adipose fin equal to or a little longer than its distance from the dorsal. Anal 16-18. Pectoral spine about  $\frac{1}{2}$  length of head; inner edge strongly serrated; clavicular process extending well beyond its middle. Pelvics extending to vent. Caudal emarginate, the middle rays about  $\frac{2}{3}$  as long as the longest. Caudal peduncle 2 to  $2\frac{1}{2}$  as long as deep. Coloration apparently yellowish, with dark blotches.

Four specimens, 80 to 115 mm. in total length, from Kia-tiang-fu, Sze Chuen, collected by Mr. Pratt.

*Liocassis truncatus*, sp. n.

Depth of body  $5\frac{1}{2}$  to 6 in the length, length of head 4 to  $4\frac{1}{3}$ . Breadth of head  $1\frac{1}{5}$  to  $1\frac{1}{3}$  in its length, length of snout 3 to  $3\frac{1}{3}$ , diameter of eye 5 to 6, interorbital width  $3\frac{1}{2}$  to 4. Head covered with skin; occipital process slender, a little shorter than snout, usually extending to basal bone of dorsal spine.

Snout blunt, scarcely projecting beyond mouth; nasal barbel, when laid back, extending to posterior edge of eye; outer mandibular barbel much longer than inner, but shorter than maxillary barbel, which just reaches operculum. Teeth on palate in a curved band, which is narrowest in the middle. Dorsal I 7; spine not or but feebly serrated,  $\frac{1}{2}$  length of head; adipose fin longer than its distance from dorsal. Anal 18-20. Pectoral spine serrated,  $\frac{2}{3}$  length of head; clavicular process extending beyond its middle. Pelvics nearly or quite reaching anal. Caudal slightly emarginate or truncate. Caudal peduncle  $1\frac{3}{5}$  to  $1\frac{3}{4}$  as long as deep. Brownish, with traces of longitudinally expanded pale areas; fins with dusky margins.

Five specimens, 75 to 130 mm. in total length, from Kia-tiang-fu.

In the largest specimen there is an interspace between the occipital process and the basal bone of the dorsal spine, but it evidently belongs to the same species as the others. *L. tenuatus*, Günth., differs in the smaller head, broader and rugose occipital process, and the more slender caudal peduncle.

LXVI. — *On a small Collection of Rhynchota made by Mr. David R. Tait at Henderson's Island.* By W. L. DISTANT.

HENDERSON'S (or, perhaps, as it is better known, Elizabeth) Island is only about five miles in length, and in the remote Pacific region: lat.  $24^{\circ} 21'$  S. and long.  $128^{\circ} 18'$  W. The fine species of *Catacanthus* here described is probably not endemic, but a migrant from some of the larger and little-known islands in this area.

The types are in the British Museum.

## HETEROPTERA.

### Fam. Pentatomidæ.

#### Subfam. SCUTELLERINÆ.

*Coleotichus* sp. ?

A single specimen, which I have been unable to identify.

## Subfam. PENTATOMINÆ.

*Catacanthus taiti*, sp. n.

Head, pronotum, scutellum, and corium resplendent bronzy green; lateral margins to pronotum and two transverse spots with dark centres near the anterior pronotal margin, apex of scutellum, claval margins, lateral and apical margins and veins to corium, ochraceous; membrane bronzy black, the apical area much paler and bronzy brown; body beneath and legs pale ochraceous; rostrum ochraceous, its apex piceous; antennæ with the first and second joints brownish ochraceous, remaining joints black; basal joint extending beyond apex of head, second, third, and fourth joints slightly but regularly increasing in length, fifth almost subequal in length to fourth, antenniferous tubercles visible from above; head obscurely transversely wrinkled, the central lobe a little projecting beyond the lateral lobes; pronotum finely transversely wrinkled and obscurely punctate, the lateral margins acute and reflexed, their anterior angles acutely shortly spinous; scutellum wrinkled and finely punctate, the basal area moderately convex, beyond which is a central longitudinal ridge not reaching apex, which just extends over the base of membrane; corium distinctly and somewhat thickly punctate; connexivum exposed beyond basal third of corium, ochraceous, with large blackish spots at the segmental incisures; membrane extending considerably beyond the apex of the abdomen, veins numerous and simple; rostrum reaching the posterior coxæ; abdominal spine long, its apex recurved, not quite reaching the anterior coxæ; anterior tibiæ a little dilated, posterior tibiæ slightly curved.

Long. 20 to 23 mm.

A peculiarity in this species, and one found also in several other species of *Catacanthus*, is in having the spiracles of the basal ventral segment exposed, not hidden by the metasternum. This character, strictly applied, would locate these species in the Tessaratominæ, but it has recently been shown that this course is not of universal application. Thus in 1881 I described the genus *Delocephalus* and on the exposure of the spiracles placed it in the Tessaratominæ, for which Horváth proposed a distinct tribal division, Delocephalini, and in which Schouteden described a second species. The last-named writer has since, and I think correctly, transferred the genus to the Phyllocephalinæ. Another recent instance is of a genus correctly placed by Westwood and Stål in the Dinidorinæ, and incorrectly transferred on these characters alone by Bergroth to the Tessaratominæ.

*C. taiti* is allied to *C. viridicatus*, Dist.

## HOMOPTERA.

## Fam. Fulgoridæ.

Subfam. *ISSINÆ*.*Devagama insularis*, sp. n.

Vertex brownish ochraceous; pro- and mesonota dull ochraceous; body beneath and legs paler ochraceous; tegmina dull greyish opaque, the venation (except in a pale central area) castaneous, on each side of the pale central area more or less suffused with dark castaneous, sometimes fasciately so, in other specimens almost obsoletely shaded; abdomen above broadly banded with piceous; face ochraceous, centrally shaded with piceous; clypeus dark castaneous; head broad, including eyes as wide as pronotum; vertex quadrangular, with a transverse ridge before anterior margin, its posterior margin moderately concave, its lateral margins ridged, an obscure central ridge in front of the transverse ridge; face a little concave at anterior margin, longer than broad, posteriorly slightly ampliate and rounded, centrally obscurely carinate and with a curved discal sublateral carination on each side; pronotum with its posterior margin truncate, anteriorly subtriangularly produced and with a faint central longitudinal ridge, margins of both pro- and mesonota carinate; tegmina placed vertically, strongly amplified posteriorly, the apical margin somewhat rounded, a distinct series of short apical veins, which are continued round apex on posterior edge of costal area.

Long., incl. tegm.,  $5\frac{1}{2}$  mm.

I originally founded the genus *Devagama* for the reception of two Oriental species.

*Devagama fasciata*, sp. n.

A smaller species than *D. insularis*, the tegmina shorter and comparatively broader, the venation on the middle and apical areas pale and almost concolorous, the central pale area margined with two dark castaneous transverse fasciæ which are inwardly united; abdomen above ochraceous; body beneath and legs ochraceous; apical margins of tegmina broadly rounded; pro- and mesonota subequal in length.

Long., incl. tegm.,  $4\frac{1}{2}$  mm.

*Devagama maculata*, sp. n.

Size and shape of *D. fasciata*, the anterior angles of vertex

more pronounced and acute ; tegmina with the venation dark ochraceous, that belonging to the short apical cells black, on basal half some prominent but irregularly shaped and sized black spots, and near centre a curved ochraceous discal fascia ; body beneath testaceous, legs testaceous.

Long., incl. tegm.,  $4\frac{1}{2}$  mm.

Fam. *Cercopidæ*.

*Clovia insignis*, sp. n.

Vertex ochraceous, narrow lateral margins (somewhat discontinuous) black ; pronotum black, with a broad central longitudinal fascia, not reaching anterior margin, ochraceous ; scutellum pale ochraceous ; tegmina black, apical areas of clavus (but not the claval suture), and broad, sinuate lateral margins, abruptly widening posteriorly, more or less ochraceous ; body beneath and legs ochraceous ; head as broad as pronotum, about as long as breadth between eyes ; narrowed and subacutely rounded anteriorly ; pronotum distinctly transversely striate, strongly excavate before base of scutellum ; scutellum longer than broad, obscurely transversely striate ; tegmina finely punctate ; face somewhat convex, but distinctly flattened on disk ; clypeus not quite reaching the apices of the anterior coxæ ; apex of rostrum black ; posterior tibiæ bispinose ; apices of tarsi black.

Long. 7 mm.

LXVII.—*Descriptions of Eight new Marine Gastropoda, mostly from Japan.* By G. B. SOWERBY, F.L.S.

[Plate IX.]

*Cominella fortilirata*, sp. n. (Fig. 1.)

Testa elongato-fusiformis, imperforata, solidiuscula, sordide albida, epidermide fusca tenuiter induta ; spira elongata, elata, pyramidalis ; anfractus 6, convexi, spiraliter quinque lirati ; liris elevatis, crassis, leviter complanatis ; interstitiis excavatis, oblique filostriatis ; anfractus ultimus spiram circiter æquans ; liris 15, munitus, antice leviter concavus ; apertura subpyriformis, intus sulcata, albida ; columella rectiuscula, albida, lævis.

Long. 55, maj. diam. 33 mm.

*Hab.* Urup, Kuril Islands.

*Ann. & Mag. N. Hist.* Ser. 8. Vol. xi.

Readily distinguished by its exceedingly strong elevated liræ; compared with *C. porcata* it is much more elongate in form.

*Phos hirasei*, sp. n. (Fig. 2.)

Testa oblongo-fusiformis, albida, pallide stramineo tineta; maculis paucis fuscis irregulariter conspersa; spira acuminata, ad apicem acuta; anfractus 10, convexi, primi 2-3 læves, nigro tincti, sequentes hic illic irregulariter varicosi, spiraliter tenuiter lirati, longitudinaliter tenuissime striati; costis longitudinalibus numerosis rotundatis muniti; sutura impressa; anfractus ultimus spiram vix æquans, convexus, antice constrictus; columella contorta, biplicata; apertura ovata, intus lirata; labrum acutum. Long. 38, maj. diam. 17 mm.

*Hab.* Kii, Japan.

A typical *Phos*, but differing from those hitherto known. Compared with *P. varicosus*, it is larger and its whorls are more roundly convex.

*Conus meleus*, sp. n. (Fig. 3.)

Testa cylindræa, solidiuscula, albida, flammis et balteis luteis ornata; spira breviter conica; anfractus 9, vix concavi, spiraliter lirati; angulum obtusiusculum, leviter undulatum; anfractus ultimus convexiusculus, antice grano-liratus. Long. 29, maj. diam. 15 mm.

*Hab.* Kii, Japan.

At first sight this is just like the West-Indian *C. flavescens*, but it is readily distinguished by the liræ of the spiral whorls, the spiral whorls of the West-Indian species being invariably smooth.

*Conus hedgesi*, sp. n. (Fig. 4.)

Testa elongato-turbinata, solidiuscula, pallide cæruleo-grisea maculis fuscis minutis lineisque diversiformibus in fasciis 3-4, elegantissime ornata, antice regulariter oblique sulcata, aliter lævis; lateribus relictiusculis, vix convexis; angulum leviter rotundatum, haud coronatum; spira mediocriter elata, concava, acutissime conica; anfractus 11, primi 2 læves, subpapillari, sequentes 3-4 gradati, deinde concavi, spiraliter conspicue lirati; apertura recta, intus violacea. Long. 32, maj. diam. 16 mm.

*Hab.* — ?

A pretty, delicately coloured shell, with rather quaintly and diversely formed markings, ranging from fine, hair-like,



zigzag lines to small spots and transverse bands. The interior of the mouth is beautifully coloured.

The type is the largest of the only three specimens I have seen.

*Fusus mollis*, sp. n. (Fig. 5.)

Testa fusiformis, solidiuscula, pallide straminea; spira acute pyramidata; anfractus 8, leviter convexi, spiraliter subobsolete striati, costis latis longitudinalibus circiter 8 instructi; anfractus ultimus spiram superans fere lævis, antice rostratus; rostrum leviter recurvum, mediocriter longum; apertura ovata, intus lirata; columella alba, lævis, arcuata.

Long. 40, maj. diam. 15 mm.

*Hab.* —?

Although this shell is finely spirally striated, especially on the upper whorls, in general aspect it has a peculiarly smooth waxy appearance.

*Pseudomurex crebrilamellosus*, sp. n. (Fig. 6.)

Testa acuminato-ovata, alba umbilicata; spira acute pyramidata; anfractus 10, convexi, obscure biangulati, liris numerosis eximio squamosis spiraliter instructi, longitudinaliter late-costati; anfractus ultimus latus, perconvexus, basin versus concavo constrictus; lira crassa, arcuata, rugose squamosa munitus; apertura subcircularis, antice breviter canaliculata, intus sulcata; columella lævis, leviter arcuata.

Long. 27, maj. diam. 17 mm.

*Hab.* Kii, Japan.

Very closely and beautifully lamellated throughout. The shell has an acutely conical form, and is clearly distinguishable from those hitherto known.

*Chlorestoma collicula*, sp. n. (Fig. 7.)

Testa depresso turbinata, profundo umbilicata, nigrescens, irregulariter rugosa; spira late conica, convexa; anfractus 5, primi complanati, aliter convexi; anfractus ultimus latus, ad peripheriam rotunde angulatus; basis leviter convexus, area centrali alba; umbilicus circularis, profundus, latiusculus; apertura latiuscula, intus margaritacea; peristoma acutum, nigro-fusco marginatum; columella obliqua, binodulosa.

Alt. 17, diam. 25 mm.

*Hab.* Hidako, Yesso, Japan.

This species is nearly allied to *C. umbilicatum*, Lischke, but the surface of the shell is smoother, lacking the oblique rugose ridges characteristic of that species.

*Margarita obliqua*, sp. n. (Fig. 8.)

Testa oblique-ovata, umbilicata, tenuiuscula, fusca; spira depressa, convexa; anfractus 4, rotunde convexi, oblique tenuiter striati; anfractus ultimus latus, dextrorsum expansus; umbilicus medio-criter latus; apertura expansa, intus margaritacea; peristoma tenue, continuum.

Alt. 8, diam, 12 mm.

*Hab.* Urup, Kuril Islands.

Distinguished chiefly by its obliquely inflated form.

## EXPLANATION OF PLATE IX.

*Fig. 1. Cominella fortilirata.*

*Fig. 2. Phos hirasei.*

*Fig. 3. Conus meleus.*

*Fig. 4. — hedgesi.*

*Fig. 5. Fusus mollis.*

*Fig. 6. Pseudomurex crebrilamellosus.*

*Fig. 7. Chlorestoma collicula.*

*Fig. 8. Margarita obliqua.*

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LXVIII.—Notes on the Synonymy contained in Dr. Bequaert's recently published Paper on Tabanidæ collected in Belgian Congo\*. By ERNEST E. AUSTEN.

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THE paper by Dr. Bequaert forming the subject of the present communication contains a number of misapprehensions which it seems desirable to correct without delay. The subjoined notes deal solely with species, and are not concerned with questions relating to genera, otherwise it would not be difficult to show that *Dorcalæmus*, Austen, which is regarded by Bequaert as a subgenus of *Pangonia*, Latr., is really entitled to generic rank.

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*Chrysops fusca*, Ric., is the ♂ of *C. stigmatalis*, Lw., not of *C. distinctipennis*, Austen, as suggested by Bequaert (*t. cit.* pp. 222–223). The ♂ mentioned by Dr. Bequaert

\* "Tabanides recueillis au Congo Belge par la Mission pour L'Étude de la Maladie du Sommeil.—I. Pangoniinæ." Par le Dr. J. Bequaert. ('Revue Zoologique Africaine,' vol. ii, fasc. 2, Février 1913, pp. 218–231.)

(p. 222) under the name *Chrysops fusca* is probably not the true *C. fusca*, Ric. (= *C. stigmaticalis*, Lw.), but belongs to *C. distinctipennis*, Austen.

*Pangonia neavei*, Beq. (nec *Diatomineura neavei*, Austen).—Dr. Bequaert regards *Diatomineura inornata*, Austen, which was described from a single ♀ in the British Museum collection, as conspecific with *Diatomineura neavei*, Austen, ♂ (nec ♀), and he terms this supposed species *Pangonia neavei* (p. 224). A very brief re-examination and comparison of the types of *Diatomineura neavei*, Austen, and *D. inornata*, Austen, is, however, sufficient to confirm previous conclusions, and to show that these types respectively belong to two perfectly distinct species. As stated by the present writer at the end of the original description of *Diatomineura neavei*, Austen (Bull. Ent. Res. i. p. 281, January 1911):—"This fine species . . . is evidently allied to *Diatomineura* (*Corizoneura*) *distincta*, Ricardo . . . to which, in both sexes, it presents a general resemblance in appearance, besides agreeing with it in the character of the sexual colour-dimorphism." *Diatomineura inornata*, Austen, on the other hand, has a very different facies, and, in the female sex at any rate, is distinguished from *D. neavei*, Austen, *inter alia*, by having a pair of small, brown, facial calli, instead of a single, large, black callus, and by the very different colour of the abdomen and legs, and of the costa cells in the wings. *Pangonia neavei*, Beq. (nec *Diatomineura neavei*, Austen), is therefore the designation of a false concept and not of a species, and must accordingly be dropped.

*Pangonia austeni*, Beq. (p. 225).—Dr. Bequaert considers that *Diatomineura neavei*, Austen, ♀, and *Pangonia infusca*, Austen, ♂, belong to the same species, for which he proposes *Pangonia austeni* as a *nomen novum*. In this case again Dr. Bequaert, who states that the only difference between *Diatomineura neavei*, Austen, ♀, and *Pangonia infusca*, Austen, ♂, is to be found in the venation, is evidently under a complete misapprehension. The present writer's belief in the correctness of the concept to which he applied the designation *Diatomineura neavei* has already been reaffirmed. The types of both sexes of *Pangonia infusca*, Austen, as also those of both sexes of *Diatomineura neavei*, Austen, are contained in the British Museum collection; in the former case the sexes are alike as regards the colour and markings of the body, and in respect of markings are very different from the ♀ of

*Diatomineura neavei*, Austen. Other striking differences, to which it is here unnecessary to refer, also exist, and no one who compares the types of these two species can have the slightest doubt that specifically they are absolutely distinct. The designation *Pangonia austeni*, Beq., must therefore be cancelled.

*Silvius schoutedeni*, Beq. (p. 231), nom. nov. for *Silvius fallax*, Austen (Bull. Ent. Res. iii. p. 113, August 1912).—The change in nomenclature here proposed by Dr. Bequaert is due to a suggestion long ago tentatively put forward by Loew ('Dipt.-Fauna Südafrika's,' p. 21, 1860), and recently definitely adopted by Surcouf ('Étude Mon. des Tabanides d'Afrique,' p. 206, 1909), namely that *Tabanus fallax*, Macq. (Dipt. Exot., Suppl. i. p. 32, 1846),—a species the type of which was stated to be from Caffraria—is a *Silvius*. If this were so, the designation *Silvius fallax*, Austen, would of course be a homonym. *Tabanus fallax*, Macq., however, is not a *Silvius*, but belongs to an at present undescribed genus allied to *Hinea*. There is consequently no necessity for a change of name, and *Silvius schoutedeni*, Beq., is a synonym of *Silvius fallax*, Austen.

LXIX.—*Descriptions of new Species of Lepidoptera from Africa and the East.* By G. T. BETHUNE-BAKER, F.L.S., F.Z.S.

#### Hypsidæ.

##### *Digama budonga*, sp. n.

♂. Head, palpi, and thorax neutral grey, spotted with blackish; abdomen yellow, with black dorsal spots; ventral surface pale straw-colour, with a lateral row of black spots. Primaries neutral grey, with blackish markings that largely cover the entire surface; the basal area is almost entirely mottled over with black, leaving but little grey visible; it might be described as having three parallel black stripes confluent with each other; outside these is a black dot in the cell with all the veins black, a postmedian strongly angled stripe, much blotched, especially on the fold, a subterminal deeply angled and serrate black stripe more or less confluent

with its predecessor; termen darkly dotted. Secondaries uniform pale orange-yellow.

Expanse 36 mm.

*Hab.* Budongo Forest (Masindi), E.C. Africa.

Type in my collection.

Nearest to *D. meridionalis*, Swinhoe.

### Noctuidæ.

#### SYNGATHA, gen. nov.

Proboscis small; palpi small, porrect. Eyes large. Primaries with apex slightly produced; termen slightly excised to vein 4, rapidly receding from vein 3. Neuration with vein 2 from near the middle of the cell, 3 from just before the angle, 5 from above the angle, 6 from upper angle, 7 from ariole, 9 from 10 anastomosing with 8 to form the ariole, 11 anastomosing shortly with 10 to form a pseudo-ariole. Secondaries with 3 from immediately before the angle, 5 from about the middle of the cell, 6 and 7 from upper angle.

Type, *Syngatha elegans*, B-B.

#### *Syngatha elegans*, sp. n.

♂. Both wings clear pale straw-yellow, with the basal half of the wings pink. Primaries with the costa reddish brown, expanding outwards along vein 3 and becoming more orange beyond the cell; in the middle of this area is a small triangular spot of the ground-colour; middle of costa narrowly pale straw-colour, subapical area pale straw-colour; a fine, dark, erect, curved line below the end of the cell to the inner margin; lower radial and tornal area pale straw-yellow; termen pointed with red. Secondaries with the basal three-quarters pinkish, in which are the irregular, fine, antemedian and postmedian dark lines; postmedian area pale straw-yellow; termen darkly and very finely pointed.

Expanse 20 mm.

*Hab.* N'Dalla T'ando, Angola, 2700 feet; November (*Ansorge*).

Type in my collection.

### DELTOIDINÆ.

#### *Plecoptera ansorgei*, sp. n.

♂. Head and thorax dull pale chocolate-brown. Primaries pale lilac-brown, with a pale waved antemedian line,

bordering which externally is a dark chocolate costal patch, followed by a large oblique costal patch in the postmedian area, which is straight on its inner edge but dentate externally; a waved and produced and crenulate obscure pale subterminal line; subapical and costal area darkish brown; termen finely darkish brown, edged externally by a fine defined cream-coloured line, which has a sharp serration above the middle and is slightly crenulated near the tornus. Secondaries dirty brown.

Expanse 34 mm.

*Hab.* N'Dalla Tando, Angola, 2700 feet (*Ansorge*).

Type in my collection.

## RHOPALOCERA.

### LIPTEINÆ.

#### TUMEREPEDES, gen. nov.

Palpi shortish, end segment naked and nearly as long as the two first segments together; legs with the femora and tibiæ all swollen, the femora of the mid pair being least swollen. Antennæ shortish, tapering very slowly into a narrow club, with segmental divisions marked and visible under a low-power lens. Wings: primaries with costa very highly arched at the base, then evenly curved to apex; termen produced evenly outwards, inner margin excised from before the middle to near the tornus. Secondaries ample, subovate, long, with termen fairly evenly rounded. Neuration: primaries with cell less than half the length of the wing, veins 2 and 3 from near together from well before the lower angle, 4 from the lower angle, 5 from the upper angle, 6 from the cell, 8 and 9 stalked on a very long stalk from 7, which rises from about a quarter along the cell; 10 and 11 long, the latter rising near the middle of the cell but rather nearer the base than the end of the cell; the lower discocellular markedly stronger than the upper part. Secondaries with veins 3 and 4 stalked on a short stalk from the lower angle of the cell, 5 from above the middle, 6 from the upper angle, 7 from the cell, 8 shortish, highly arched at the base.

Type, *Tumerepedes flava*, B-B.

This genus appears to be nearest to *Nevia*, but though the neuration appears similar in the primaries (it is not so in the secondaries), it is in reality quite different, and the cells in both wings are different in shape.

*Tumerepedes flava*, sp. n.

♀. Head, thorax, abdomen, and both wings ochreous yellow. Primaries with the costa broadly blackish and the termen very broadly blackish, the yellow area being evenly rounded off by these borders on its posterior margin. Secondaries rather duller yellow than the primaries, with a very broad blackish termen, which tapers off evenly and rapidly to the anal angle and to just beyond the apex.

Expanse 41 mm.

*Hab.* Upper Niger.

Type in my collection.

*Mimacrea masinda*, sp. n.

♂. Primaries brown, with a subapical, creamy-yellow, oblique broad band just below the apex and almost touching the costa; inner margin to vein 1*a* and a large patch below the latter half of the cell extending up to and somewhat along vein 4 nearly up to the lower edge of the oblique band orange; the patch tapers down from vein 4 into the tornus. Secondaries brown, with nearly all the cell orange (except at the extreme base and along its upper margin) and the whole of the median area orange also, extending very broadly right across the wing. Underside: primaries as the upperside, with the addition of dagger-shaped radiations as in the secondaries in the terminal area. Secondaries yellowish grey, with four basal spots arranged diagonally, beyond which are four spots in a curve, the lower two being close together, the upper part of the upper discoidal with a black spot on it; the outer area up to the cell with dagger-shaped radiations of dirty ochreous, edged internally with grey and having a central dirty ochreous streak; between the radiations are long, fine, wedge-shaped, grey stripes; termen finely dark, fringes ochreous.

Expanse 58 mm.

*Hab.* Budongo Forest, Masindi, B.E. Africa.

Type in my collection.

## LYCENINÆ.

*Pithecopis urai*, sp. n.

♂. Both wings deep lustrous blue over the cell and for about half of the lower radial area, the rest of the wings black. Underside: both wings pure white, with a bright yellow submarginal line, which in the primaries is complete

but in the secondaries extends from about vein 2 to vein 7; there is a trace of a marginal series of black points in both wings which is definite in the secondaries; a large black subapical spot is present also in the secondaries. The fringes of the primaries are brownish, in the secondaries they are white, with a black dot at the end of each vein.

Expanse 32 mm.

*Hab.* Urai, North Formosa.

Type in my collection.

This species, which was brought home by Mr. Elwes, and of which specimens are now in the National Collection, is very close indeed to *maricæ*, but it has a greater extent of blue above; so close did it appear to be (though there was something that made me think it was distinct) that to be quite sure about it I mounted the male sexual armature of both, from which it became evident that they were distinct species; the clasps and the ædeagus are very different in shape, and the tegumen likewise shows definite distinctions.

*Waigeum mioswara*, sp. n.

Primaries dark brown, with a broad white band running along the lower margin of the cell and halfway along vein 4, the outer border being indefinite; on the cell are a few scattered brilliant metallic-blue scales. Secondaries dark brown, with a broad white band across the base of the wing from the inner margin to near the apex of the costa. Under-side: primaries with the white band more extensive and whiter; an irregular, broadish, brilliant, metallic-blue costal stripe, curved more narrowly round the black cellular and upper radial area, and recurved basewards along vein 4; a subterminal brilliant blue line, interrupted at the veins. Secondaries with a black basal costal patch surrounded with brilliant blue scales; an oblique broad white band right across the wing, edged by a brilliant blue line which borders the deep black area extending up to the termen, and in which is an oblique, broad, brilliant metallic-blue band, extending from the inner margin to vein 6, at which point it is broadest and has an evenly rounded termination; a broadish terminal line of brilliant blue.

Expanse 43 mm.

*Hab.* Isle of Misowar, Geelvink Bay, Dutch New Guinea (*Pratt*).

Type in Coll. Kenrick.

Near *subcæruleum*, G. Sm., also near *Hypochrysops herdonius*, Hew.



*Waigeum utyi*, sp. n.

♂. Primaries blackish, with the cell filled with metallic bright greenish-blue scales, which extend well between veins 3 to 8; a broad white stripe commencing in the middle of the fold, tapering up narrowly to vein 3, veins 2 and 3 interrupting it and giving it the appearance of three diminishing white spots. Secondaries blackish, with a restricted black base, followed by a very broad and definite oblique white band right across the wing and extending to the apex; some metallic bright greenish scales between veins 2 and 5. Under-side: primaries black, with the white area more extensive and curved up to above vein 4, where it is produced somewhat towards the termen; a metallic bronzy-green stripe runs through the lower area of the cell and beyond a short way along vein 4; a broad metallic bronzy-green stripe occupies the subcostal region, bending round before the apex and bordering the white area, along which it runs, almost touching the stripe along vein 4; a similar metallic terminal line is interrupted at the veins. Secondaries with the basal black area restricted but extending finely along two-thirds of the costa, and bordered above with metallic bronzy green; the white oblique band is very broad and definite, and is finely edged on each side with metallic bronzy green; the rest of the area is deep black, and in it in the postmedian area is a defined, broadish, waved, metallic bronzy-green stripe tapering to a point below the apex; the terminal bronzy-green stripe is narrow at the apex and gradually increases in width to the anal angle, up which it curves and almost meets the postmedian stripe.

Expanse 46 mm.

*Hab.* Uty River, Dutch New Guinea (*Pratt*).

Type in Coll. Kenrick.

*Waigeum pratti*, sp. n.

♂. Both wings black, with white transverse bands and bright metallic greenish-blue scales. Primaries with the base, cell, all the upper radial area, a broad stripe down the lower radial area outside the white area, and the whole of the inner margin, brilliant metallic greenish blue; the white area scarcely extends below the cell, but is from vein 1 to nearly vein 4, each of the three internervular patches being smaller than its predecessor, the third being little more than an obscure spot. Secondaries with the very restricted basal area black, almost all covered with metallic greenish blue;

the white oblique band is very broad to about the end of the cell; in the angle of veins 2 to 4 is a small triangular greenish-blue patch and an interneural terminal series of greenish-blue patches from vein 6 to the angle gradually increasing in size. Underside: primaries with the base and costal areas black, including the cell and all above vein 4, the rest of the wing white, with a broad black termen; a subcostal broad curved stripe of brilliant metallic blue extending in an even curve finely down to vein 4; a terminal line of the same colour interrupted at the veins. Secondaries with the basal black area much restricted and not extended along the costa; a short, broadish, basal, metallic-blue curved dash; white band occupying the same position as on the upperside and finely edged with metallic blue, the lower edge being somewhat interrupted; in the postmedian area is a metallic-blue waved stripe, which meets on vein 6 a fine trace of a similarly coloured line, descending and touching it again at the anal angle; this line is edged externally by a whitish stripe; a broadish terminal metallic-blue line.

Expanse 48 mm.

*Hab.* Uty River, Dutch New Guinea (*Pratt*).

Type in Coll. Kenrick.

This is somewhere near *ribbei* (Röber), but the underside of the secondaries is quite different.

*Hypochrysops mioswara*, sp. n.

♂. Both wings sooty brown. Primaries with the basal half of the fold and part of the inner margin filled with brilliant metallic green, ending triangularly about vein 2; above this in the internervular spaces between veins 2 and 4 are obscure indications of whitish patches. Secondaries with the base dark very restrictedly, and covered with metallic-greenish sheen; median and first part of submedian area white, dusky on the costa and abdominal fold; rest of wing sooty brown; fringes blackish, with fine white inter-sections. Underside: primaries with costa chestnut-brown over the cell, becoming red beyond up to apex and down the termen, tapering off finely to about vein 1*a*; costal vein and upper margin of cell lustrous metallic bluish, with a series of three small metallic spots beyond the cell, with three more beyond these and two along the costa about in a line with the costal vein; beyond these spots a small crescentic dash of white; a terminal row of lustrous bluish metallic spots; lower part of cell black; base of fold brown; terminal red area broadly edged with sooty brown from vein 4 to tornus.

Secondaries white, with the basal three-quarters of the wing creamy white; a restricted area above the costal vein at base deep crimson; termen broadly more or less deep crimson, excavated between veins 4 and 6, increasing in width below 4 to the inner margin, with interneural terminal dashes of lustrous metallic bluish which extend a little distance up the inner margin.

Expanse 38 mm.

*Hab.* Isle of Mioswar, New Guinea; October (*Pratt*).

Type in Coll. Kenrick.

*Bindahara arfaki*, sp. n.

♂. Primaries with the base to nearly the end of the cell, the costa nearly to vein 4, and the termen exceedingly broadly black, leaving a large inverted U-shaped patch over the postmedian area to the inner margin white. Secondaries with the base black, very restricted; the median and postmedian area white right across the wing; terminal area very broadly black, increasing in width to the anal angle; lobe-spot black, bordered externally with metallic bluish; a fine bluish metallic terminal line from vein 3 to the tail and a central metallic bluish line all down the centre of the long black tail. Underside: both wings white. Primaries with three transverse broad black bands from the costa across the cell, the two outer ones broadly confluent on the costa; two broad wedge-shaped black bands from the costa to vein 4 beyond the cell; termen broadly blackish for half the radial area, bisected by an obscure whitish line. Secondaries with a blackish wedge-shaped basal patch from the costa to the origin of vein 2; a broad blackish basal stripe extending all along the fold, and touching finely the very broad black terminal area, which is bisected by a more obscure whitish line than in the primaries; the anal angle of this black area is suffused indefinitely with yellowish from the inner margin to vein 5; lobe-spot and tail as in the upper surface, with the addition of a metallic-blue interneural dash below vein 2 and a trace of a second between veins 2 and 3.

Expanse 46 mm.

*Hab.* Warmasin, 6000 feet, Arfak Mountains, Dutch New Guinea; February (*Pratt*).

Type in Coll. Kenrick.

**Geometridæ.**

*Negla nudalla*, sp. n.

♂. Head and thorax whitish grey, the latter spotted with

black; abdomen slightly yellowish, spotted with black dorsally and laterally. Both wings palest straw-colour, almost white, with dark brownish-grey markings. Primaries with various small spots in the basal and antemedian area; a very broad-angled median dark band, followed by a narrow dentate line, which is confluent in the upper radial area with the dark apical area, which is of very large dimensions and is confluent with the broad dark termen; in the lower radial area are a few small dark spots. Secondaries with a broad median band; a strongly curved postmedian dentate line with a few small spots on each side of it; terminal area with large interneural scalloped spots, those between veins 4 and 7 being confluent; the termen itself is very highly scalloped interneurally.

♀. Primaries like the male, except that the subbasal spots develop into an antemedian line, whilst the whole of the dark markings beyond this are confluent, leaving a very small and irregular whitish area in the lower radial region. The same thing applies to the secondaries, most of the markings of the median area up to the termen being confluent, leaving only a little whitish isolated area here and there.

Expanse, ♂ ♀, 50 mm.

*Hab.* N'Dalla Tando, Angola; November to January.

Type in my collection.

*Prasinocyma tandi*, sp. n.

♂. Head and thorax pale green; abdomen yellowish. Both wings pale emerald-green of mottled appearance, somewhat hyaline, with minute white vertical dashes scattered over the wing and forming obscure antemedian and postmedian lines, the latter being oblique, the lines being more discernible in the primaries than in the secondaries.

Expanse 28 mm.

*Hab.* N'Dalla Tando; November (*Ansorge*).

Type in my collection.

Next *unipuncta*, Warren.

*Prasinocyma ænospila*, sp. n.

♂. Head, thorax, and abdomen pale green. Both wings pale grass-green. Primaries with three or four dark points across the median area and a postmedian slightly oblique row of dark points; a small dark terminal patch between veins 1 *a* and 2; termen finely dark. Secondaries with an irregular postmedian series of dark points and a dark spot

on the inner margin a quarter from the base; termen finely dark.

Expanse 32 mm.

*Hab.* N'Dalla Tando; October and November (*Ansorge*).

Type in my collection.

*Heterorachis prouti*, sp. n.

♂. Head, thorax, and abdomen creamy grey. Both wings palest emerald-green, very thinly scaled. Primaries with a trace of an erect, ochreous, dotted median line; an oblique white postmedian line, edged with ochreous internally. Secondaries with an oblique white postmedian line, edged internally with ochreous.

Expanse 32 mm.

*Hab.* N'Dalla Tando; November (*Ansorge*).

Type in my collection.

*Heterorachis bidentata*, sp. n.

♂. Face pink, head white, thorax and abdomen greenish. Both wings grass-green, with brownish markings. Primaries with the costa mottled with brownish grey; a spot closing the cell finely edged with darker brown; termen greyish brown, rather narrow, but with two indentations, one between veins 4 and 6 and the other just above the tornus. There is also a trace of a very irregular postmedian series of dots. Secondaries with the central spot and the very obscure postmedian series of spots as in the primaries; termen with the brownish border decidedly broader than in the primaries.

Expanse 26 mm.

*Hab.* Lokoja (100 miles to the north) (*Cator*).

Type in my collection.

*Omphacodes bellista*, sp. n.

♂. Head and thorax palest green, abdomen greenish, antennæ whitish. Both wings very pale green of a very delicate tone, quite devoid of any yellow. Primaries with an oblique, straight, whitish postmedian line, edged internally with a line of darker ground-colour. Secondaries with the postmedian line as in the primaries, but curved, the basal area somewhat paler.

Expanse 26 mm.

*Hab.* N'Dalla Tando; November (*Ansorge*).

Type in my collection.

*Mixocera obliqua*, sp. n.

♂. Head ochreous, thorax pale sage-green, abdomen cream-colour. Both wings pale sage-green, with the costa cream-coloured rather narrowly, and an oblique well-defined postmedian line, narrow at the costa, but gradually increasing slightly to the inner margin. Secondaries with the postmedian line as in the primaries.

Expanse 20 mm.

*Hab.* N'Dalla Tando; November (*Ansorge*).

Type in my collection.

*Chloroclystis insignifica*, sp. n.

Head, thorax, and abdomen dull brown. Both wings brownish grey, with brown markings. Primaries with a fine irregular basal line; an oblique deeply dentate antemedian line; a trace of a very fine irregular median line; postmedian line more prominent, irregular, wavy, and dentate; a submarginal darker scalloped shading, bordered palely by the ground-colour; termen darker. Secondaries with the basal and antemedian lines obscure; postmedian line fairly distinct, very irregular; the submarginal darker shading somewhat obscure; termen dark.

Expanse 15 mm.

*Hab.* N'Dalla Tando, Angola; November (*Ansorge*).

Type in my collection.

*Eucymatoge ansorgei*, sp. n.

Head, thorax, and abdomen bronzy brown. Primaries greenish, with a subbasal broad dark stripe; median area very broadly brown, edged by a paler greenish-brown broad stripe, which is margined finely on each side with dark brown; terminal area with patches of brown scales, the most prominent being in the subapical area. Secondaries uniformly brownish.

Expanse 21 mm.

*Hab.* N'Dalla Tando, Angola; November (*Ansorge*).

Type in my collection.

*Macaria angolæ*, sp. n.

♂. Head, thorax, abdomen, and both wings dull slate-grey, slightly mottled with ochreous. Primaries with a dark median band, followed by a line of scattered whitish scales; postmedian line obscure, irregular, very dark rusty brown,

with an edging of ochreous scales in its costal area, followed by three dark sepia-brown patches below each other, one on the costa being more rusty than the others, one about veins 3 and 4, and one just above the tornus; between the costal and the second is a patch of ochreous. Secondaries with an irregular dark median stripe, a fine postmedian dentate line, and a wider subterminal stripe with a large dark spot in it about veins 3 and 4.

Expanse 28 mm.

*Hab.* N'Dalla Tando, Angola; December (*Ansorge*).

Type in my collection.

*Zamarada excavata*, sp. n.

♂. Head, thorax, and abdomen pale pinkish brown; collar pale green; abdomen with pale greenish dorsal tufts. Both wings hyaline, pale apple-green, with a reddish-brown small spot at the end of the cell. Primaries with a few scattered fine pale pinkish-brown scales; costa narrowly pale buff-colour; termen very broadly pale cinnamon-brown, excavated almost up to the termen between veins 2 and 4. Secondaries with the markings exactly like the primaries both as to colour and position.

Expanse 28 mm.

*Hab.* N'Dalla Tando, Angola; November (*Ansorge*).

Type in my collection.

Next to *flavicosta*, Warren.

*Zamarada ordinaria*, sp. n.

♂. Head, thorax, antennæ, and abdomen cinnamon-brown. Both wings hyaline greenish, with a fine sparse irroration of pale cinnamon-colour and a small brown spot at the end of the cell. Primaries with the costa finely dusted with pale cinnamon; termen very broadly pale greyish brown, with the inner edge scalloped between the veins, the part between veins 2 and 4 being rather more deeply scalloped than elsewhere. Secondaries with the brown termen just as in the primaries.

Expanse 24 mm.

*Hab.* N'Dalla Tando, Angola; November (*Ansorge*).

Type in my collection.

Near *chrysothyria*, Hmps. n.

*Zamarada catoris*, sp. n.

♂. Thorax and abdomen brownish. Both wings dull  
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hyaline greenish, with brown markings and very faint brownish irrorations. Primaries with costa darkish mottled brown; a largish spot closing the cell and a very broad brown terminal area, which terminates in an acute excavation at the apex and is irregularly excised between veins 2 and 4; in this area is a dark dentate stripe, indefinite as to its inner edge and palely bordered. Secondaries with the terminal area as in the primaries, but without the apical angle, owing to the costa not being brown; the spot closing the cell is reduced to a point.

Expanse 28 mm.

*Hab.* Northern Nigeria (*D. Cator*).

Type in my collection.

*Miantochora casualalla*, sp. n.

♂. Head and thorax dove-grey, abdomen rather darker. Both wings pale silvery grey. Primaries with an antemedian, broadish, irregular, dentate, subochreous band, with a similarly coloured very obscure trace of a median band; postmedian line waved, dirty ochreous, and darkly dotted on each vein on its internal edge; a dark rusty subapical patch. Secondaries paler than the primaries, sparingly and finely irrorated with darker grey, with an oblique, straight, chocolate-brown postmedian line, obtusely angled on vein 7 to the costa; this line has a second finer dotted one close to its inner margin.

Expanse 46 mm.

*Hab.* Casualalla, N. Angola; November (*Ansorge*).

Type in my collection.

Var. *ochraria*, var. nov.

Primaries with the whole of the median and much of the postmedian area palish ochreous, very finely irrorated in parts with pale cinnamon-colour; a fair-sized dusky spot is in the grey terminal area between veins 5 and 6; the dark rusty subapical patch of the type is reduced to a smaller fawn-coloured patch. Secondaries pale ochreous up to the grey terminal area, sparingly and finely irrorated with grey.

The pattern of the type is carried out in a subdued manner.

*Hab.* Casualalla; November.

Type in my collection.

*Psilocerea transversa*, sp. n.

♀. Head, thorax, and abdomen dirty ochreous. Both



wings palish straw-colour. Primaries with a chestnut-brown fine antemedian line, acutely angled on the lower margin of the cell; postmedian line chestnut-brown, oblique, and edged externally finely with deep cream-colour; a dark band of grey irrorations rises from the tornus to above vein 3; a dark grey small spot is at the end of the cell. Secondaries with a median dark chestnut oblique stripe.

Expanse 46 mm.

*Hab.* N'Dalla Tando; November (*Ansorge*).

Type in my collection.

This species is very near *pulverosa*, Warren, but is no doubt distinct.

*Haggardia angolaria*, sp. n.

♂. Head, thorax, and abdomen dirty brownish grey. Both wings brownish grey, very finely irrorated with darker brown. Primaries with a dark excurved antemedian line; a slightly waved, dark, oblique postmedian line; a dark spot closing the cell; terminal area more densely irrorated with brown. Secondaries with a dark spot at the end of the cell, followed by an oblique dark brown postmedian line, from which up to the termen the ground is more closely irrorated with brown than on the basal and median areas.

Expanse 40 mm.

*Hab.* N'Dalla Tando; October (*Ansorge*).

Type in my collection.

The species is near *interpellans*, but appears to differ in some particulars.

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LXX.—A new Genus of Tipulidæ from Turkestan, with  
Notes on other Forms. By E. BERGROTH, C.M.Z.S.

PTILOSTENA, gen. nov.

Antennæ 16-articulatæ. Thorax longitudinaliter modice convexus.

Alæ angustæ, basi longe petiolatæ, angulo axillari late rotundato, vena Sc basin sectoris radii nonnihil superante, Sc<sub>2</sub> paullo ante basin sectoris sita, Rs pone medium alæ incipiente, vena transversa radiales nulla, vena R<sub>2</sub> et dimidio apicali venæ R<sub>3</sub> maxime reflexis, parallelis vel paullulum convergentibus, vena media biramosa, parte basali venæ M<sub>2</sub> deficiente, parte ascendente venæ Cu<sub>1</sub> sat longe ante basin cellulæ discoidalis apertæ cum cellulâ M<sub>3</sub> confluentis sita. Pedes perlongi, tibiis calcaribus destitutis.

Head rounded; rostrum as long as the rest of the head; antennæ 16-jointed, joints with verticillate hairs. Thorax longitudinally moderately convex; pronotum rather long, but a little shorter than broad at the base. Wings very narrow, pedunculate; axillar angle broadly rounded, Sc somewhat passing base of Rs, Sc<sub>2</sub> placed a little before the base of the moderately curved sector, which originates behind the middle of the wing; no radial cross-vein; R<sub>2</sub> and the apical half of R<sub>3</sub> strongly upturned, parallel or slightly convergent, R<sub>2</sub> joining margin of wing a little in front of or at apex of R<sub>1</sub>, cell R<sub>3</sub> about four times longer than cell R<sub>2</sub>, M two-branched, M<sub>1</sub> and M<sub>2</sub> fused; median cross-vein present, roundedly confluent with M<sub>3</sub>, but in some specimens angularly joined to it and in this case emitting a short stump of a vein from the angle backwards, basal part of M<sub>3</sub> entirely lacking and discal cell consequently confluent with cell M<sub>3</sub>, ascending portion of Cu<sub>1</sub> joining M at a good distance before the base of the discal cell. Propygium elongated, median style very long and slender; lateral lobes without apical apophyses, but each with two interior hooked appendages. Legs very long; tibiæ without spurs.

This genus should be placed near *Gonomyia*, from which it differs by the narrow petiolate wings, the position of Sc<sub>2</sub> which is more removed from the tip of Sc<sub>1</sub>, and the shape of cell R<sub>2</sub> which is very short and subrectangular owing to the strongly upturned apical half of R<sub>3</sub>—a course of this vein not known in any previously described Tipulid genus. The propygium is also somewhat differently constructed than in *Gonomyia*. The disappearance of the basal part of M<sub>3</sub> and the shifting of this vein upon the median cross-vein is a rather uncommon character, but occurs also in some other Eriopterina, in *Ellipoptera*, Schin. (this is the correct spelling of the name), and *Thaumastoptera*, Mik., and in some species of *Dicranomyia*.

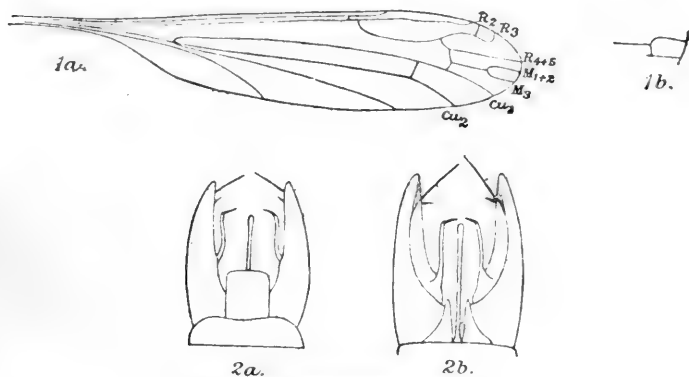
*Ptilostena recurvinervis*, sp. n.

Gracilis, opaca, subglabra, abdomine parce pilosulo, propygio densius piloso, capite et dorso thoracis cinereis, mesonoto fusco-bivittato, pleuris albidis, dorso abdominis fusco-testaceo, ventre sulphureo-ochraceo, propygio flavido, antennis et pedibus flavo-testaceis, palpis, apice fibiarum atque articulis quattuor ultimis tarsorum fuscis, alis subhyalinis, ad venas plerasque transversaliter currentes fusco-notulatis, stigmatibus plus minusve infuscato, halteribus albidis, clava fusca.

Long., ♂ corp. et alæ, 5·5–7 mm.

Turkestan (Verni and Kendyk-tau, *J. Sahlberg*).

Head grey, sparingly pilose; palpi fuscous; antennæ yellowish testaceous, in the male scarcely passing base of wings, joints oval, except the shortly cylindrical basal joint, those of the apical half of the flagellum much narrower. Dorsum of thorax glabrous, pale ash-grey; pronotum more or less infuscated in the middle, its narrowly laminate lateral margins whitish; mesonotum with two approximated, rather narrow, sometimes anteriorly confluent, fuscous vittæ; pleuræ whitish. Wings as long as the body and five times longer than broad, subhyaline; stigma more or less infuscated, filling the apical part of cell  $R_1$  from vein  $R_2$  to the middle of the petiole of cell  $R_2$ , its basal half usually darker; base of  $R_s$ , vein  $R_2$ , the recurved part of  $R_3$ , the petiole of cell  $R_{4+5}$ , the median cross-vein (apparent base of  $M_3$ ), and the



*Ptilostena recurvinervis*, Bergr. ♂.

Fig. 1 a. Wing.

1 b. Cell  $M_{1+2}$  in other specimens.

Fig. 2 a. Propygium from above.

2 b. Propygium from below.

ascending portion of  $Cu_1$  bordered with fuscous;  $R_s$  as long as  $R_{4+5}$ , cell  $M_{1+2}$  a little shorter than its petiole, which is subequal in length to the distance between apex of  $Cu_{1a}$  and base of discal cell; apex of  $An$  opposite the middle of  $R_s$ ; distances between tips of  $Ax$  and  $An$  and between tips of  $An$  and  $M_3$  subequal in length. Halteres long, whitish, the knob fuscous. Abdomen sparingly pilose, above brownish testaceous, beneath sulphur-yellow; propygium scarcely darker than the venter, pilose, elongated, but not incrassated; basal part of the median style, seen from above, hidden under

the narrow subrectangular last abdominal segment (9th tergite), but seen from below the style is visible throughout its length; the underside shows two acuminate subtriangular basal pieces, and on each side an elongate lobe which bears no apical apophyses, but the inner part of which is grooved, the hollow being filled with two basally confluent appendages, the first (subbasal) of which is very slender, reaching the apex of the median style and armed with a black tooth at the apex; the second appendage much longer and broader, but not reaching the apex of the lobe, running out into a very long and slender black tooth, emitting a much shorter black tooth from its inner base; seen from above only a part of these teeth protrudes from under the interior margin of the lobe, but almost the whole subbasal appendage is visible also from above. Legs very slender, pale yellowish testaceous, apex of tibiæ and last four tarsal joints fuscous.

As the details of the propygium are tolerably well visible also in dry specimens, I have given an outline of it with the lateral lobes a little more outspread than they are in the dry state and omitting the hairs. The female is unknown.

#### *Systematic and Synonymical Notes.*

1. In Ent. Tidskr. 1888, p. 170, I said that *Holorusia*, Loew, though forming a distinct group, cannot be separated generically from *Tipula*. As, however, the peculiarities of the venation and the structure of the propygium (except details) are common to all *Holorusiæ*, and as the antennæ are not verticillate, I now think that it must be regarded as a good genus. All exotic species of *Tipula* without verticillate antennæ must be removed from this genus. For *H. rubiginosa*, Loew, I proposed the new name *grandis*, believing that *H. rubiginosa*, Big., was of prior date; but they were described the same year, and it is impossible to know which of them has priority. As *rubiginosa*, Big., is a synonym of *H. albobittata*, Macq. (incorrectly placed in *Tipula* by Kertész), there is no reason to reject the name *rubiginosa*, Loew, and the name *grandis* is quite unnecessary.

2. In his excellent 'Fauna of British India: Diptera Nematocera' (one of the best works ever published on any group of exotic Diptera), Brunetti has redescribed the genus *Ctenacroscelis*, End., alleging that Enderlein "has mistaken the tip of the 1st longitudinal vein for a continuation of the small cross-vein connecting that vein with the costa." This remark shows that Brunetti has paid very little attention to Comstock's and Needham's studies on the homologies of the

wing-veins in Diptera. Enderlein's description is quite correct. It is true that Osten-Sacken set forth as one of the principal differences between the Tipulinæ and the Limnobiinæ that in the Tipulinæ the first longitudinal vein is incurved towards the second and ending in it, and that an oblique cross-vein connects the first vein, a little back of the tip, with the costa; whereas in the Limnobiinæ the first longitudinal vein ends in the costa, united with the second vein by a cross-vein (often wanting). This difference is, however, entirely imaginary. What Osten-Sacken regarded as an oblique cross-vein connecting the radial vein with the costa (Brunetti's "costal cross-vein") is simply the end of the radial vein, and what Osten-Sacken called the end of that vein is the radial cross-vein, which in the Tipulinæ usually takes a more longitudinal position owing to the short strongly reflected  $R_2$ . Why should these veins be quite differently named in the Tipulinæ than in the Limnobiinæ, as they occupy the same mutual position and as the wrongly so-called "costal cross-vein" often is a straight continuation of  $R_1$ ? That Osten-Sacken ever could advance his idea about "the cells round the stigma" will always remain a curious fact, but not even Loew accepted his theory and it is now only of historical interest.

3. In his diagnosis of the genus *Macromastix*, O.-S., Enderlein (Zool. Jahrb. 1912, p. 13) says that the antennæ are "stark verlängert" in the males. There are, however, many species of this genus having very short antennæ in both sexes.

4. In the description of the genus *Pehlkea*, Enderlein (l. c. p. 15) says that it belongs to the Tipulinæ, although Sc ends in the costa. I think it doubtless belongs there, and, judging from the figure, the venation is quite normal. Sc does not end in the costa, but in  $R_1$  at the very point from where  $R_1$  turns upward to the costa; the radial cross-vein is also at its usual place. What Enderlein designated as  $R_1$  is  $R_2$ , and his  $R_{2+3}$  is  $R_3$ .

5. It is impossible to understand why Enderlein (l. c. p. 30) has placed his new genus *Tipulodina* in the Pediciina of the Limnobiinæ. It belongs to the Tipulinæ, and is very closely allied to *Pachyrhina*. The venation is quite normal. Sc ends in  $R_1$  and emits a short adventitious cross-vein to the costa a little before its tip, quite as in many individuals of the genus *Pachyrhina*. The radial sector is not longer than the stigma—one of the best characters of *Pachyrhina*. The antennal joints are shaped as in *Pachyrhina*. Too much weight must not be attached to the shortness of the last joint

of the palpi in *Tipulodina*, for exceptions from the rule occur. In *Pedicia*, for instance, the last palpal joint is quite as long as in the Tipulidæ longipalpi. Enderlein has taken the adventitious cross-vein for the end of Sc and the real end of Sc for a cross-vein (= Sc<sub>2</sub> in Needham's nomenclature); but even if this interpretation were correct (which it certainly is not) this "cross-vein" is in *Tipulodina* situated behind the base of Rs, whereas in the *Pediciina* it is placed much before the sector.

6. Edwards (Trans. Linn. Soc., Zool. xv. p. 197) says that *Dicranomyia confinis*, Bergr., 1889 (*consimilis*, m., 1888), is probably not distinct from *D. tipulipes*, Karsch, as the chief distinguishing character given by me (viz., the length of the small cross-vein) is variable. This character is indeed of little importance, but the main distinguishing character given by me was the position of Sc<sub>2</sub> (the "subcostal cross-vein"), which in *confinis* is placed close to the tip of Sc<sub>1</sub>, not considerably removed from it as in *tipulipes*. As far as I can find, this character is not subject to variations in the species of *Dicranomyia*, but quite constant.

7. *Libnotes thwaitesiana*, Westw., the type of the genus, described from Ceylon, is omitted in Brunetti's 'Fauna.'

8. In describing his *Geranomyia synaporosa*, Speiser (Deutsche ent. Z. 1913, p. 135) says that the radial cross-vein in this species is very weak and tends to disappear, and that it is therefore impossible to sharply separate *Geranomyia* and *Aporosa*. The real difference between these two genera is, however, the position of the palpi, which, as correctly pointed out by Enderlein, are placed at the apex of the rostrum in *Aporosa*, far from the apex in *Geranomyia*. The mouth-parts are also differently constructed in these two genera. *Elephantomyia*, O.-S., is extremely closely allied to *Aporosa*, Macq., though possibly distinct from it, but I perfectly agree with Scudder's demonstration in his paper on "Tertiary Tipulidæ" that *Elephantomyia* is the same as *Toxorhina* of Loew. This genus was described, though imperfectly, by Loew in 1850, and founded solely on three fossil species of the genus, later called *Elephantomyia* by Osten-Sacken. The fact that Loew, in 1851, wrongly placed a living species in the same genus does not invalidate the name *Toxorhina* as originally understood. The genus *Toxorhina*, O.-S., nec Loew, would then be without a name; but I can see no inconvenience in using the name *Limnobia-rhynchus*, Westw., for this genus, although it is only partly a synonym of it.

9. The Indian *Gonomyia incompleta*, Brun., and *flavo-marginata*, Brun., and the African *Atarba lamellaris*, Speis., belong to the genus *Liponeura*, Skuse, which is distinct from *Atarba*, O.-S. Of the five American species placed by Alexander (Ent. News, 1912, p. 418) in *Liponeura*, which he considers a subgenus of *Gonomyia*, four doubtless belong there; but, although I have not seen the "more extensive discussion of the genus published elsewhere," of which Alexander speaks, I venture to express some doubt whether *Gonomyia manca*, O.-S., really is congeneric with the others. Osten-Sacken says in his description: "the venation is precisely like that of *G. sulphurella*, except that the posterior branch of the second longitudinal vein is obliterated; thus the second longitudinal vein, shortly before its tip, takes a sudden turn towards the anterior margin, in consequence of which the submarginal cell is trumpet-shaped." This description is evidently correct, although Osten-Sacken later (Berl. ent. Z. 1887, p. 165 and 202), by some mistake, stated that the anterior branch of the second vein is obliterated in *G. manca*—a statement in which he was followed by Brunetti. It was clearly owing to this sudden turn of the second vein that Osten-Sacken could recognize a *Gonomyia* in his insect, and any *Gonomyia* with  $R_2$  (the posterior branch of the "second" vein) obliterated could be recognized by the fact that  $R_2$  has retained its original shape and position with the apex suddenly upturned, forming an angle with the basal part of  $R_2$  and ending a little in front of the apex of  $R_1$ . In *Liponeura* the vein  $R_{2+3}$  is almost perfectly straight or gently and slightly curved, and the apical part does not form an angle with the basal part, and ends somewhat farther from the tip of  $R_1$ , thus occupying a position intermediate between  $R_2$  and  $R_3$  in the typical *Gonomyiæ*. The difference may seem to be of little importance; but it indicates that the disappearance of the first submarginal cell of the old nomenclature in *Gonomyia manca* is due to a simple obliteration of  $R_3$ , whereas in *Liponeura* it is due to an actual fusion of  $R_2$  and  $R_3$ , of the same kind that has taken place in all *Limnobiina* and *Rhamphidiina*. I therefore think that *Gonomyia manca* is a true *Gonomyia*, for which not even a subgenus is necessary; whereas *Liponeura* should hold the position assigned to it by Skuse as a distinct genus of the *Rhamphidiina* near *Atarba*, O.-S., the latter genus now being restricted to its type, *A. picticornis*, O.-S., and the Indian *A. flava*, Brun., which is clearly congeneric. This opinion is strengthened by the different structure of the male pro-

pygium. Osten-Sacken says that he described the forceps of *G. manca* from a living specimen, and stated that it shows the same type of structure as in the other species of *Gonomyia*, although it is more simple. Had the stout inferior median piece (Alexander's "ventral gonapophysis"), so characteristic of *Liponeura*, been present, Osten-Sacken would certainly have mentioned it. Alexander says that the forceps of *L. pleuralis*, Will., and *L. amazona*, Al., are "fundamentally" different; but his figures show that they are built on the same plan, though the details are different. From the figures of the forceps of *L. incompleta*, Brun., and *lamellaris*, Speis., it is also evident that their structure is very similar, with the same strongly developed ventral gonapophysis.

As *Gonomyia antica*, Brun., has a radial cross-vein and a discal cell "coalescent with the second posterior cell," it seems to be an *Empeda*; but, if Sc is as short as in *Gonomyia*, the species is a distinct connecting-link between these two genera.

10. Enderlein, in the above-quoted paper (pp. 60-62), has evidently misunderstood the venation in the genera *Mongoma* and *Trentepohlia*. The vein called by him  $R_{2+3}$  is  $R_2$ , his  $R_{4+5}$  is  $R_3$ , his  $M_1$  in *Mongoma* and  $M_{1+2}$  in *Trentepohlia* are  $R_{4+5}$ , his  $M_2$  in *Mongoma* is  $M_{1+2}$ , and his  $M_3$  in *Trentepohlia* is  $M^{1+2+3}$ . The radio-median cross-vein is lacking in these genera.

11. Needham (N.Y. State Mus. Bull. 124, p. 227) says  $R_2$  is atrophied in *Lipsothrix*, Loew, and figures it so. He has been misled by a very faulty figure in Wahlgren's paper (corrected in the separate copies).  $R_2$  in this genus runs through to the wing-margin, the part of it wanting in the figures being parallel to  $R_3$ .

12. In 1911, Alexander described a North-American species of *Adelphomyia*, Bergr., under the name *A. minuta*. The wings of this species are glabrous; but he seems to have placed it in this genus chiefly on account of the venation, which is said to be quite similar to that of *A. senilis*, Hal. Although I, in my generic diagnosis, incidentally mentioned the presence of five posterior cells, this character is of no importance; and, although I included *senilis* in the genus, the type is *A. helvetica*, Bergr., which differs somewhat in venation from *senilis*. The genus was solely founded on the hairiness of the wings: "characteres *Limnophila* generis, sed superficie alarum dense distinctius puberula et præterea apicem versus setis validiusculus obsita, his setis basi papillato-incrassatis." I think *A. minuta* must be referred to *Limno-*



*phila*, and there are other species of *Limnophila* similar to *minuta* in variation and, at least among the European species, almost quite as small. Later, Alexander has not laid much stress on the venation, including in *Adelphomyia* two new species with quite different venation, but with a distinct pilosity in the apical part of the wing; these species can, I think, be left in *Adelphomyia*. If this genus is made to comprehend both species with hairy and with glabrous wings and with quite different venation, I fail to see by what characters it could be separated from *Limnophila*.

13. In his monograph of the Tipulidæ found in Baltic amber, Meunier has described a *Limnophila robusta*. As this name was given one year before by Wahlgren to a species from Sweden, I propose for Meunier's species the name *L. palæa*.

14. Of *Diazosma hirtipenne*, Siebke, one of the rarest of the European Tipulidæ, the late G. Czwalina sent me a specimen from near Danzig, East Prussia. It was originally described as a *Trichocera*, but belongs to a distinct genus called *Diazoma* by Wallengren. As this name is preoccupied (Lamarck, Mollusca, 1816), I propose to replace it by *Diazosma*, which has the same signification. (The name *Trichoptera*, used by Strobl for this genus, is also preoccupied.) The North-American *Trichocera trichoptera*, O.-S., is likely to prove a *Diazosma*.

15. In his 'Fauna' (p. 515) Brunetti says: "a correspondence carried on between Osten-Sacken and Bergroth as to the question of priority and suitability between *Amalopsis*, Hal., and *Tricyphona*, Zett., resulted in the former name being permanently retained." Far from being permanently retained, the name *Amalopsis* has been rejected by Coquillett, Strobl, Wahlgren, Lundström, and other dipterists who have written more or less extensively on Tipulidæ, and the claim of *Tricyphona* to priority is self-evident. Even if Zetterstedt's first description (1838) is insufficient, we must remember that his *second* description, published five years before that of Haliday, is quite correct and very detailed, filling one page; he consequently also mentions the open discal cell, but lays no particular stress on this character, which was also mentioned by Haliday. The other reason why Osten-Sacken rejected *Tricyphona*—that its definition is applicable to one species only—is still more untenable, for we cannot proceed to rename every genus founded on a single species as soon as more species of it are found; the characters must in such cases be modified, but the name retained. Osten-Sacken united *Orimargula*, Mik., with *Antocha*, O.-S.

I agree with Mik that they are generically distinct, but if their synonymy is admitted as correct, and the nomenclatorial principles vindicated by Osten-Sacken, Aldrich, and Brunetti are upheld, we must reject the name *Antocha*, for this genus was founded on a single species and was principally based on the presence of a discal cell, the indistinct  $Sc_1$ , and the square anal angle of the wing—three characters not present in the other species, *A. (O.) alpigena*, Mik. In the same manner as with *Tricyphona*, Brunetti deals with the genus *Crapitula*, Gimm. Although this genus was well described and figured by Gimmerthal, and although Brunetti admits that its type and only species is identical with the type and only species of *Plectromyia*, Brun., he rejects the name *Crapitula* and puts his own name *Plectromyia* instead of it. This procedure is not rendered more just by citing, as Brunetti does, *Crapitula* as a synonym of *Plectia*, where it, of course, does not belong. I am unable to find in Brunetti's book other reasons for such deviations from generally accepted rules than the words he quotes from Osten-Sacken: "the almost absolute rules of priority recognized for specific names are not equally applicable to the generic ones." Osten-Sacken's well-known arbitrariness in nomenclatorial matters is not, however, consistent with the principles of nomenclature adopted by the zoological congresses of late years. On the other hand, it must be noticed with satisfaction that Brunetti has rejected the names in Meigen's pamphlet of 1800. Meigen did not state in his paper that he accepted the binominal nomenclature, and there is nothing in the paper indicating that he did so. Admittedly generic names in works of this class cannot be taken into consideration.

16. In the only specimen on which the genus *Amalopina*, Brun., was founded there is a supernumerary cross-vein in the cell  $R_3$ ; but this character is apparently accidental or at most specific. Yet *Amalopina* may be a good genus, as it does not show the most striking peculiarity of *Tricyphona*, viz., the unusual position of the radio-median cross-vein before the base of cell  $R_3$ . To *Amalopina* also appertain the North-American *Tricyphona exoloma*, Doane, and *T. diaphana*, Doane. The undetermined species of "*Amalopis*" figured by Needham in his above-quoted work (pl. 25, fig. 3) may possibly also belong here, but, as the radial sector is very short and strongly divergent from  $R_1$ , it is more probable that it is a *Plectromyia* or a *Rhaphidolabis*.

LXXI.—On certain of the smaller S.-American Cervidæ.  
By OLDFIELD THOMAS.

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A. BROCKETS. (Genus *Mazama*.)

OWING to their remarkable variability both in cranial and external characters the Brockets of the genus *Mazama* are exceedingly difficult to work out systematically with any exactness. Thus, while in most cases the widely spread species *Mazama americana* (*M. rufa* auctorum)\*, ranging from Guiana to Paraguay and Rio Grande do Sul, has the hairs of its nape reversed up the centre, two specimens in the Museum have no trace of this arrangement, the hairs being directed backwards as usual; and one of these specimens was obtained at the same time and place as examples of the normal reversed type. And, again, of two specimens of *M. tema* from Guatemala, one has the nape-hairs reversed and the other not. *M. simplicicornis*, the common small species, with buffy underside, whose range is coextensive with that of *M. americana*, seems never to have any hairs reversed on the nape.

In the skull the obvious character as to the extension upwards of the premaxillæ towards or to the nasals proves also to be rather variable, examples from the same locality having sometimes considerable differences in this respect. Still at the same time there are certain average differences

\* When resuscitating the name *americana* from Erxleben's *Moschus americanus* (Field Museum Nat. Hist. Publ. no. 155, vol. x. p. 43, 1912), it is a pity that Mr. Osgood did not investigate for himself the question as to which species it should be applied to, instead of accepting the synonymies of people who believed it to be a preoccupied name, and one therefore requiring little attention. Instead of its applying to "*M. nemorivagus*" (*M. simplicicornis*), the smaller Brocket of Guiana, it clearly belongs to the larger one, commonly known as *M. rufa*, and must, I am afraid, be used for it.

On the other hand, while differing from Mr. Osgood as to the application of this *americanus*, I cordially agree with him as to the want of nomenclatural status in the case of the other *americanus* on p. 312 of Erxleben's work. There *americanus* was simply a word, not a name, as is shown, among other things, by its being italicized. In Erxleben none of the technical names are italicized, while ordinary words on which he wished to lay emphasis were (cf. "Magnitudo cervi damæ," p. 313, "*altera* . . . *altera*," p. 370). As a consequence, the name of the common North-American deer should be *Odocoileus virginianus*, Bodd., not *americanus*, Erxl.

between the species, *M. americana*, for example, having generally a naso-premaxillary articulation, while the species now described as *M. zetta* has not. The preorbital pits are fairly deep in *M. rufina* and *bricenii*, shallow in all the other species. I may note that a fine male specimen of *M. bricenii*, recently received, is considerably larger than the typical female, its skull having a condylo-basal length of 168 mm.

The following forms appear to need description :—

*Mazama zetta*, sp. n.

A brown species related to *M. americana*.

Size about as in *M. americana*, but form rather stouter. General colour rufous brown, browner and less rufous than in *americana*. Head distinctly brown, with indistinct rufous markings above and below eyes and on sides of muzzle. Ears brown, their bases below whitish. Chin and interramia dull whitish. Neck brown, the hairs along the whole centre of its upper side reversed (in all three specimens available). Body dark rufous brown above, becoming more rufous posteriorly. Chest and belly rufous brown, the extent to which the brown is tinged with rufous varying considerably. Limbs dark brown, paler rufous on their internal aspect proximally, darker rufous terminally. Tail dark rufous brown above, white below.

Skull shorter and more stoutly built than that of *M. americana*. Premaxillæ shorter than in that species, often falling far short of the nasals, and only rarely just reaching them.

Upper tooth-row of the type, a small subadult female, 60 mm.

Dimensions of fully adult male and female skulls (85. 4. 22. 6 and 8) :—

Condylo-basal length 187, 190 mm.; zygomatic breadth 96, 95; length of nasals 60, 62; interorbital breadth 42, 46; gnathion to front of anterior premolar 63, 63; palatal length 124, 121; breadth between outer sides of  $m^2$  65, 66; upper tooth-row 60, 61.

*Hab.* Medellin, Antioquia, Colombia.

*Type.* Young adult female. B.M. no. 78. 8. 31. 3. Collected by Mr. J. K. Salmon. A stuffed specimen, two skins, and seven skulls examined.

This beautiful little Deer was determined by Sir Victor Brooke as *M. rufina*, Pucheran, but there is no doubt that that is a mountain form allied to *M. bricenii*. *M. zetta*, on the other hand, is a representative of *M. americana*, from which it differs by its stouter form, browner colour, shorter

skull, and the lesser extension of the premaxillæ towards the nasals.

*Mazama sheila*, sp. n.

A small pale rufous ally of *M. americana*.

Size conspicuously smaller than in *M. zetta*. Form about as in that species. Fur close and short. Nape-hairs not reversed (in the single specimen). General colour bright rufous (between orange-rufous and tawny of Ridgway). Muzzle, centre of crown, and neck brown, supraorbital lines rufous, not sharply defined. Ears pale brown, with distinct patches of white at the base of their inner edges. Chin and interramia, a patch on chest, and anal region whitish; rest of under surface rufous, like back. Fore limbs rufous throughout. Hind limbs rufous, but the metatarsals brown, darker posteriorly. Tail rufous above, white below.

Skull of the same somewhat broad squat shape as in *M. zetta*, but far smaller. Premaxillæ not quite reaching to the nasals.

Dimensions of the typical skull (adult, but not old):—

Condyllo-basal length 177 mm.; zygomatic breadth 85; length of nasals 48; interorbital breadth 39; gnathion to front of anterior premolar 58; palatal length 111; breadth between outer sides of  $m^2$  63; upper tooth-row 55.

*Hab.* Lowlands near Merida, Venezuela. Type from the Montaña de Limones. Alt. 50 m.

*Type.* Adult male. B.M. no. 13.4.24.4. Collected 17th October, 1910, by S. Briceño and Sons.

This Brocket is readily distinguishable by its bright rufous colour, unreversed nape-hairs, and small size, as compared with its only near allies, *M. americana* and *zetta*.

Coming from somewhere near the same region, Osgood's *M. americana citus*\* has nothing to do with this animal, but is a member of the *M. simplicicornis* group.

*Mazama americana jucunda*, subsp. n.

Similar in general characters to the ordinary *M. americana* of eastern South America (*M. rufa* auctorum), but the skull conspicuously shorter. Fur of medium length; nape-hairs reversed (one skin only). Colour above of head and neck brown, of body bright rufous fawn, not very unlike that of *M. zetta*. Under surface, as usual in this group, whitish on chin and throat, rufous, like back, on belly. Limbs brown

\* Cf. footnote above.

proximally, rufous on the digits. Tail dark rufous above, white below.

Skull, as compared with that of ordinary *M. americana*, very much shorter, but of about the same breadth. Pre-maxillæ just touching the nasals in the two skulls available. Nasals of adult male remarkably broad and short.

Skull-dimensions of an adult male and an immature female (the latter the type) :—

Condyllo-basal length 178, 175; zygomatic breadth 88, 80; length of nasals 45, 57; interorbital breadth 46, 38; gnathion to front of anterior premolar 55, 57; palatal length 109, 109; breadth between outer sides of  $m^2$  65, 57; upper tooth-row 61, 58.

*Hab.* Serra do Mar, Parana, S. Brazil. Type from Roça Nova; alt. 1000 m.

*Type.* Immature female (milk-teeth still in place, but basilar suture closed); skin and skull. B.M. no. 3. 7. 1. 103. Original number 836. Collected 9th September, 1901, by Alphonse Robert. An adult male skull also examined.

This may be the small rufous Deer which German writers have assigned to *M. rufina*, but it has certainly nothing to do with that species, being related to *M. americana*, of which it forms a small short-headed race.

Adult skulls of *M. americana* are about 205–210 mm. in condyllo-basal length, and a female specimen, younger than the type of *jucunda*, has this dimension 202 mm.

## B. THE ECUADOREAN PUDU. (*Pudua mephistophiles*, de Wint.)

The highland Pudu of Ecuador, discovered by Consul Söderström and described by Mr. de Winton as *Pudua mephistophiles*\*, differs so markedly from the Chilean species, *Pudu pudu*, that I consider that it ought to be separated generically from the latter, and would propose for the new genus the name of *Pudella*.

The most noticeable difference is the entire absence of the preorbital glands in *Pudella*, there being no external orifice in the skin, and the lacrymal bone being only faintly concave † in the usual position of the lacrymal pit. In the true Pudu, on the other hand, the glands are unusually well developed, with an obvious opening externally, their pit in the skull being very deep, with sharply defined edges.

\* P. Z. S. 1896, p. 508.

† As I have previously pointed out, the skull figured and described by de Winton is that of a *Mazama* (probably *M. rufina*).

In *Pudu* the premaxillæ do not reach the nasals, in *Pudella* they do.

In *Pudu* the hoofs, both large and small, are of the normal shape; in *Pudella* they are unusually narrow and pointed.

In *Pudu* the middle lower incisors are not disproportionately larger than the others, being barely twice the breadth of the second pair; in *Pudella* their blade is three or four times the size of that of  $i_2$ , which in turn is little larger than  $i_3$  and the canine.

In *Pudu* the naked rhinarium is but small, in *Pudella* unusually large, projecting backwards in the middle line.

No doubt the two genera are closely allied, but, in the absence of any connecting links, I think a special name for the Andean form is advisable.

## PROCEEDINGS OF LEARNED SOCIETIES.

### GEOLOGICAL SOCIETY.

November 6th, 1912.—Dr. Aubrey Strahan, F.R.S., President,  
in the Chair.

The following communications were read:—

1. 'A Contribution to our Knowledge of Wealden Floras, with Special Reference to a Collection of Plants from Sussex.' By Albert Charles Seward, M.A., F.R.S., F.L.S., F.G.S., Professor of Botany in Cambridge University.

In this paper an account is given of specimens of Wealden plants from the Sussex coast, for the most part from the neighbourhood of Fairlight, acquired by the British Museum since 1895, the date of publication of the second part of the Wealden Flora (British Museum Catalogue). The majority of the fossils have been presented to the National Collection by Father Félix Pelletier and Father Teilhard de Chardin, by whom they were collected, and who worked in association with Mr. Charles Dawson, F.S.A., F.G.S.; the remainder form part of the Rufford Collection. Fresh information is given in regard to several previously recorded species, and the following new types are described:—A new species of *Lycopodites* (a lycopodiaceous plant with the habit of a *Selaginella*); a new species

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of *Selaginellites*, which affords evidence of heterospory; a new species of *Hausmannia*, founded on several well-preserved fronds; a new genus and species represented by incomplete fertile pinnæ with well-preserved spores very similar to those of recent Schizæaceæ; a new genus and species of fern founded on fertile pinnæ; *Aphlebia* sp.; a new species of *Dichopteris*; *Ctenis* sp.; a new species of *Conites*; *Pinites* sp. cf. *P. dunkeri* Carr. Additional information is given in regard to the following species:—*Sagenopteris mantelli* (Dunk.), *Matonidium gœpperti* (Ett.), *Ruffordia gœpperti* (Dunk.), *Cladophlebis browniana* (Dunk.), *Williamsonia carruthersi* Sew. (?), *Otozamites klipsteini* (Dunk.), *Eurycyadolepis* sp., *Araucarites pippingfordensis* Ung., *Pinites solmsi* Sew., and *Sphenolepidium kurrianum* (Dunk.).

The concluding section deals with Wealden floras generally, and some account is given of the geographical distribution of the better-known types. It is pointed out that, while there is a very close similarity between the Wealden flora of England and the corresponding floras in Eastern and Western North America, the number of cosmopolitan types is less than in the case of the Middle Jurassic floras.

2. 'Notes on the Discovery of Fossiliferous Old Red Sandstone in a Boring at Southall, near Ealing.' By Ernest Proctor, A.R.C.S. With a Note on the Fish-Remains, by Dr. A. Smith Woodward, LL.D., F.R.S., Sec.G.S.

The boring described in this paper is situated at Southall, and was made for the purpose of obtaining water from the Lower Greensand. For this purpose, however, the boring was a complete failure, as it passed directly from the Gault into Palæozoic rocks. The older rocks were met with at a depth of 1130 feet, and continued with slight variation to a depth of 1261 feet, the lower limit of the borehole. For the most part, they were red and green mottled clays and sandstones, with occasional bands of fine conglomerate.

The fossils were yielded by definite bands, which varied from 1 inch to an eighth of an inch in thickness; they consisted mainly of scales and teeth of *Holoptychius* and plates of *Bothriolepis*, both characteristic genera of the Old Red Sandstone.

The paper concludes with a brief description of the fish-remains, which, although fragmentary, are sufficient to indicate the Upper Devonian or Upper Old Red Sandstone age of the rocks in which they were discovered.



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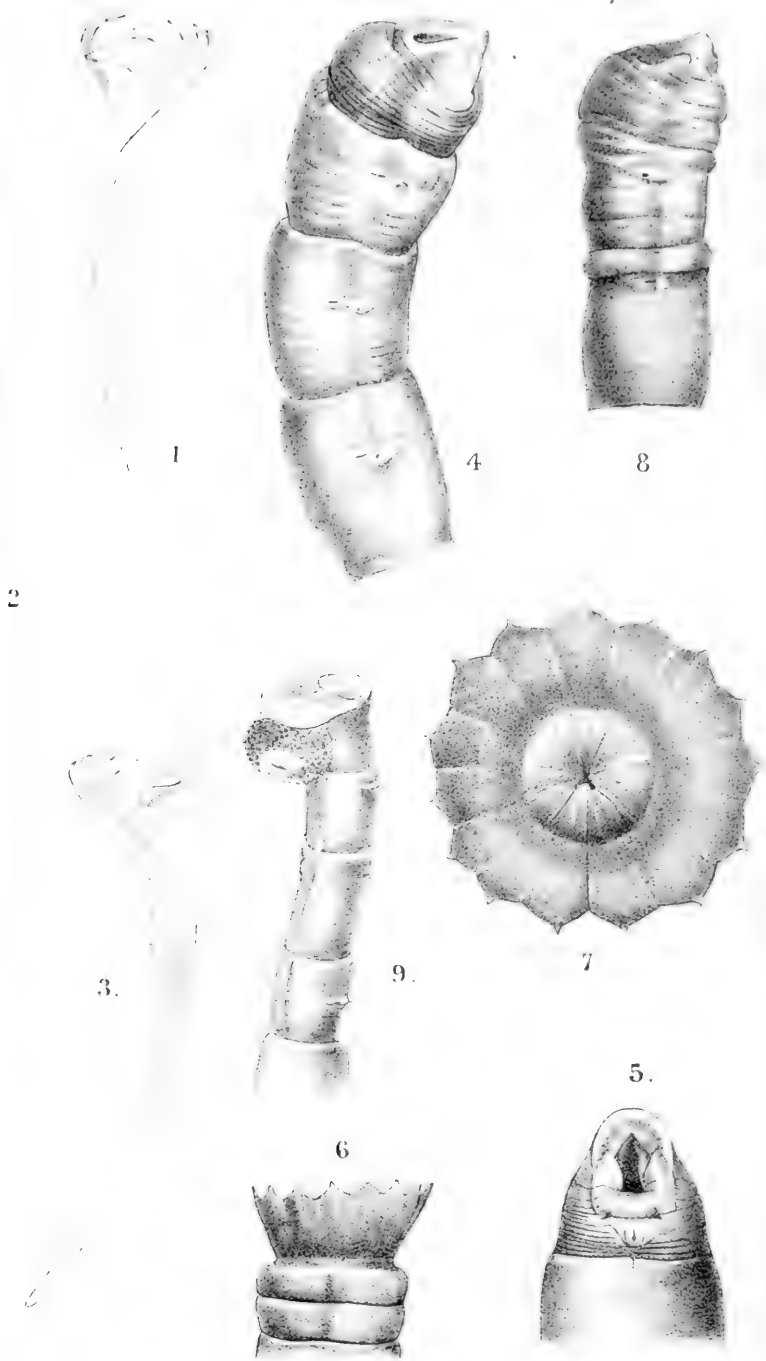
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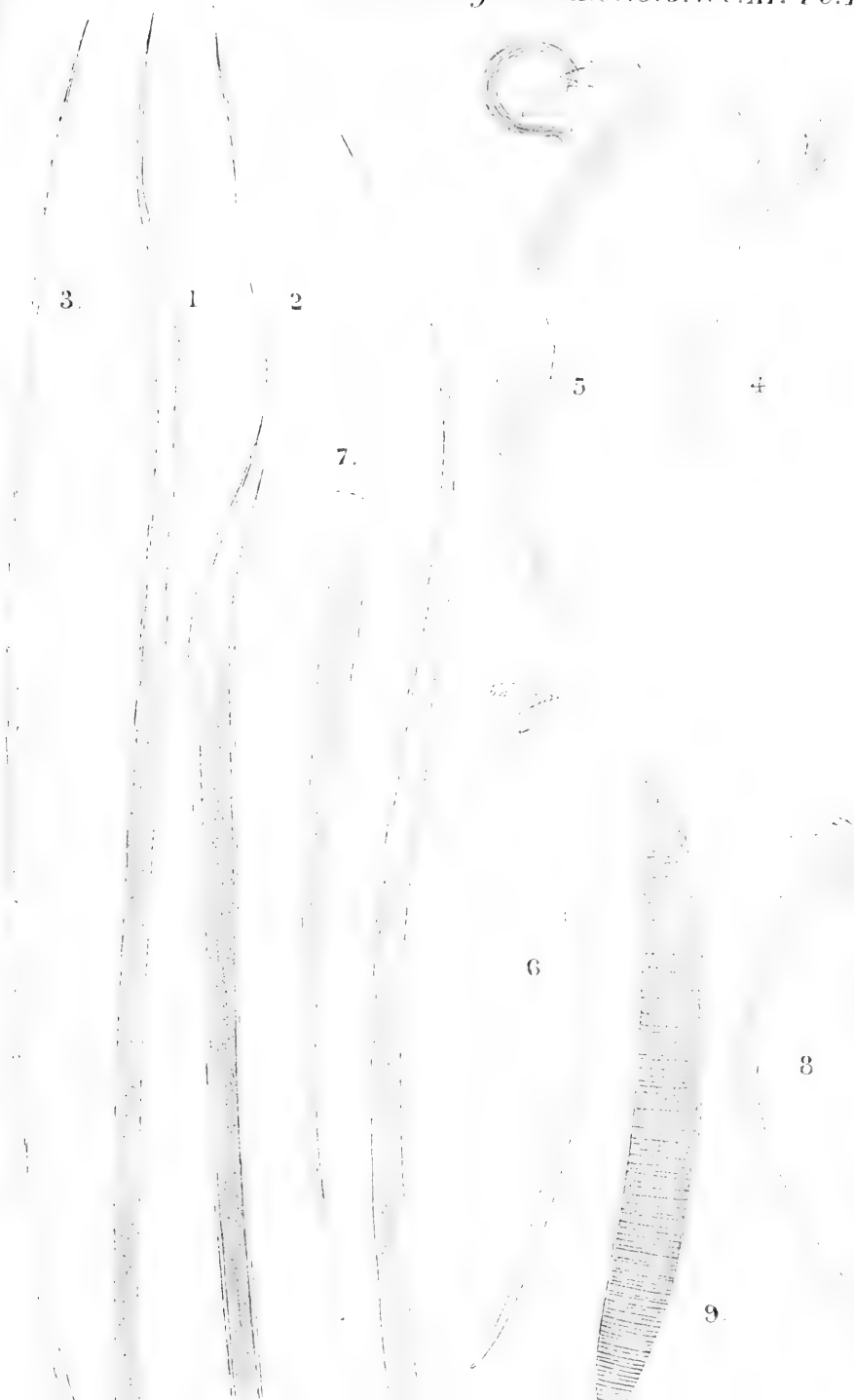
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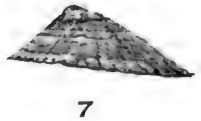
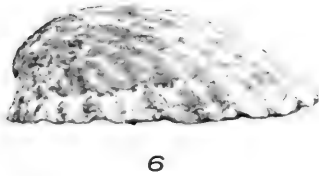
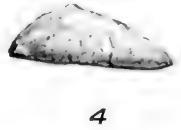
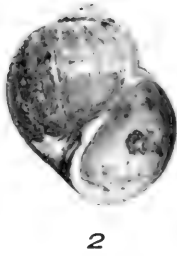
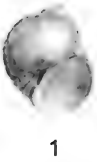
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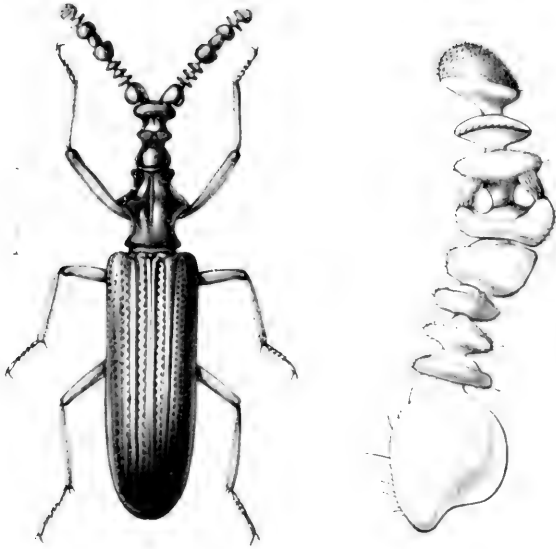




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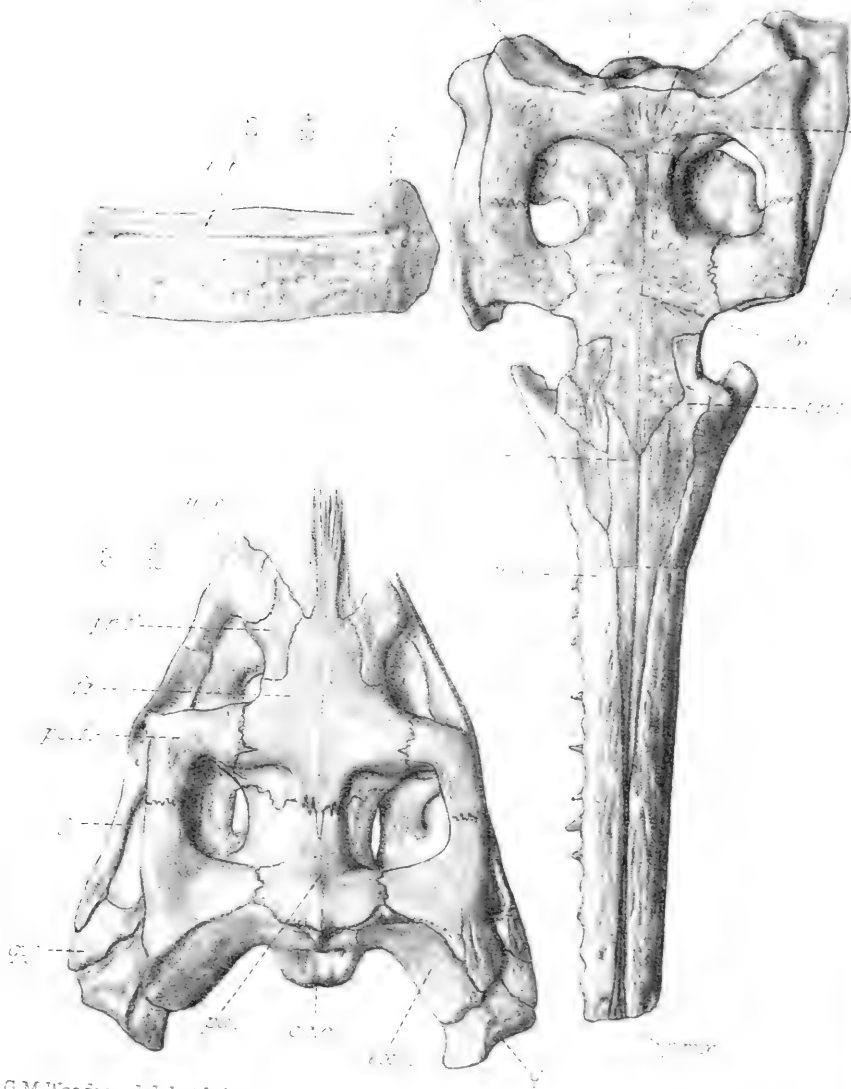






RHYSODINA MARSHALLI.



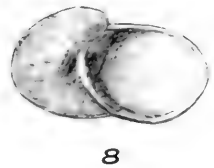
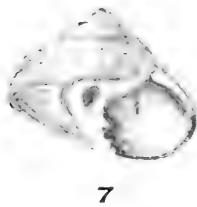


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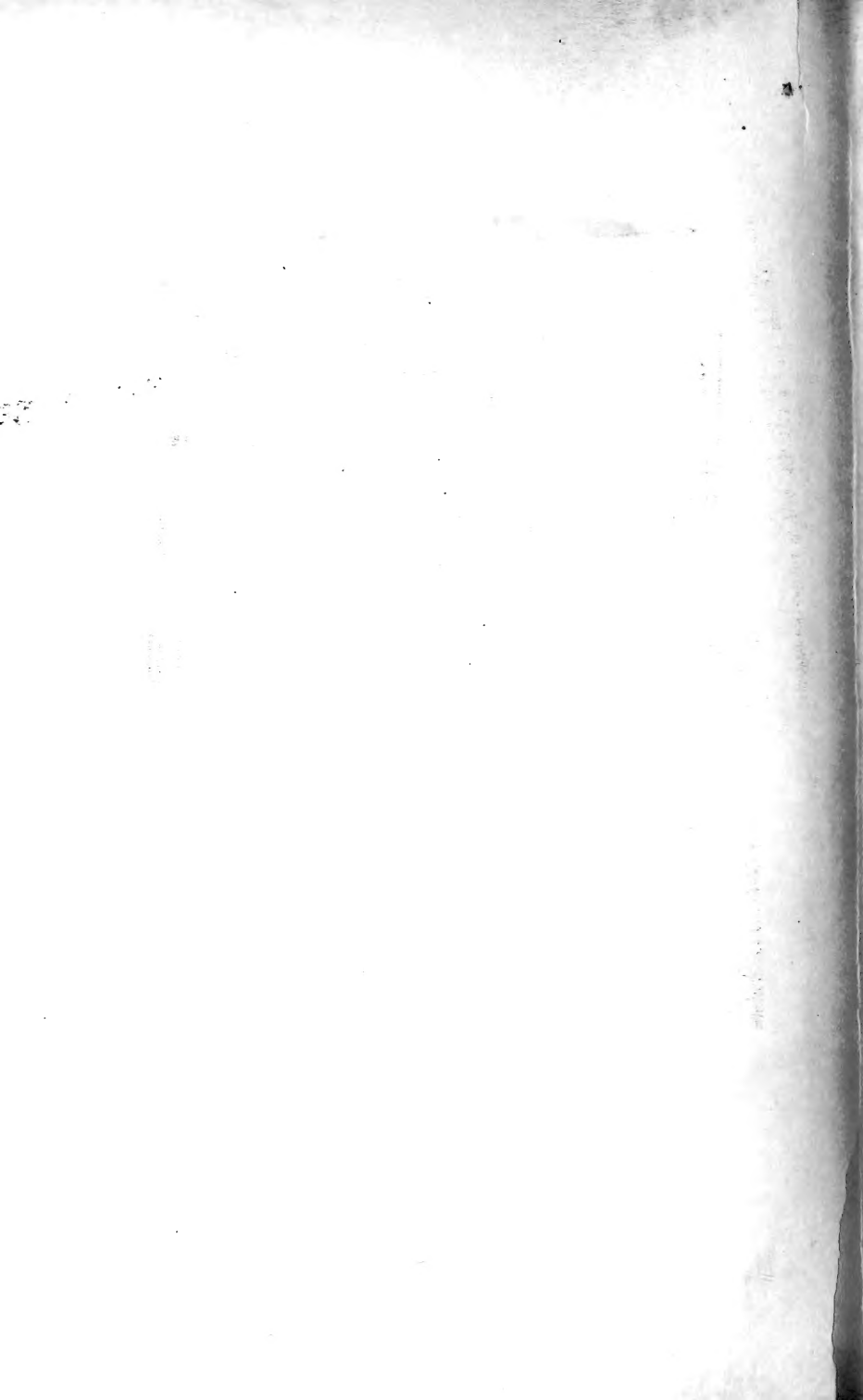
Figs. 1-2. *Pholidosaurus decipiens* Watson.  
" 3 " *laevis*, sp. n.













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